



October 27, 2021

MR. JEFFREY DANKO  
JOHNSON CONTROLS, INC  
5757 N. GREEN BAY AVENUE  
MILWAUKEE, WI 53209

MR. SCOTT WAHL  
TYCO FIRE PRODUCTS LP  
1 STANTON STREET  
MARINETTE, WI 54143

*Via Email Only to [jeffrey.howard.danko@jci.com](mailto:jeffrey.howard.danko@jci.com) and [scott.wahl@jci.com](mailto:scott.wahl@jci.com)*

SUBJECT: **Site Investigation – Additional Actions Required**  
(1) Review of Isoconcentration Maps and Cross-Section Figures  
(2) Potable Well Sampling Results from the Expanded Site Investigation Area  
JCI/Tyco FTC PFAS, 2700 Industrial Parkway South, Marinette, WI  
BRRTS #02-38-580694

Dear Mr. Danko and Mr. Wahl:

The Wisconsin Department of Natural Resources (DNR) provides this letter to Johnson Controls, Inc. and Tyco Fire Products, LP (JCI/Tyco) to communicate that the above-referenced site (the “Site”) remains uncharacterized or insufficiently characterized in many areas. To date, JCI/Tyco has relied primarily on screening-level data and has drawn conclusions for some areas without testing. Data gaps and deficiencies in the site investigation (SI) remain unresolved and additional actions are required to define the degree and extent of contamination under Wisconsin Administrative Code (Wis. Adm. Code) § NR 716.11(3)(a).

Included in this letter are the DNR’s review and response to JCI/Tyco’s isoconcentration maps and cross-sections received on June 23, 2021, a summary of the potable well sampling results from the expanded site investigation area (“ESIA”) and directions on next steps. JCI/Tyco must review the data gaps identified in prior DNR correspondence and those highlighted again in this letter and submit a site investigation work plan to address the remaining deficiencies. An appropriately scoped field investigation with supporting documentation are required to define the degree and extent of contamination (Wis. Adm. Code § NR 716.11). As the responsible party for per- and polyfluoroalkyl substances (PFAS) contamination at the Site, JCI/Tyco must take the necessary response actions, including the sampling and provision of alternative water for potable wells impacted by PFAS in the ESIA (Wis. Adm. Code §§ NR 708.05(4)(f) and NR 716.13(16)). The DNR offers to meet with JCI/Tyco to discuss the technical contents of this letter.

### Background

JCI/Tyco are investigating and responding to the discharge of PFAS to the environment at the JCI/Tyco Fire Technology Center (FTC), located at 2700 Industrial Parkway South in Marinette, Wisconsin. The discharge occurred as the result of fire suppressant training, testing, research and development of PFAS-containing aqueous film forming foams (AFFF) at the Site starting in the early 1960s.

Data collected to date by JCI/Tyco indicates PFAS contaminants have migrated from the FTC property and impacted potable wells, groundwater, surface water and other media in the area. JCI/Tyco has defined a boundary

to its “testing area”; however, JCI/Tyco cannot limit its field investigation and response actions to the confines of this boundary without further data to support its conclusions. JCI/Tyco must define the degree and extent of the PFAS contamination as required under Wis. Adm. Code § NR 716.11(3)(a) based on a field investigation designed to evaluate all potential pathways for migration of the contamination under Wis. Adm. Code § NR 716.11(5)(a) and that complies with the sampling and analysis requirements under Wis. Adm. Code § NR 716.13. The DNR has reviewed JCI/Tyco’s prior submittals and identified data gaps and deficiencies that JCI/Tyco must address to make progress toward completing the SI. These prior DNR letters outlining deficiencies are summarized in **Attachment A**; many of the deficiencies remain unaddressed or are in initial phases of work. Categorical deficiencies that remain unresolved include:

- Lack of NR 141 Monitoring Well Network to Define Degree and Extent of Groundwater Contamination
- Incomplete Isoconcentration Maps and Cross-Sections
- Little to No Evaluation of PFAS Migration in Surface Water, Stormwater Run Off and Wetlands
- Incomplete Evaluation of Airborne Migration (and Deposition) of PFAS from the FTC<sup>1</sup>
- Refusal to Evaluate Actual and Potential PFAS Contamination in Potable Wells in the ESIA

Further discussion on several of these items is provided in this letter.

### **Isoconcentration Maps and Cross-sections**

As part of the site investigation reporting, JCI/Tyco must submit groundwater isoconcentration maps and cross-sections per Wis. Adm. Code § NR 716.15(4). Several of the letters in **Attachment A** directed JCI/Tyco to submit these visual aids. The most recent directions were provided in the DNR’s April 9, 2021 letter. On June 23, 2021, Arcadis U.S., Inc. (Arcadis) on behalf of JCI/Tyco submitted isoconcentration maps and cross-sections, which were accompanied by the fee required under Wis. Adm. Code § NR 749.04(1) for DNR review and response. The DNR used its review of the isoconcentration maps and cross-sections to illustrate areas of the Site where additional field investigation is needed to define the degree and extent of contamination, including potential migration pathways to the ESIA. These illustrations are included in this letter.

### ***Isoconcentration Maps and Cross-sections Summary***

JCI/Tyco prepared five cross-sections through the FTC that depict depth to bedrock and groundwater isoconcentrations for perfluorooctanoic acid (PFOA) + perfluorooctanesulfonic acid (PFOS) to the top of the bedrock surface. JCI/Tyco also prepared groundwater isoconcentration maps for eight depth intervals starting at land surface (~590 to 610 feet mean sea level [ft msl]) down to an elevation of 505 ft msl. JCI/Tyco’s depiction of the groundwater contamination on the drawings is based on PFOA + PFOS concentrations. JCI/Tyco also mapped the extent of contamination for individual PFAS compounds detected at the Site for the eight depth intervals. The extent of each individual PFAS compound is depicted as a single black line within the extent of the colored PFOA + PFOS contaminant plume.

The PFOA + PFOS isoconcentration contours and extent of individual PFAS compounds were interpreted from various data types: permanent NR 141 monitoring wells, private potable wells, temporary wells and vertical aquifer profiling points. The data were collected at different times over the span of several years. The sample point locations and concentrations used to interpret the isoconcentration contours are displayed on the figures. JCI/Tyco also included surface water data on the isoconcentration maps for the shallowest depth interval. The methods used to develop the isoconcentration contours was not included in the narrative that accompanied the drawings.

---

<sup>1</sup> On April 23, 2021, JCI/Tyco submitted an Air Pathway Site Investigation Workplan. The DNR responded with approval and additional actions required in letter dated September 14, 2021.

### ***DNR Review of Isoconcentration Maps and Cross-sections***

The DNR's comments on the drawings are included in **Attachment B**. The comments include specific questions and highlight areas where data is needed to define the degree and extent of contamination. This is not an exhaustive list of all the data gaps remaining in the SI, but the comments illustrate some of the areas requiring additional investigation that were identified in prior DNR letters (**Attachment A**).

The DNR considers the current isoconcentration maps and cross-sections to be provisional drawings that will be revised as JCI/Tyco collects additional SI data. These visual aids are important to refer to and update throughout the investigation process, and thus JCI/Tyco must make the revisions outlined below for future submittals of isoconcentration maps and cross-sections for the Site (Wis. Adm. Code § NR 716.17). These revisions are needed to share the current understanding of the contamination with stakeholders, identify areas where there are data gaps or uncertainty and to develop scopes of work to complete the SI.

- **Include a narrative discussion on methods used to develop the maps and indicate on the drawings where the isoconcentration lines are inferred.** Many portions of the groundwater contaminant plume were interpreted with no PFAS data or from screening-level data (i.e., samples collected from points that do not comply with NR 141 standards for permanent monitoring wells). Several areas lacking data are identified in **Attachment B**; this is not an exhaustive list. The narrative should discuss any geostatistical analyses used to support the interpretation and discuss how data obtained from NR 141-compliant monitoring wells outweighs the screening-level data collected at the Site (see next bullet).
- **Present sample points and data in such a way that conveys data from temporary points and vertical aquifer profiles are not equivalent to data collected from permanent NR 141 monitoring wells.** A site investigation cannot be complete without a proper field investigation (Wis. Adm. Code § NR 716.11) that includes sampling and analysis of groundwater from a network of NR 141-compliant monitoring wells (Wis. Adm. Code § NR 716.13(10)). JCI/Tyco broadly comments on the thousands of groundwater samples collected from the Site covering over 10 square miles; however, JCI/Tyco has only sampled 29 permanent NR 141 monitoring wells for PFAS, with half of the wells being located on the eastern portion of the FTC property. (A summary of the NR 141 monitoring wells sampled for PFAS is included in **Attachment C**.) There are currently no NR 141 monitoring wells tested for PFAS that show the horizontal or vertical extent of contamination at the Site. The areas lacking data from NR 141 monitoring wells must be clearly identified to show where data gaps remain and for JCI/ Tyco to effectively scope future site investigation activities to define the degree and extent of contamination.
- **Show all NR 141 monitoring wells/piezometers on figures.** Approximately 33 NR 141 monitoring wells were installed since 2017 for the purposes of this investigation but have not been tested for PFAS. A summary of the NR 141 monitoring wells associated with the FTC, that have not been sampled for PFAS is included in **Attachment C**. Knowing the locations of these wells relative the current interpretation of the groundwater contaminant plume is needed to scope future site investigation activities to define the degree and extent of contamination. Show locations of all wells *outside the FTC and Stanton property boundaries* on the map corresponding to the screened interval for each well. Because there is a high density of wells on the Stanton and FTC properties, showing all these wells is not recommended at the scale of the current drawings because it will clutter the figures. However, JCI/Tyco should show locations of on-site wells to be tested for PFAS in future site investigation activities when a well is anticipated or proposed for sampling.
- **Remove potable wells from the isoconcentration maps.** The DNR accepts JCI/Tyco's approach to displaying the potable well locations and PFAS sampling results on the cross-sections. However, because potable wells are not NR 141 compliant monitoring wells, and depths of most potable wells are unknown, uncertain or span multiple depth intervals, JCI/Tyco must remove all potable well sample points from the isoconcentration maps. The development of the isoconcentrations in areas with potable wells can be

interpreted using professional judgement (e.g., review of the cross-sections), and refined following collection of groundwater samples from NR 141 wells installed in these areas.

- **Remove the surface water data from the groundwater isoconcentration maps.** The surface water data is displayed in orange on the maps, but this data was not used to develop the groundwater isoconcentration contours. JCI/Tyco must only include the groundwater data that it used to develop a particular groundwater isoconcentration map. If JCI/Tyco wants to overlay the surface water data on the interpreted extent of the shallow groundwater plume to illustrate groundwater-surface water interactions, or other technical evaluation, this overlay must be done on a separate figure developed for that purpose.
- **Revise the color scale on the isoconcentration maps.** The contour intervals and color scale align on the cross-sections, but not on the isoconcentration maps. Update the color scale on the maps to be the same as the logarithmic color scale used on the cross-sections. During this update, apply a stronger distinction in the colors for the 20 and 100 ppt intervals than the shades of green used on the current cross-sections.

### **Potable Well Results from the Expanded Site Investigation Area**

As part of the field investigation, JCI/Tyco is required to sample known and potentially impacted water supply wells per Wis. Adm. Code § NR 716.13(16). Several of the letters in **Attachment A** directed JCI/Tyco to sample potable wells beyond JCI/Tyco's current testing area; the area beyond JCI/Tyco's current testing area is referred to as the expanded site investigation area or ESIA. JCI/Tyco has contended that the ESIA is not impacted by PFAS from the FTC and that it is outside its testing area; however, until the degree and extent of contamination are defined, conclusions on the boundaries of a "testing area" cannot be made.

On May 27, 2020, the DNR sent a notice of noncompliance to JCI/Tyco outlining actions requiring immediate attention by JCI/Tyco including testing potable wells within the ESIA in accordance with Wis. Adm. Code § NR 716.13(16). JCI/Tyco refused to complete the potable well sampling in the ESIA. Thus, to evaluate impacts to potential drinking water receptors in a timely manner, the DNR planned to conduct the sampling of potable wells within the ESIA under the statutory authority provided by Wis. Stat. § 292.11(7)(a). On July 7, 2020, the DNR set a notice of intent to JCI/Tyco stating that DNR would complete PFAS testing of potable wells in the ESIA and seek cost recovery because JCI/Tyco refused to perform the work. Documentation and results for the DNR-led sampling and the next steps JCI/Tyco is required to take within the ESIA are summarized below.

To perform the work, the DNR's contractor, Wood Environment & Infrastructure Solutions, Inc. (Wood), sent 578 mailers to properties within the ESIA offering PFAS testing for potable wells. Affirmative responses were received from 415 properties, 20 opted out of testing and 143 did not respond. Between October 23, 2020 and June 22, 2021, Wood sampled the 415 wells in the ESIA in which an affirmative response for testing was received. The samples were submitted to Eurofins Test America and analyzed for 36 PFAS compounds, and the results are summarized in Wood's report dated July 18, 2021. The DNR provided JCI/Tyco an electronic data file with the testing results, as requested.

The testing results were compared to the Department of Health Services' (DHS) Cycle 11 recommended groundwater standards ("Cycle 11) and hazard index (HI) of less than 1.0. PFAS were not detected in 85 of the tested wells, and PFAS < Cycle 11 and HI < 1.0 were detected in 298 wells. PFAS ≥ Cycle 11 and/or HI ≥ 1.0 was detected in 32 wells; alternative bottled water was offered to users of wells in this category.

### ***Evaluation: Depth and Location***

The locations of wells sampled by Wood, on behalf of the DNR, and their relative testing results are shown on **Figure 1**; the figure also includes the locations and results for potable wells sampled by JCI/Tyco. The PFAS testing results are broken into three categories: PFAS not detected; PFAS < Cycle 11 and HI < 1.0; and PFAS ≥ Cycle 11 and/or HI ≥ 1.0. Wells having PFAS ≥ Cycle 11 and/or HI ≥ 1.0 are outlined in red.

The well construction details for many potable wells in this area are unknown, but when known, the wells were grouped into three categories based on depth: “shallow” < 50 feet below ground surface (ft bgs); “mid” = 50 to < 100 ft bgs; and “deep”  $\geq$  100 ft bgs. The depth category (or if the depth was unknown) is depicted by the grey tone marking each well location on **Figure 1**. In general, the wells having PFAS  $\geq$  Cycle 11 and/or HI  $\geq$  1.0 showed the following characteristics:

- screened in the shallow depth zone (or the depth of the potable well was unknown), and
- distributed throughout *both* JCI/Tyco’s current testing area and the ESIA, with a high proportion located near the shoreline along the Bay of Green Bay.

### ***Evaluation: PFAS Signature***

The relative concentration of PFAS compounds detected (the “PFAS signature”)<sup>2</sup> for any potable well having PFAS  $\geq$  Cycle 11 and/or HI  $\geq$  1.0 are shown of **Figure 2**. PFOA is the prominent PFAS compound detected in almost all wells having PFAS  $\geq$  Cycle 11 and/or HI  $\geq$  1.0. Because PFOA is a primary component (or transformation product) in the AFFF produced and/or used by JCI/Tyco, its presence in the PFAS signature continues to link the FTC as a source to the PFAS detected in the ESIA.

The PFAS signature is not fixed and varies across the area of affected wells. The PFAS signature in wells closest to the FTC are dominated by 6:2 fluorotelomer sulfonic acid (FTS) and perfluorinated carboxylic acids (PFCAs) with five to eight carbons (namely PFOA, perfluorohexanoic acid [PFHxA] and perfluoropentanoic acid [PFPeA]). At moderate distances, the PFAS signature is dominated by PFOA, and at greater distances PFOA, PFHxA and PFPeA remain, but PFOS, perfluorobutanesulfonic acid (PFBS) and perfluorohexanesulfonic acid (PFHxS) are also present at similar concentrations to the PFCAs.

An analysis that considers time, distance, transformations, and changes in AFFF formulations is needed to draw conclusions on variations in the PFAS signatures. JCI/Tyco as the responsible party with specific knowledge on AFFF use and operations at the Site is best suited to make this evaluation. An interpretation DNR made from the data is that the transition in the PFAS signature with distance from the FTC may in part be caused by changes with AFFF formulations over time and JCI/Tyco’s use of AFFF produced by other manufacturers (e.g., 3M) during various periods. The FTC began operation in the early 1960s, and since that time changes in the AFFF formulations (1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> generation) have occurred. PFOS was prominent in many 1<sup>st</sup> generation AFFFs and use of these would have dominated earlier operations at the FTC. Contamination resulting from discharges in earlier operations (i.e., containing more PFOS) is expected to be observed in groundwater that has migrated further distances from the FTC. Whereas 6:2 FTS is prominent in 3<sup>rd</sup> generation AFFFs, and contamination resulting from these more recent discharges (i.e. 6:2 FTS and its terminal degradation products) is expected in groundwater closer to the FTC.

### **SI Deficiencies and the ESIA**

Field investigations are required to evaluate all potential migration pathways and define the degree and extent of contamination (Wis. Adm. Code § NR 716.11). Until the degree and extent of contamination are defined, conclusions on the boundaries of the Site cannot be made. JCI/Tyco’s “testing area,” groundwater isoconcentration maps, cross-sections and SI framework are generally based on the assumption that all PFAS discharged to the environment at the FTC infiltrated on the FTC property east of Ditch A or along Ditch A to the south. This interpretation is based primarily on the absence of data to the west of Ditch A and insufficient characterization in other areas. Additional field investigation data is needed to draw conclusions on the degree and extent of contamination.

---

<sup>2</sup> Based on analysis for 36 PFAS compounds that JCI/Tyco is required to report.

Many of the potential migration pathways for PFAS discharged from the FTC remain untested or are in initial phases of investigation. These potential migration pathways include, but are not limited to: air deposition<sup>1</sup>; overland flow from stormwater and/or AFFF use at the Site; groundwater/surface water interactions or migration of contaminated sediment through wetlands and ditches connected to the Site; subsurface leaks from utilities connected to the Site; and subsurface migration along preferential pathways like utility backfill or sloping weathered bedrock layers. These untested migration pathways (current or historical) from the FTC include pathways into the ESIA.

JCI/Tyco's current testing area and interpretation on the extent of groundwater contamination does not include the ESIA; however, JCI/Tyco's interpretation is made with insufficient field investigation data. The samples from one temporary point on the southwest corner of the FTC property are not sufficient to document the extent of contamination west of Ditch A.

To illustrate this deficiency in the groundwater investigation, the DNR overlaid JCI/Tyco's shallow isoconcentration and shallow groundwater potentiometric surface maps (with NR 141 wells) onto the DNR's Figure 1 with the potable well testing results. This overlay is presented in **Figure 3** and highlights the following:

- (1) areas where NR 141 wells were installed, but which have not been tested for PFAS (these wells are also summarized in **Attachment C**), and
- (2) areas lacking NR 141 wells needed for PFAS testing data and/or water level measurements to substantiate isoconcentration maps and cross sections.

**A field investigation must extend as needed to define the degree and extent of contamination** (Wis. Adm. Code §§ NR 716.11(3)(a) and 713.11(4)), **and the sampling locations used for the field investigation must be selected to evaluate the potential migration pathways** (Wis. Adm. Code § NR 716.11(5)(a)). JCI/Tyco must submit a site investigation work plan to address the outstanding SI deficiencies/data gaps. JCI/Tyco must sample new and existing NR 141 wells for PFAS in areas and depths requiring further characterization.

For the ESIA, JCI/Tyco must complete the following in the upcoming work (additional work may be required):

- Install NR 141 wells to measure groundwater levels and map regional groundwater flow patterns.
- Install NR 141 wells to measure the concentration of PFAS in the groundwater west of Ditch A at various depth intervals starting on the FTC property and following potential migration pathways (e.g., shallow migration in surface water, stormwater and wetlands; deposition from airborne migration; and preferential flow paths including along the weathered bedrock).
- Analyze and submit documentation on the *current and historical* surface water drainage pathways from the FTC to the Little River. This includes stormwater management and surface drainage patterns on the FTC property and the connecting flow in ditches, streams, and wetlands extending from all sides of the property. (Desktop evaluations based on current topography may not be sufficient for this analysis because engineered stormwater conveyances [e.g., culverts] are used in some areas and conditions may have changed over time with development in the area.) An initial comparison of the ditch maps prepared by JCI/Tyco to historical aerial photographs, current topographic maps, and surface drainage maps from various sources (e.g., DNR 24k Hydro, United States Geological Survey [USGS] National Hydrography Dataset [NHD], Marinette County) show differing interpretations of flow patterns in some areas.
- Provide maps of subsurface utilities that conveyed or potentially conveyed PFAS from the FTC historically, recently, or currently. This is required to begin assessment of utility corridors as a potential migration pathway. Field investigation of utility corridors as a potential migration pathway for PFAS from the Site is required.

### **Other Sources and Responsibility for Potable Wells in the ESIA**

The DNR maintains that JCI/Tyco is the responsible party for the PFAS-impacted potable wells within the ESIA. JCI/Tyco must take over all testing of potable wells and provisions of alternate water within the ESIA by **January 31, 2022**.

JCI/Tyco has contended that the PFAS detected in these wells are from local septic systems and/or other sources. However, JCI/Tyco must provide evidence to document and substantiate this claim (e.g., testing of the septic leach fields in the area). If other sources of PFAS exist at a response action site, it is the obligation of a responsible party to evaluate the other sources of contamination as part of site investigation scoping under Wis. Adm. Code § NR 716.07(5).

Additional investigation and research are needed to assess the contributions from septic systems and/or other sources to PFAS in potable wells in the ESIA. Please note that if JCI/Tyco finds evidence that the septic systems contributed to the PFAS in these potable wells, it will not necessarily mean that discharges of PFAS from the FTC did not *also* contribute to the PFAS detected in these wells, and does not negate the fundamental requirement of the site investigation to test and evaluate all potential migration pathways to define the degree and extent of contamination from the Site.

### **Next Steps**

The DNR offers to meet with JCI/Tyco to answer questions on this letter and discuss plans for JCI/Tyco to take over the testing and provisions of potable water in the ESIA. **The DNR is prepared to host a virtual meeting the week of November 8, 2021**. As a reminder, technical evaluations that JCI/Tyco wishes to present and use a basis for decisions must be submitted to the DNR in a document for review; presentations to the DNR do not constitute a submittal.

- 1) By **January 1, 2022**, submit a **potable well long-term monitoring plan** with monitoring criteria and frequency for potable wells in the ESIA, plans for supplying alternative water to PFAS-impacted potable wells and plans to notify affected community members and the public (Wis. Adm. Code §§ NR 714.07 and NR 716.17(1)). The deadline to begin implementing these actions is January 31, 2022.
- 2) Within **60-days** after November 8, 2021 (earliest proposed meeting date), submit a **site investigation work plan** (Wis. Adm. Code § NR 716.09) that includes the following:
  - a. Field investigation activities to evaluate potential migration pathways and define the degree and extent of contamination. At a minimum it must include a scope of work to address the SI deficiencies summarized in this letter and unresolved data gaps listed in prior correspondence (**Attachment A**) (Wis. Adm. Code § NR 716.11).
  - b. Updated cross-sections and isoconcentration maps for PFOA + PFOS based on required revisions listed in this letter and any new data available for the Site. Use the updated drawings to assist in developing the scope of work for the site investigation (Wis. Adm. Code § NR 716.17(1)).
  - c. Technical evaluation of potable well testing results for the ESIA and field investigation to identify other potential drinking water receptors beyond the ESIA (Wis. Adm. Code § NR 716.13(16)(b)). Include a plan for testing additional potable wells if potential drinking water receptors are identified during the investigation (Wis. Adm. Code § NR 716.11(5)(b)).
  - d. Proposed plan and schedule to submit SI status report(s) for approval<sup>3</sup>. The DNR recognizes that site investigations for large and complex sites such as this may be iterative, and a final SI report

---

<sup>3</sup> The 10-day data notifications per Wis. Adm. Code § NR 716.14 (2) are not required for samples collected on JCI/Tyco-owned property if JCI/Tyco continues to provide the DNR with biweekly database updates. The notification requirements remain in effect for samples collected off JCI/Tyco-owned property, unless otherwise requested and approved by the DNR.

may not be possible while work is ongoing to define the degree and extent of contamination. However, certain elements are needed to evaluate the data and to make decisions regarding completeness of the site investigation. Therefore, per Wis. Adm. Code § NR 716.17(1) JCI/Tyco must submit SI status reports during the site investigation that at a minimum, include the following elements required under Wis. Adm. Code §§ NR 716.15 and 716.11(6):

- i. Laboratory reports and summary of the results compared to applicable standards.
- ii. Isoconcentration maps and cross-sections that address the revisions listed in this letter.
- iii. Assessment on the horizontal and vertical extent of PFAS impacts to groundwater.
- iv. Documentation of management of investigative derived waste.
- v. Conclusions and recommendations for next steps.

As a reminder, this Site is subject to an enforcement action and therefore all submittals to the DNR under Wis. Adm. Code chs. NR 700-799 and submittals directed by the DNR must be accompanied by an Wis. Adm. Code ch. NR 749 fee per Wis. Stat. § 292.94. These fees are not pro-ratable or refundable per Wis. Adm. Code § NR 749.04(1). If you have any questions about whether to include a fee with a submittal, please contact DNR staff prior to submitting a document without a fee.<sup>4</sup>

If you have any questions about this letter, please contact me, the DNR Project Manager, at (608) 622-8606 or [Alyssa.Sellwood@wisconsin.gov](mailto:Alyssa.Sellwood@wisconsin.gov).

Sincerely,



Alyssa Sellwood, PE  
Complex Sites Project Manager  
Remediation & Redevelopment Program

Attachments: Figure 1: Potable Well PFAS Results: All Wells with Depth Classification  
Figure 2: Potable Well PFAS Results: Wells at/or Above Recommended Standard or HI $\geq$ 1  
Figure 3: Groundwater Investigation Deficiency: Areas Lacking Data from NR 141 Wells

Attachment A: Summary of Letters with Directions to JCI/Tyco to Address SI Deficiencies  
Attachment B: Questions and Comments to JCI/Tyco's Drawings  
Attachment C: Summary of NR 141 Monitoring Wells for BRRTS 02-38-580694  
Attachment D: JCI/Tyco original figures used to prepare Figure 3

cc: Scott Potter, Arcadis (via email: [Scott.Potter@arcadis.com](mailto:Scott.Potter@arcadis.com))  
Bridget Kelly, DNR (via email: [bridgetb.kelly@wisconsin.gov](mailto:bridgetb.kelly@wisconsin.gov))  
Jodie Peotter, DNR (via email: [Jodie.Peotter@wisconsin.gov](mailto:Jodie.Peotter@wisconsin.gov))

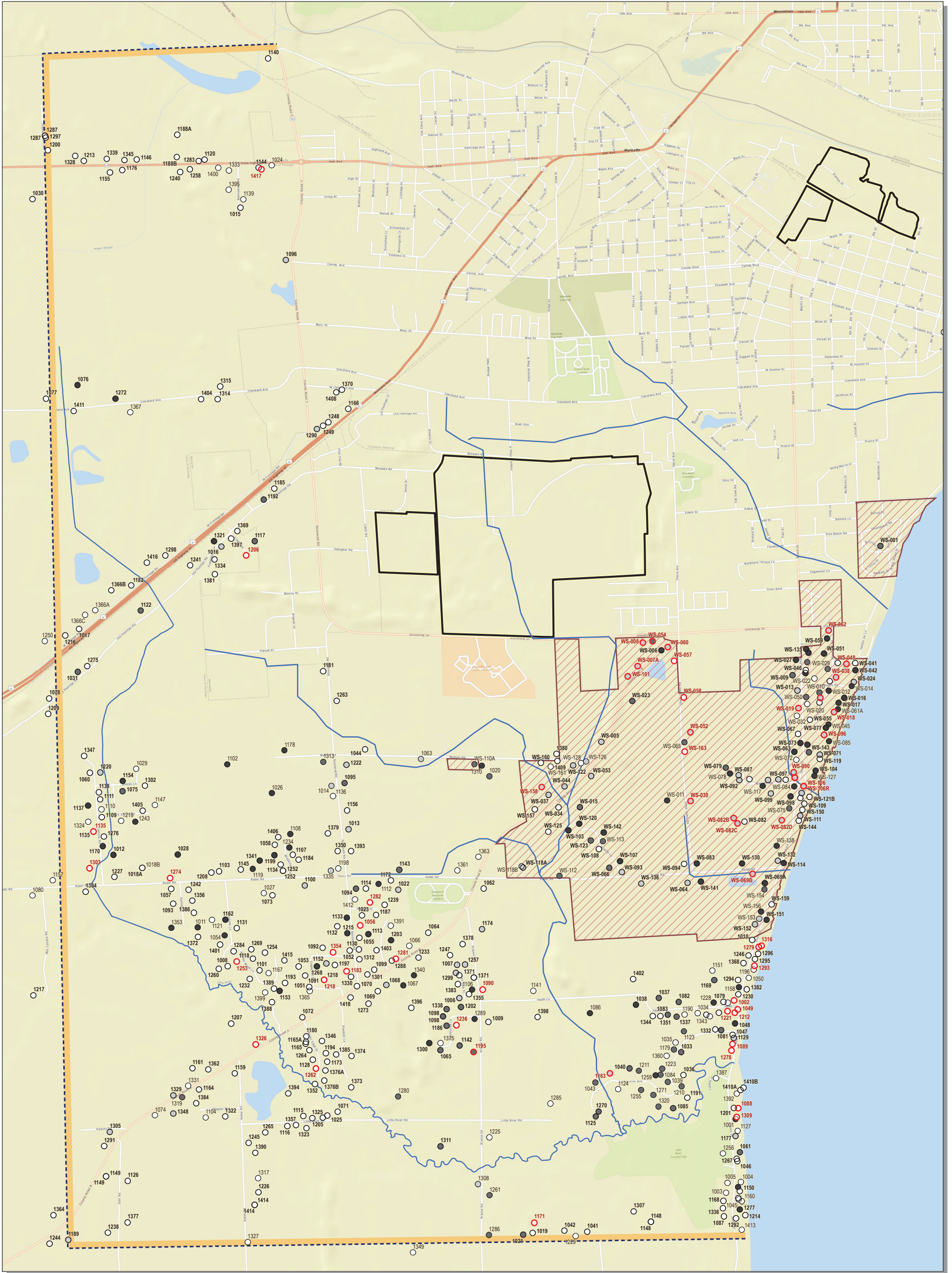
---

<sup>4</sup> On September 4, 2020, JCI/Tyco submitted a site investigation work plan to the DNR with a fee. On November 17, 2020, JCI/Tyco requested that the DNR stop its review and transfer the fee to a revised work plan that was forthcoming. A revised site investigation work plan has not been received since that time; thus, the DNR will apply the fee received September 4, 2020 to the site investigation work plan required in this letter.



# BRRTS 02-38-580694 Potable Well PFAS Results

## All Wells With Depth Classification



### Legend

- Potable well locations by depth class**
- UNKNOWN (n=340)
  - SHALLOW (< 50 feet) (n=73)
  - MID (50 - < 100 feet) (n=66)
  - DEEP (>= 100 feet) (n=81)

- Potable well locations by PFAS results**
- Not Detected (n=134)
  - Less than Recommended Enforcement Standard (n=369)
  - At or Above Recommended Enforcement Standard or Hazard Index Meets or Exceeds 1 (n=57)

- Expanded Site Investigation Area
- ▭ JCI/Tyco Property Boundary
- ▨ JCI/Tyco Potable Well Sampling Area

## Figure I

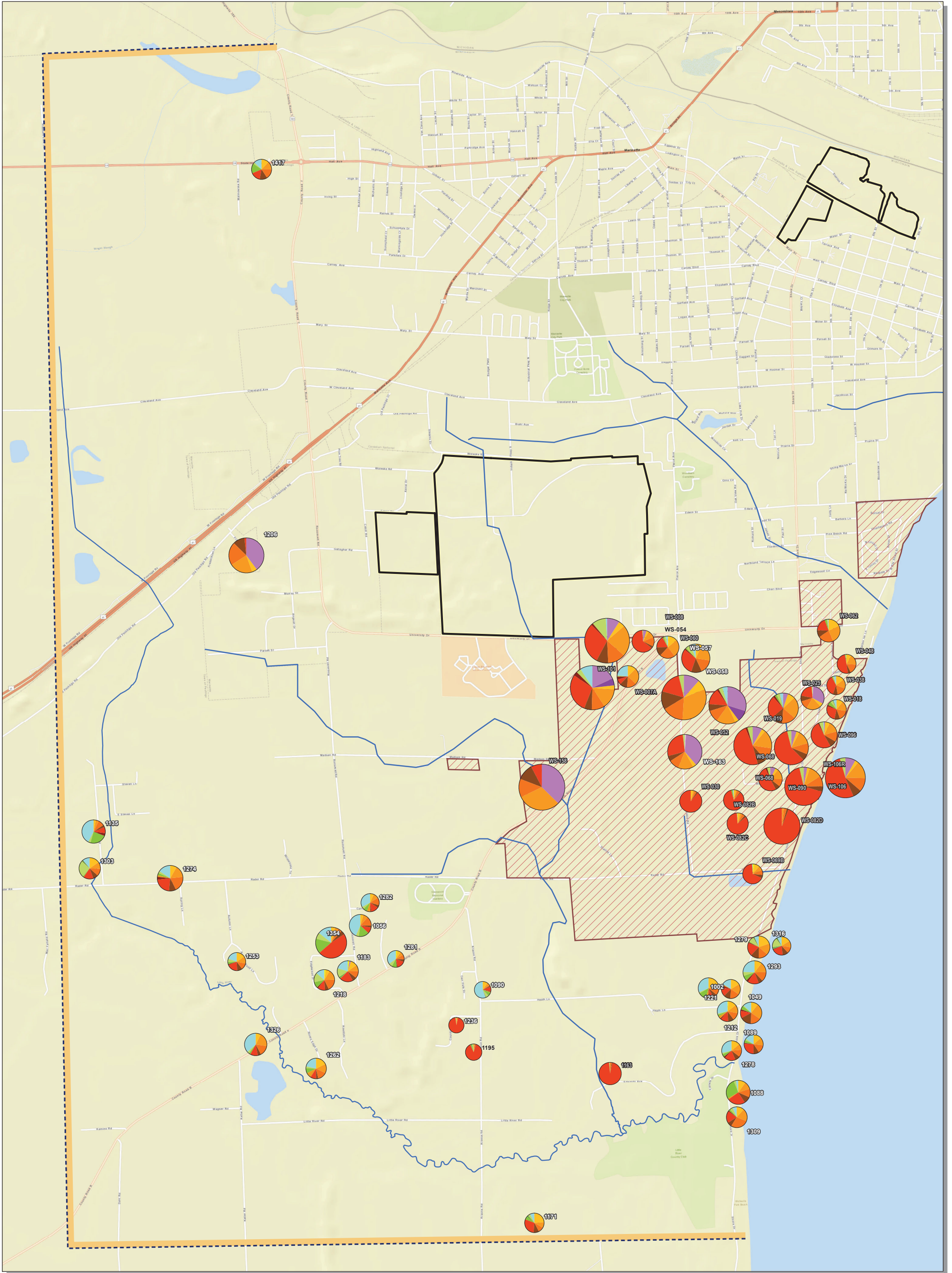


3,000 feet



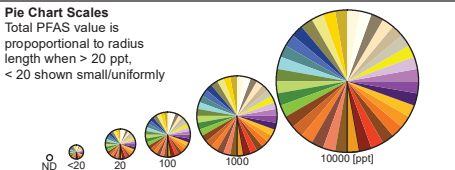
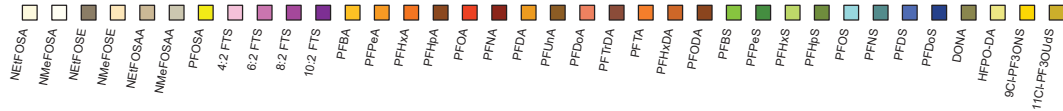
# BRRTS 02-38-580694 Potable Well PFAS Results

Wells at/or Above Recommended Enforcement Standard or HI>=1 (51 wells)



## Legend

### Sorted PFAS Parameters



PFAS results represent the highest concentrations detected through April 29, 2021 for private wells samples analyzed for 36 PFAS. The number of sampling events per well varies.

**Label** = Deep Well  
**Label** = Mid Depth Well  
**Label** = Shallow Well  
**Label** = Unknown Depth Well

- Expanded Site Investigation Area
- JCI/Tycos Property Boundary
- JCI/Tycos Potable Well Sampling Area



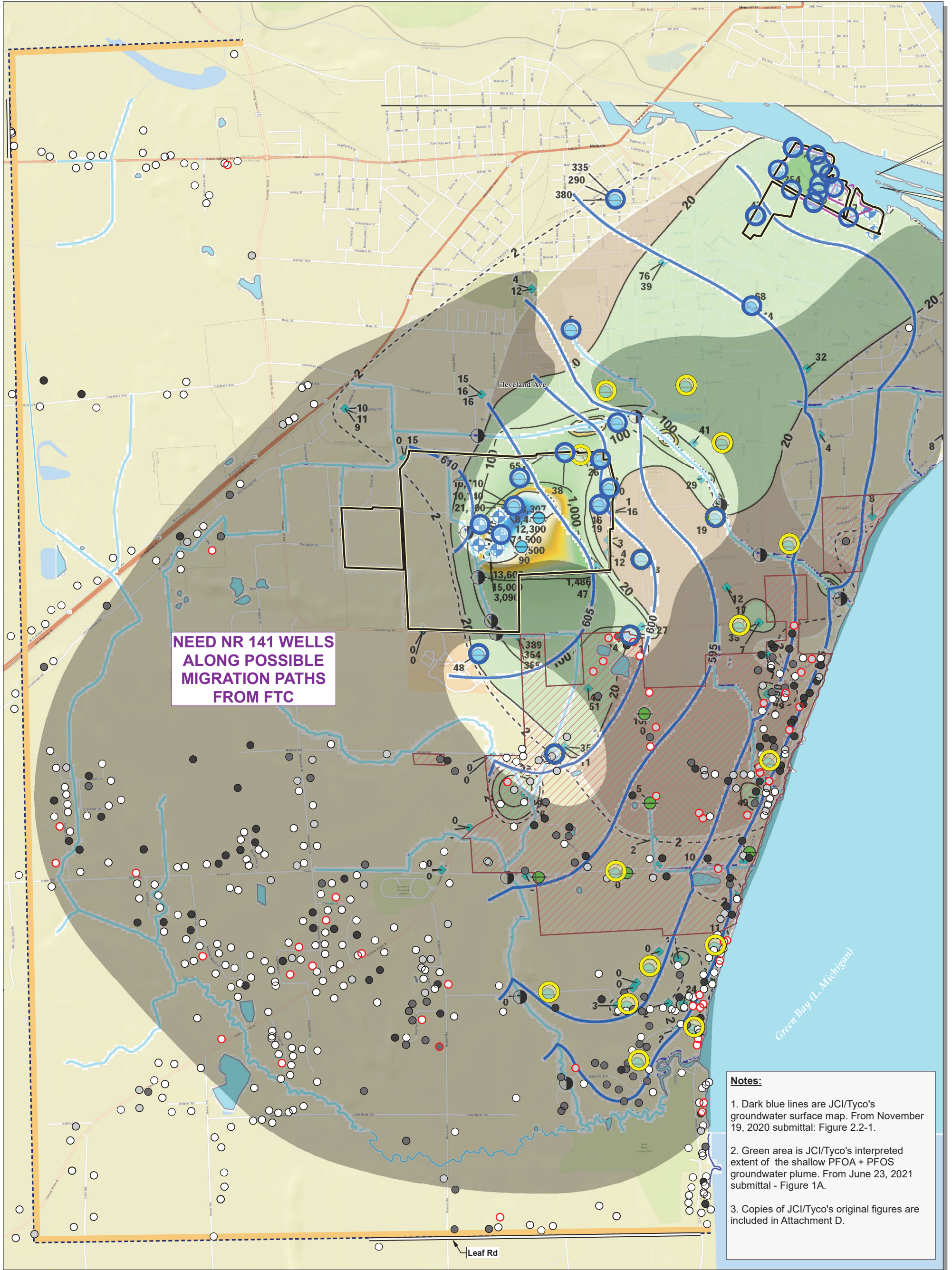
## Figure 2



Wisconsin Department of Natural Resources  
 Remediation & Redevelopment Program  
 - JJP, Oct 19, 2021

# BRRTS 02-38-580694 Groundwater Investigation Deficiency

## Areas Lacking Data from NR 141 Monitoring Wells



### Figure 3



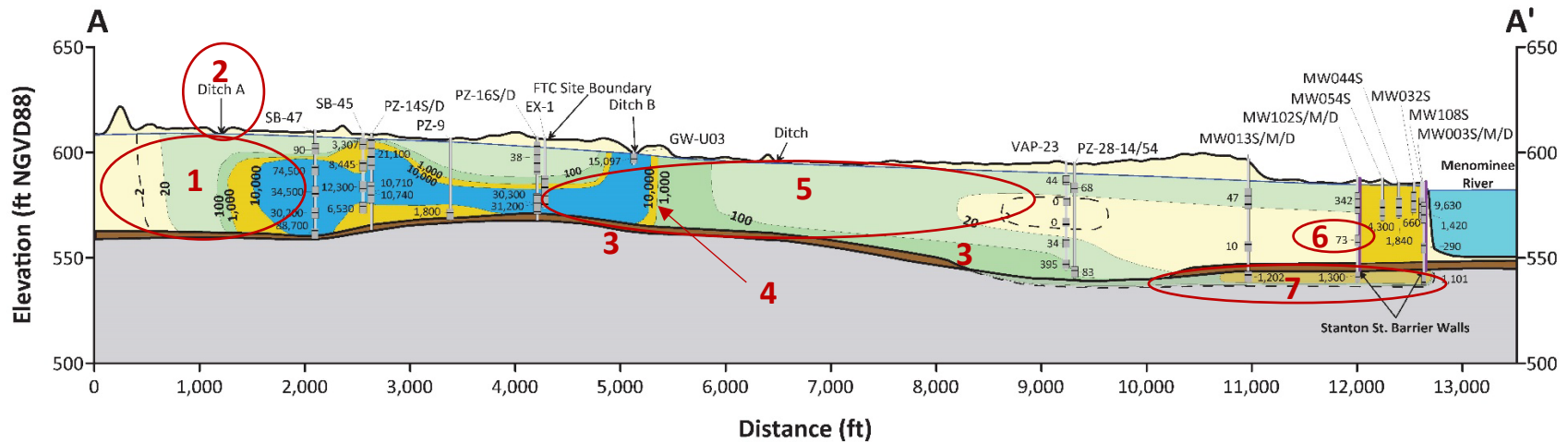
**Attachment A:  
Summary of Prior DNR Letters with Directions to JCI/Tyco to Address Site Investigation Deficiencies\***

<b>Date</b>	<b>Subject</b>
<a href="#">December 7, 2018</a>	September 2018 Site Investigation Report Review – Site Investigation Incomplete
<a href="#">February 19, 2020</a>	Directions to Expand the Site Investigation Including Potable Well Sampling
<a href="#">April 9, 2020</a>	Response to March 30, 2020 April Community Letter
<a href="#">May 27, 2020 a</a>	Non-Compliance with Site Investigation Requirements: Site Investigation Deficiencies
<a href="#">May 27, 2020 b</a>	Response to Draft SI Report of the Southern Area Groundwater Evaluation Efforts
<a href="#">July 7, 2020</a>	DNR to Test Potable Wells in Expanded Area
<a href="#">September 24, 2020 a</a>	Response to Interim SI Report – Additional Investigation Needed
<a href="#">September 24, 2020 b</a>	Response to Conceptual Site Model
<a href="#">February 23, 2021</a>	Response to Aerial Deposition Evaluation Report
<a href="#">April 9, 2021</a>	Response to GW Flow and Solute Transport Model Report
<a href="#">August 31, 2021</a>	Response to Near-Term Bedrock Groundwater Evaluation Work Plan
<a href="#">September 14, 2021</a>	Response to Air Pathway Site Investigation Workplan

\* **Note:** This list is provided as a quick reference to the primary correspondence where SI deficiencies were previously summarized; it is not an exhaustive list and other DNR correspondence may contain information on additional SI deficiencies. The DNR recognizes that some of the deficiencies have been addressed, are in the initial phases of investigation or are proposed for investigation in recent work plans submitted by JCI/Tyco.

## Attachment B – DNR Review of Isoconcentration Maps and Cross-Section Figures

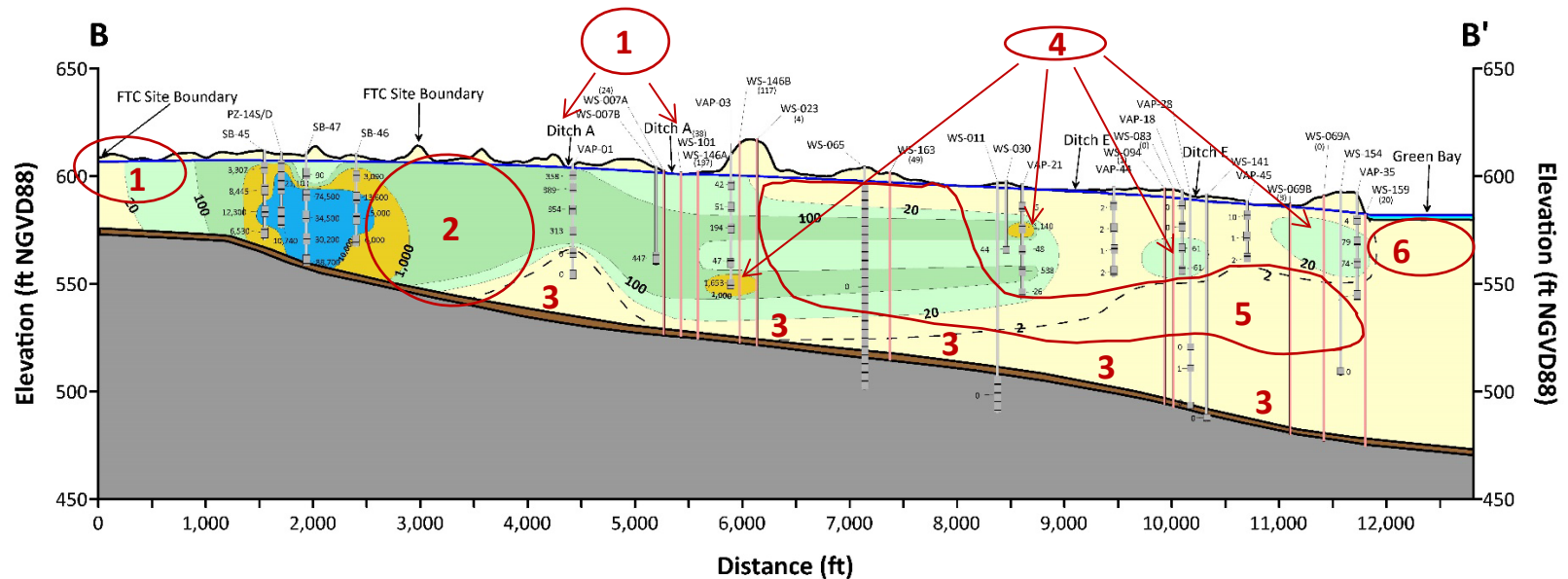
### Cross-Section A-A'



1	No data west of SB-45 and SB-47 to define extent of contamination.
2	How do the PFAS detected in surface water in Ditch A relate to groundwater plume?
3	No data to evaluate migration pathways along weathered bedrock or to evaluate presence of till.
4	How can such a steep concentration gradient be explained here? In JCI/Tyco's January 12, 2021 letter it states, "Ditch B is predominantly gaining but is not a complete groundwater discharge boundary... Ditch B is interpreted to intercept portions of overburden groundwater flow, while some deeper groundwater migrates underneath."
5	No Data between EX -1 and PZ-28 (~ 1 mile) – except for shallow groundwater at Ditch B
6	Why is this detection of PFAS > 20 ppt not included in the 20 ppt contour interval?
7a	Why is the 1,000 ppt in shallow bedrock not connected to plume coming from the FTC? If Stanton Street is the assumed source of these detections of PFAS, then please provide corresponding arsenic data to support this argument.
7b	If the three wells (MW003D, MW013D and MW102D) screened in the shallow weathered bedrock have concentrations of PFAS > 1,000 ppt, what is the basis for assigning this as zero-concentration boundary across the rest of the site? The weathered bedrock layer and fractures or other more permeable sections of bedrock must be evaluated as potential migration pathways (Wis. Adm. Code § NR 716.11(5)(a)).

## Attachment B – DNR Review of Isoconcentration Maps and Cross-Section Figures

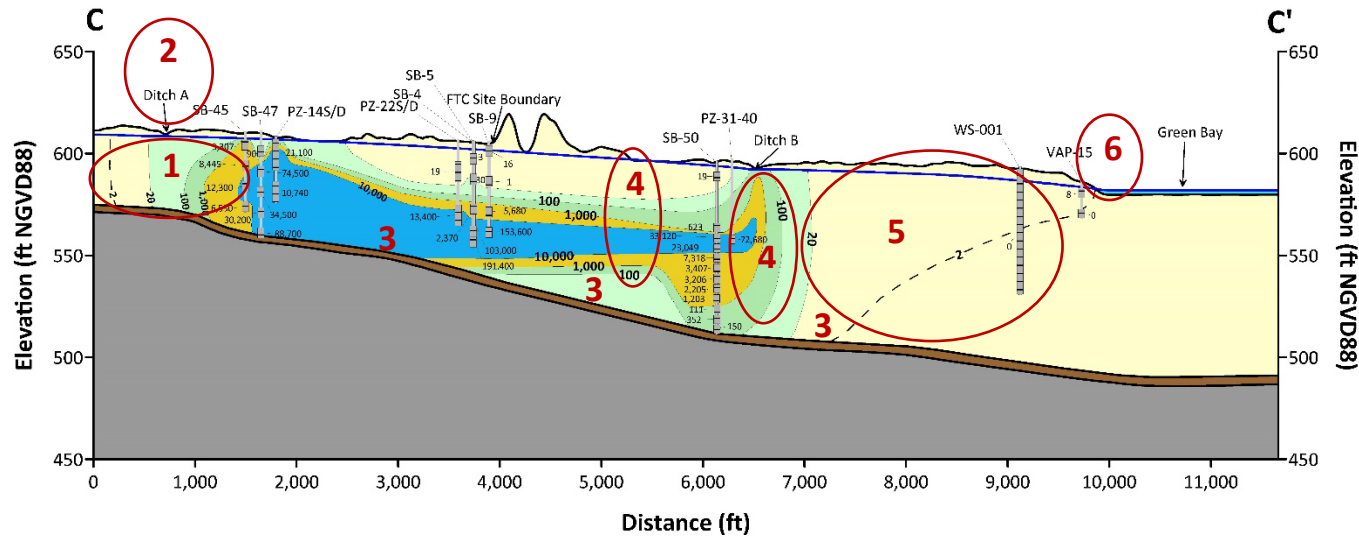
### Cross Section B-B'



1	How do the PFAS detected in surface water in Ditch A relate to the groundwater plume?
2	No data to define extent of contamination near source area.
3	No data to evaluate migration along weathered bedrock or to evaluate presence of till.
4	Why are these points disconnected from the similar concentration areas in the upgradient plume? Were localized migration paths considered (i.e., is not more likely that these detections in the downgradient plume are connected by preferential flow paths to areas of similar concentration in the upgradient plume)?
5	Limited data to define extent of contamination and evaluate migration through possible preferential flow pathways.
6	Is the groundwater plume discharging into Green Bay? What is the basis for ending the contaminant plume at Green Bay?

## Attachment B – DNR Review of Isoconcentration Maps and Cross-Section Figures

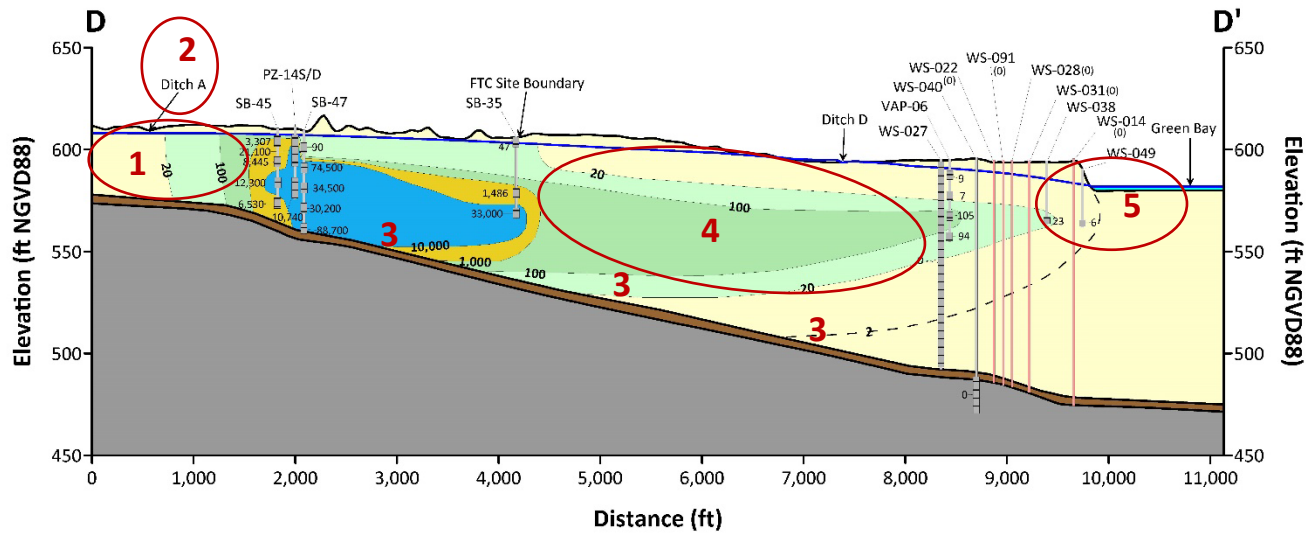
### Cross Section C-C'



1	No data west of SB-45 and SB-47 to define extent of contamination.
2	How do the surface water concentrations > 1,000 ppt measured in Ditch A relate to groundwater plume?
3	No data to evaluate migration along weather bedrock or to evaluate presence of till.
4	No data to define the vertical extent of groundwater contamination around where PFAS > 10,000 ppt.
5	No data to define extent of contamination (~ ½-mile).
6	How do the PFAS in surface water detected in (nearby) Ditch C relate to groundwater plume?

## Attachment B – DNR Review of Isoconcentration Maps and Cross-Section Figures

### Cross-Section D-D'

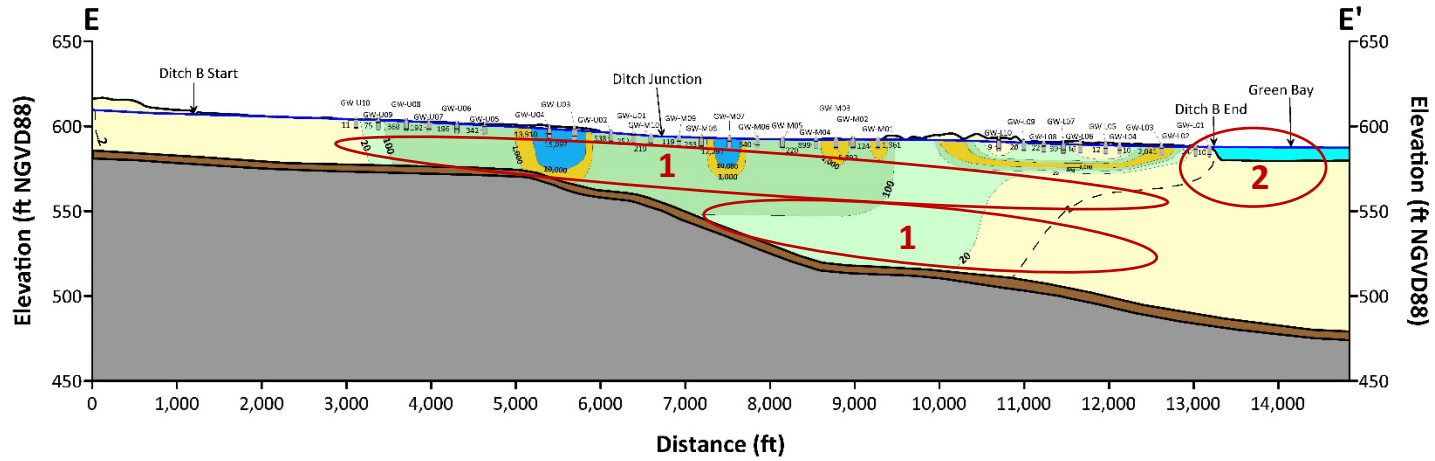


1	No data west of SB-45 and SB-47 to define extent of contamination.
2	How do the PFAS detected in surface water in Ditch A relate to groundwater plume?
3	No data to evaluate migration along weather bedrock or to evaluate presence of till.
4	No data to define extent of contamination (~ 1-mile).
5	Is the groundwater plume discharging into Green Bay? What is the basis for ending the contaminant plume at Green Bay?



## Attachment B – DNR Review of Isoconcentration Maps and Cross-Section Figures

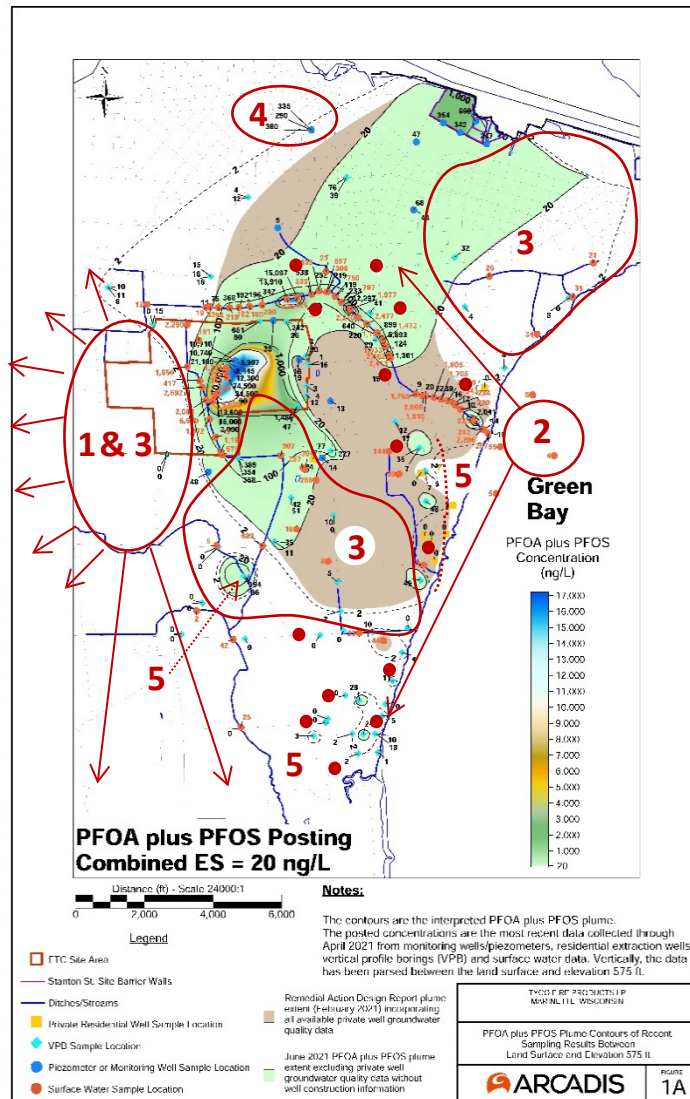
### Cross-Section E-E'



1	No data to define the vertical extent of groundwater contamination below Ditch B.
2	If PFAS is detected in deeper sections of the aquifer below Ditch B, does it discharge into Green Bay?

# Attachment B – DNR Review of Isoconcentration Maps and Cross-Section Figures

## Shallow GW Plume Map (Figure 1A)



- 1 - No data west of Ditch A to define extent of contamination  
*The current isoconcentrations maps assume that all the PFAS discharged at the FTC Site entered the groundwater near the Outdoor Testing Area (OTA); however, it is possible that one or more migration pathways transported PFAS west or south along Ditch A.*
- 2 – Need to sample existing NR 141 wells for PFAS.  
*The red dots highlighted on this map represent wells JCI/Tyco constructed off the FTC property not tested for PFAS.*
- 3 – Need to install NR 141 wells to characterize PFAS in these areas,  
*Field investigation must be completed to document the degree and extent of contamination in these areas and sampling points must be selected to test all possible migration pathways.*
- Questions on current interpretation
- 4 – Why is this data not included in the isoconcentrations contour?
- 5 - Why are the areas near “5” disconnected from the upgradient plume? Were preferential flow paths evaluated or considered?

**Att C: Summary of NR 141 Monitoring Wells for FTC Site (BRRTS #02-38-580694)**

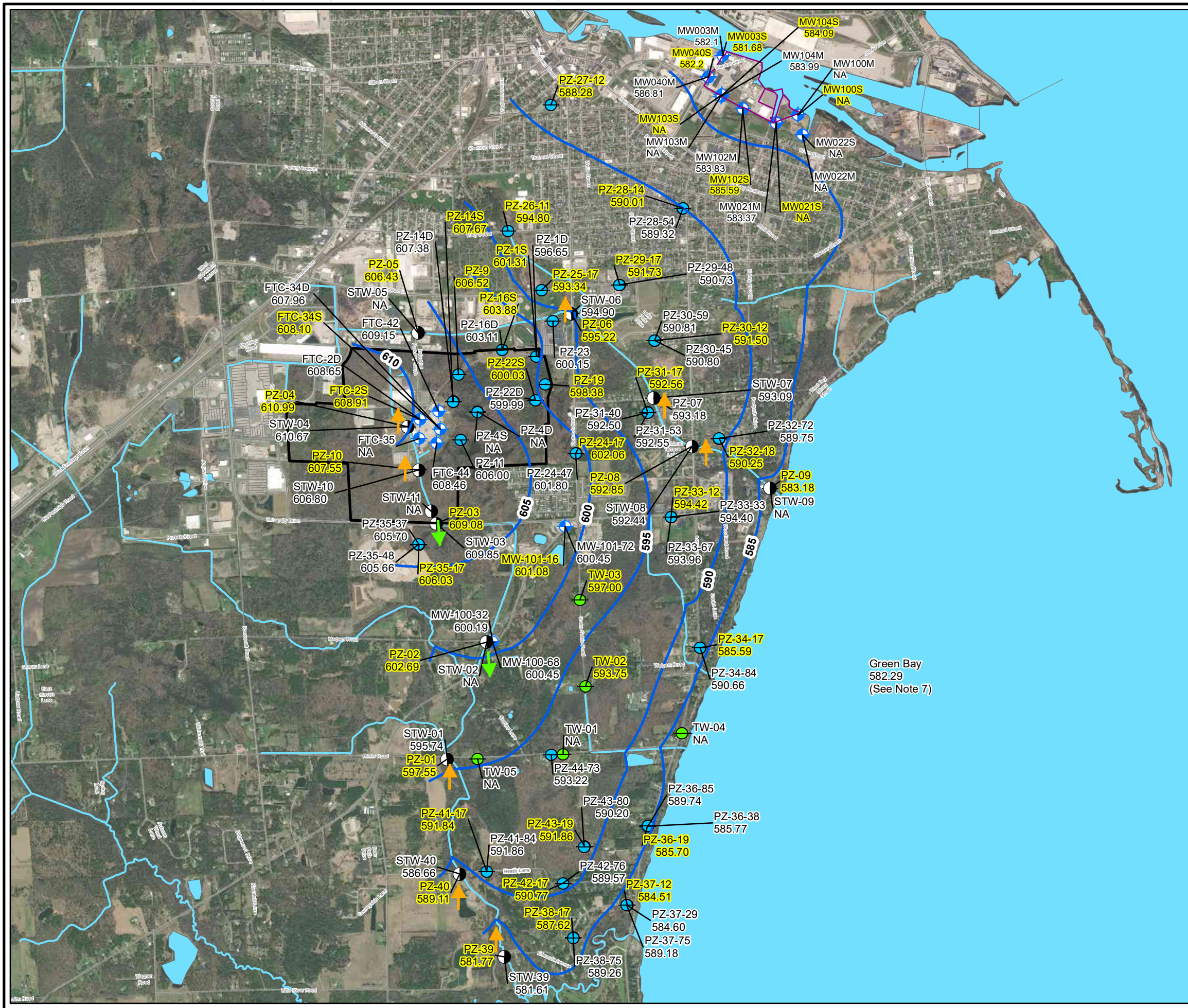
**Wells Located on the FTC Property**

Well ID	Tested for PFAS	NOT Tested for PFAS	Year Installed
MW5		--	2010
CS-9R		--	?
FTC 1		--	1993
FTC 13R		--	?
FTC 15R		--	?
FTC 20R		--	?
FTC 27		--	1995
FTC 3		--	1993
FTC 30		--	1995
FTC 31		--	1995
FTC 32D		--	1996
FTC 32S		--	1996
FTC 33D		--	1996
FTC 33S		--	1996
FTC 45		--	2003
FTC 46D		--	2004
FTC 46S		--	2004
FTC 47		--	2004
FTC 66		--	?
FTC-28		--	1995
FTC-2D	✓		1993
FTC-2S	✓		1993
FTC-34D	✓		1996
FTC-34S	✓		1996
FTC-35		--	?
FTC-42		--	2003
FTC-44		--	2003
FTC-67		--	?
PZ-12		--	?
PZ-13		--	?
PZ-14D	✓		?
PZ-14S	✓		?
PZ-15D		--	?
PZ-15S		--	?
PZ-16D	✓		?
PZ-16S	✓		?
PZ-17D		--	?
PZ-17S		--	?
PZ-18D		--	?
PZ-18S		--	?
PZ-19	✓		?
PZ-1D	✓		2010
PZ-1S	✓		2010
PZ-2		--	2010
PZ-20		--	?
PZ-21		--	?
PZ-22D	✓		?
PZ-22S	✓		?
PZ-3		--	2010
PZ-45-31		--	2020
PZ-4D		--	2010
PZ-4S		--	2010
PZ-5		--	?
PZ-6D		--	2011
PZ-6S		--	?
PZ-7		--	2011
PZ-8		--	?
PZ-9	✓		?
<b>58</b>	<b>14</b>	<b>44</b>	<b>TOTAL</b>

**Wells Located Off-Site**

Well ID	Tested for PFAS	NOT Tested for PFAS	Year Installed
MW-100-32	✓		2018
MW-100-68	✓		2018
MW-101-16	✓		2018
MW-101-72	✓		2018
PZ-23	✓		2017
PZ-24-17	✓		2019
PZ-24-47	✓		2019
PZ-25-17		--	2019
PZ-26-11	✓		2019
PZ-26-49		--	2020
PZ-27-12	✓		2019
PZ-28-14	✓		2019
PZ-28-54	✓		2019
PZ-29-17		--	2019
PZ-29-48		--	2019
PZ-29-68		--	2020
PZ-30-12		--	2019
PZ-30-45		--	2019
PZ-30-59		--	2019
PZ-31-17		--	2019
PZ-31-40	✓		2019
PZ-31-53		--	2019
PZ-32-18		--	2019
PZ-32-72		--	2019
PZ-33-12		--	2019
PZ-33-33		--	2019
PZ-33-67		--	2019
PZ-34-17		--	2019
PZ-34-84		--	2019
PZ-35-17	✓		2019
PZ-35-37	✓		2019
PZ-35-48	✓		2019
PZ-36-19		--	2019
PZ-36-38		--	2019
PZ-36-85		--	2019
PZ-37-12		--	2019
PZ-37-29		--	2019
PZ-37-75		--	2019
PZ-38-17		--	2019
PZ-38-75		--	2019
PZ-41-17		--	2019
PZ-41-84		--	2019
PZ-42-17		--	2019
PZ-42-76		--	2019
PZ-43-19		--	2019
PZ-43-80		--	2019
PZ-44-73		--	2019
<b>47</b>	<b>15</b>	<b>32</b>	<b>TOTAL</b>

Attachment D: JCI/Tyco Original Figures Used to Prepare Figure 3



**LEGEND:**

- MONITORING WELL
- PIEZOMETER
- IN-STREAM PIEZOMETER AND STILLING WELL PAIR
- TEMPORARY PIEZOMETER
- ROAD
- HYDRAULIC CONTAINMENT WALL
- DITCH/STREAM
- WATERBODY
- SHALLOW SAND POTENTIOMETRIC SURFACE (AMSL)
- APPROXIMATE SITE PROPERTY BOUNDARY
- GAINING CONDITION AT STREAM GAUGE
- LOSING CONDITION AT STREAM GAUGE

- NOTES:**
1. WELLS AND PIEZOMETERS WERE USED FOR CONTOURING THE GROUNDWATER POTENTIOMETRIC SURFACE.
  2. WATER LEVELS POSTED FOR PIEZOMETER/STILLING WELL PAIRS ARE FOR THE PIEZOMETERS. STILLING WELL MEASUREMENTS NOT AVAILABLE.
  3. DITCH/STREAM DATA SOURCE: U.S. GEOLOGICAL SURVEY NATIONAL HYDROGRAPHY DATASET, ACCESSED FALL 2017.
  4. ROAD DATA SOURCE: OPEN STREET MAP, ACCESSED FALL 2017.
  5. AERIAL IMAGERY: 5/14/2017 DIGITALGLOBE, VIVID-USA
  6. POSTED WATER-LEVEL ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL (AMSL), BASED ON MEASUREMENTS COMPLETED 10/16/2019 - 10/17/2019.
  7. BAY OF GREEN BAY SURFACE ELEVATION (582.29) AS REPORTED BY NOAA/NOS MENOMINEE, MI, STATION #9087088 FOR 10/16/2019.
  8. NA = LOCATION DATA NOT AVAILABLE FOR GROUNDWATER

Green Bay  
582.29  
(See Note 7)

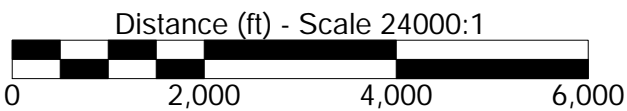
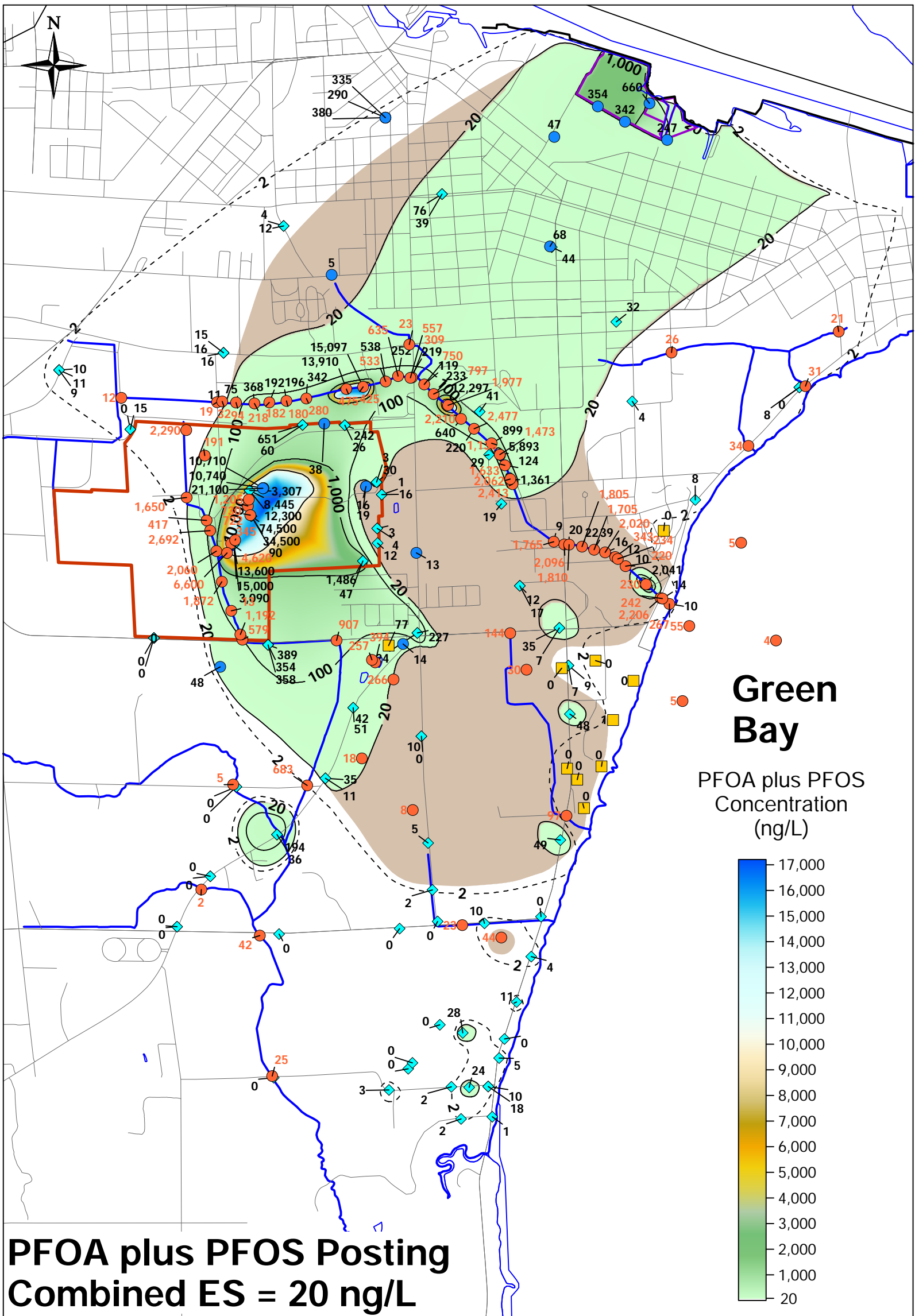


TYCO FIRE TECHNOLOGY CENTER  
MARINETTE, WISCONSIN  
GROUNDWATER FLOW AND SOLUTE  
TRANSPORT MODEL REPORT

SHALLOW SAND POTENTIOMETRIC  
SURFACE - OCTOBER 2019

FIGURE  
**2.2-1**

Attachment D: JCI/Tyco Original Figures Used to Prepare Figure 3



**Legend**

- FTC Site Area
- Stanton St. Site Barrier Walls
- Ditches/Streams
- Private Residential Well Sample Location
- ◆ VPB Sample Location
- Piezometer or Monitoring Well Sample Location
- Surface Water Sample Location

**Notes:**

The contours are the interpreted PFOA plus PFOS plume. The posted concentrations are the most recent data collected through April 2021 from monitoring wells/piezometers, residential extraction wells, vertical profile borings (VPB) and surface water data. Vertically, the data has been parsed between the land surface and elevation 575 ft.

- Remedial Action Design Report plume extent (February 2021) incorporating all available private well groundwater quality data
- June 2021 PFOA plus PFOS plume extent excluding private well groundwater quality data without well construction information

TYCO FIRE PRODUCTS LP MARINETTE, WISCONSIN	
PFOA plus PFOS Plume Contours of Recent Sampling Results Between Land Surface and Elevation 575 ft	
	FIGURE <b>1A</b>