

Mr. Tauren Beggs
Wisconsin Department of Natural Resources
2984 Shawano Avenue
Green Bay, WI 54313-6727

**PFAS GROUNDWATER INVESTIGATION WORK PLAN
FORMER MIRRO PLANT NO. 9, MANITOWOC, WISCONSIN
WDNR BRRTS ACTIVITY NO. 02-36-545108; FID 436033730**

Dear Mr. Beggs:

Ramboll US Corporation (Ramboll), on behalf of Newell Operating Company (NOC), is submitting this Groundwater Investigation Work Plan ("Work Plan") to conduct additional investigation activities related to poly- and per- fluoroalkyl substances (PFAS) detected in groundwater at the former Mirro Plant No. 9 facility located at 1512 Washington Street in Manitowoc, Wisconsin (the "facility" or "site"). This Work Plan has been prepared in conformance with Wisconsin Administrative Code (WAC) Chapter NR 716.

July 17, 2020

Ramboll
175 North Corporate Drive
Suite 160
Brookfield, WI 53045
USA

The objective of this Work Plan is to supplement PFAS investigation work done by others at the site on behalf of the City of Manitowoc to define the magnitude and extent of PFAS-impacted groundwater. This Work Plan presents a brief summary of site background information, proposed additional investigation approach, detailed scope of work, including field and laboratory methodologies, reporting, and schedule.

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Ref. 1690011063

INTRODUCTION

Site Location

The Site is owned by the City of Manitowoc Community Development Authority (CDA) and located at 1512 Washington Street in the City of Manitowoc, Manitowoc County, Wisconsin (Figure 1). According to the CDA, the site is associated with parcel number 05200024600000 and is approximately 4 acres. The site is bordered to the east by South 15th Street, north by Franklin Street, west by South 16th Street, and south by Washington Street. The surrounding properties are a mixture of residences to the east, industrial to the north and west, and first floor commercial with second floor apartments to the south.

Involved Parties

Site Owner: City of Manitowoc CDA
900 Quay Street
Manitowoc, WI 54220
Contact: Kathleen McDaniel, City Attorney,
(920) 686-6990



Owner Consultant: Stantec Consulting Services Inc.
12075 Corporate Parkway, Suite 200
Mequon, WI 53092
Contact: Harris L. Byers, (262) 643-9174

WDNR Consultant: AECOM Technical Services (AECOM)
1555 North RiverCenter Drive, Suite 214
Milwaukee, WI 53212
Contact: Dave Henderson, (414) 944-6190

Former Property Owner: Newell Operating Company
6655 Peachtree Dunwoody Road
Atlanta, GA 30328
Contact: Kristin Jones, (770) 418-7822

Newell's Consultant: Ramboll US Corporation
175 North Corporate Drive, Suite 160
Brookfield, WI 53045
Contact: Jeanne Tarvin, (262) 901-0085

Agency: Wisconsin Department of Natural Resources
2984 Shawano Avenue
Green Bay, WI 54313-6727
Contact: Tauren Beggs, (920) 662-5178

Background

Stantec, on behalf of the Site Owner (CDA), has completed demolition activities and is performing site investigation and cleanup on the site. In 2018, the WDNR requested and received access from the CDA for AECOM to install two new monitoring wells (AECOM MW-18 and AECOM MW-19) on July 13, 2018, and sample the two new monitoring wells plus four existing monitoring wells (AMEC MW-14, AMEC MW-15, AMEC MW-16, and AMEC MW-16A) at the site for PFAS on July 23, 2018. Existing off-site monitoring well AMEC MW-17 was not sampled in 2018.

On September 24, 2018, NOC received a responsible party (RP) letter from the WDNR pertaining to the former Mirro Plant No. 9 (Bureau for Remediation and Redevelopment Tracking System [BRRTS] Activity No. 02-36-545108). The RP letter notified NOC that PFAS compounds had been detected in groundwater in addition to other previously detected contamination discovered by the City of Manitowoc, the owner of the site. The RP letter stated that the WDNR believed NOC was responsible for investigating and restoring the site and requested that NOC, within 30 days, produce documents and indicate a willingness to coordinate efforts with the City. On October 25, 2018, NOC responded to the WDNR's RP letter by submitting the requested information and describing its effort to coordinate with the City. On October 22, 2018, AECOM transmitted to the WDNR the *Limited Groundwater Assessment Emerging Contaminants Report* for the former Mirro Plant No. 9 site (the "2018 AECOM PFAS Report") which presented the results of the PFAS sampling referenced in the September 24, 2018 RP letter.

Based on the 2018 AECOM PFAS Report, laboratory analytical results from the 2018 PFAS sampling indicate that PFAS are present in groundwater at the site and that perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) compounds exceed the United States Environmental Protection Agency

(USEPA) advisory level lifetime Health Advisory Level (HAL) of 70 nanograms per liter (ng/L) or parts per trillions (ppt).

In January 2019, Stantec continued site investigation activities by submitting a Site-Specific Sampling and Analysis Plan (SSSAP) and subsequent SSSAP revisions and updates to the WDNR. As part of the SSSAP, select proposed monitoring wells, as well as monitoring well AMEC MW-17 were selected for PFAS analysis. In March and April 2019, 21 monitoring wells were installed and developed in accordance with WAC NR 141. Of the 21 monitoring wells installed, 17 monitoring wells and AMEC MW-17 were sampled for PFAS. Existing monitoring wells are shown on Figure 2.

The results of the Stantec additional investigative work completed in 2019 were presented in a Phase II Environmental Site Assessment (ESA) Report (Investigation of PCB Impacts to Soil Beneath the Loading Dock and Area 8 and Continued Assessment of Site-Wide Impacts to Soil and Groundwater) prepared by Stantec, dated March 19, 2020 (the "Stantec 2020 Phase II ESA"). Based on the groundwater sampling conducted in 2019, the 18 wells sampled on site for PFAS exceeded the USEPA HAL of 70 ng/L for PFOA ranging between 93 ng/L (MW-29, May 2019) to 6,700 ng/L (MW-37, April 2019). High concentrations of PFAS were detected on site in groundwater monitoring wells placed along the western property boundary and along the southeast property boundary suggesting the potential for upgradient PFAS sources contributing to the PFAS impacts detected on site. A light non-aqueous phase liquid (LNAPL) was observed in MW-12 during 2019 groundwater sampling events. Laboratory analysis of the LNAPL indicated the presence of polyvinyl fluoride (PVF). Please note, PVF is not a PFAS analyte, but a polymer. Further characterization of the LNAPL in MW-12 was completed by Stantec in May 2020. The results of testing of the LNAPL were presented in a June 16, 2020 letter entitled "Further Characterization of LNAPL in MW-12." The June 16, 2020 letter indicates two PFAS compounds (Perfluorobutanoic acid [PFBA] and PFOA) were detected in the LNAPL sample at concentrations greater than laboratory limits of detection. PVF is not mentioned in the June 16, 2020 letter.

According to the recommendations presented in the Stantec 2020 Phase II ESA, partitioning of perfluorinated carboxylates in groundwater along the hydraulic gradient between Building K and downgradient and off-site monitoring wells is occurring. Therefore, future work should focus on delineating the off-site vertical and horizontal extents of PFAS impacts to groundwater. Once delineated, future work will likely be needed to document plume dynamics and stability.

On June 16, 2020, NOC received a Notice of Violation (NOV) letter from the WDNR indicating NOC had failed to submit a Site Investigation Work Plan. In the June 16, 2020 letter, the WDNR indicated that based on the investigation data submitted to date, the Site Investigation Work Plan needs to be submitted to define degree and extent of contamination and the municipal well closest to the site needs to be sampled for PFAS. On June 29, 2020 NOC met with the WDNR concerning the June 16, 2020 letter. The result of the meeting was for NOC to prepare a Site Investigation Work Plan to further investigate the magnitude and extent of PFAS impacted groundwater at the site as a supplemental effort to the work completed to date on site.

PFAS GROUNDWATER INVESTIGATION WORK PLAN APPROACH

Based on the information provided above, Ramboll is submitting this Work Plan to investigate the magnitude and extent of PFAS impacted groundwater initially focusing on the following key aspects:

- The potential for upgradient PFAS sources to be contributing to PFAS impacted groundwater on site. To address this issue, Ramboll is proposing to install four additional groundwater monitoring wells to the

south and west of the site, collect groundwater levels in all existing and new monitoring wells, and complete a comprehensive groundwater monitoring sampling event of all existing and new monitoring wells on site for PFAS.

- Further understanding of the LNAPL identified at MW-12 in May 2019 and May 2020. To address this issue, Ramboll will complete additional characterization and testing of the LNAPL in MW-12.
- The potential for PFAS impacted groundwater on the site to affect water supply wells. To address this issue, Ramboll is proposing to complete a private and municipal well database review to identify the location of water supply wells within a 1-mile radius of the site. Water supply wells identified to be potentially at risk will be sampled if necessary.
- The utilities corridors both on and off site to be considered pathways of concern for contaminant transport. To address this issue, a comprehensive utility corridor assessment will be completed through the review of historic drawings and available site documents from previous consultant reports.

Following completion of the above tasks, Ramboll will prepare a WAC NR 716 WAC *Groundwater Investigation Report* to present the findings and provide recommendations for additional work as necessary. This additional work will likely include downgradient monitoring wells. Ramboll has not proposed installing downgradient monitoring wells at this time since we need to complete the work proposed herein to obtain a comprehensive data round of water level elevations and PFAS concentrations in both upgradient and on-site monitoring wells to develop a Conceptual Site Model (CSM) for targeting appropriate downgradient well locations.

SCOPE OF WORK

The following work activities outline the scope of work and methodology that will be completed during the additional site investigation. Additionally, prior to on-site activities, a site-specific Health and Safety Plan (HASP) will be developed in accordance with Occupational Safety and Health Administration (OSHA) 29 CFR 1910 for the proposed field activities. Ramboll will review the HASP with all field personnel prior to commencing the field activities. Additionally, prior to on-site activities, NOC will work with the CDA on securing access to the site and monitoring wells.

Utility Clearance

Prior to conducting intrusive activities, utility mark-outs will be coordinated through Diggers Hotline. To identify subsurface utilities and confirm their location prior to initiating any intrusive work, Ramboll will contract with a private utility locator to complete geophysical surveys (e.g., using ground-penetrating radar) of the areas where subsurface investigation activities will occur.

Groundwater Monitoring Well Installation, Development, and Surveying

Four WAC NR 141-compliant groundwater monitoring wells (RMW-1, RMW-2, RMW-3, and RMW-4) will be installed utilizing hollow stem auger drilling methodology up to a maximum depth of 20 feet below grade. Well locations were selected to delineate the extent of groundwater impacts south and west of the site and within the City of Manitowoc right-of-way (ROW). Access will be secured from the City of Manitowoc prior to the proposed well installation activities. The proposed monitoring well locations are depicted on Figure 3.

Soil samples will be continuously collected from the borings for visual observation and field screening. Soil samples will be screened in the field with a photoionization detector (PID) equipped with a 10.6 electron volt

(eV) lamp for the presence of volatile organic compounds (VOCs). Soil characteristics (e.g., texture, color), PID readings, and visual and/or olfactory evidence of impacts will be recorded on soil boring logs.

The groundwater monitoring wells will be constructed in accordance with WAC NR 141 requirements using 2-inch diameter, flush thread Schedule 40 polyvinyl chloride (PVC) riser pipe, and 10 feet of 2-inch diameter PVC factory cut (0.010-inch) slotted well screen. Coarse silica filter sand packs will be placed from the bottom of the boreholes to 1 to 2 feet above the top of the well screens. Following placement of the coarse sand packs, 1 to 2 feet of fine sand pack will be placed, followed by bentonite chips or slurry to ground surface. Each monitoring well will be completed with a flush mount cover secured in a 2-foot by 2-foot concrete pad. Special precautions for installing wells for PFAS sampling will be employed.

Groundwater monitoring wells RMW-1, RMW-2, RMW-3, and RMW-4 will be developed in accordance with WAC NR 141 to remove residual materials remaining in the wells after installation and to re-establish the natural hydraulic flow conditions of the formations, which may have been disturbed by the well construction.

Upon completion of the off-site groundwater monitoring well installation activities, the location of each groundwater monitoring well will be surveyed and tied into the existing well network. The top of casing elevations of the four new monitoring wells will be surveyed to vertical accuracies of 0.01 feet to aid in the determination of groundwater flow direction and assessment of groundwater contaminant movement and distribution.

Groundwater Sampling and Analysis

PFAS groundwater samples will be collected from all existing on-site monitoring wells (28 monitoring wells) and the four proposed groundwater monitoring wells (RMW-1, RMW-2, RMW-3, and RMW-4) using special precautions for PFAS sampling. A complete list of site-wide monitoring wells and proposed groundwater analyses are shown in Table 1. Monitoring well locations are shown on Figure 2 and Figure 3. Groundwater sampling will be conducted in general compliance with WDNR guidance, where applicable.

Prior to the groundwater sampling activities, a depth to groundwater measurement will be made using a Heron electronic water level sensor, Model ET-94 (accuracy 0.01 feet) or similar equipment. Depth to groundwater, as well as the total well depth, will be recorded in a bound, PFAS free, field notebook. The monitoring well will be sampled using low-flow groundwater sampling techniques, which involve utilizing a submersible pump with disposable high-density polyethylene (HDPE) tubing. New disposable HDPE tubing will be utilized for sample collection at the well location. A new pair of powder-free nitrile gloves will be used during the collection of each sample to minimize the potential for cross-contamination. Other groundwater sampling equipment will be thoroughly decontaminated between each sampling location using an Alconox[®] solution and rinsed in laboratory supplied PFAS-free, deionized water. Field measurements of temperature, pH, conductivity, dissolved oxygen (DO), and oxygen reducing potential (ORP) will be collected prior to sampling.

The groundwater samples will be placed directly into laboratory-supplied unpreserved 250 ml HDPE containers, which will be sealed, labeled, and placed on ice pending delivery under chain-of-custody procedures to a Wisconsin-certified laboratory, for analysis. If the selected laboratory has not received Wisconsin certification, the laboratory must be enrolled in the certification process and have been audited by the WDNR. One duplicate groundwater sample will be collected per sampling event, one field blank per sampling day and one trip blank per sampling event will be included in the shipping container and will be

analyzed for PFAS. Groundwater samples will be analyzed for PFAS for the State of Wisconsin list of 36 analytes using Modified USEPA Method 537.1.

LNAPL Verification and Investigation

LNAPL was observed in MW-12 during groundwater sampling activities in May 2019 and May 2020. Stantec did not provide the thickness of LNAPL during either sampling event. Stantec results from 2019 indicated the LNAPL was primarily PVF; however, a "Further Characterization of Light Non-Aqueous Phase Liquid in MW-12" letter was submitted to the WDNR on June 16, 2020, indicating the LNAPL contained PFOA and PFBA. The letter does not mention PVF as a component of the LNAPL. Furthermore, fluid level measurements, including LNAPL thickness within the monitoring well, were not collected during either sampling event.

Given the inconsistency between the two Stantec sampling event results, Ramboll will complete characterization of the LNAPL by performing additional PFAS laboratory analysis and fingerprinting of the LNAPL in MW-12 (including the potential for the LNAPL to be polymer based). In addition, Ramboll will further evaluate the thickness and mobility of the LNAPL by conducting a LNAPL bail-down test in MW-12 utilizing ASTM E2856-13: Standard Guide for Estimation of LNAPL Transmissivity (ASTM 2013). A LNAPL bail-down test will be completed by quickly removing accumulated LNAPL from MW-12 and measuring the flow rate of LNAPL into the well from the surrounding geologic formation. The rate of LNAPL flowing into the well is a function of soil and LNAPL properties and the magnitude of the hydraulic gradient toward the well after LNAPL removal. Results of the LNAPL transmissivity test will be documented and discussed in the limited *Groundwater Investigation Report*.

Investigation Derived Waste Management and Waste Characterization

Soil cuttings, purge water, and LNAPL generated during groundwater monitoring well installation, groundwater sampling activities, and LNAPL bail-down activities will be containerized in individual 55-gallon drums and labeled. The drums will be staged at an approved, accessible location designated by the Manitowoc CDA. A waste characterization composite sample will be collected from the soil cutting drums and submitted to a Wisconsin-certified laboratory (or undergoing the certification process and been audited by the WDNR), for the following analyses:

- Polychlorinated Biphenyls (PCBs) (USEPA Method 8082);
- Toxicity Characteristic Leaching Procedure (TCLP) Resource Conservation and Recovery Act (RCRA) Metals (USEPA Method 6010);
- TCLP VOCs;
- Total VOCs (USEPA Method 8260);
- TCLP semi-volatile organic compounds (SVOCs);
- Flashpoint (USEPA Method 1010);
- Total Cyanide (USEPA Method 9014); and
- PFAS (Modified Method 537).

A waste characterization composite sample will be collected from the purge water and LNAPL drums and submitted to a Wisconsin-certified laboratory (or undergoing the certification process and been audited by the WDNR), for the following analyses:

- PCBs (USEPA Method 8082);
- RCRA Metals, totals (USEPA Method 6010);
- VOCs (USEPA Method 8260);
- SVOCs (USEPA Method 8270);
- Flashpoint (USEPA Method 1010);
- Total Cyanide (USEPA Method 9014); and
- PFAS (Modified Method 537.1).

A waste profile will be completed and submitted to a waste disposal company for transportation and disposal at a licensed waste facility. Waste disposal documentation will be provided in the *Groundwater Investigation Report*.

Utility Corridor Review and Evaluation

Concurrent with the PFAS groundwater investigation, historic drawings and previously provided Phase I ESAs will be reviewed to determine utility and utility corridor locations, depths, and potential contaminant pathways. Ramboll will also review City of Manitowoc files for additional drawings if present. A comprehensive utility corridor figure with subsurface utilities, including tunnels, will be developed, evaluated, and presented in the *Groundwater Investigation Report*.

Additionally, as noted on historic drawings, Sherman Creek was located in the northwestern corner of the property and was channelized into a storm sewer. Water levels within the existing Sherman Creek access vaults (manholes) located along the property boundary will be gauged and compared to the existing water levels from the monitoring well network to assess hydrogeologic influence. At no time during gauging activities will the vaults be entered by Ramboll personnel. Access locations are shown on Figure 3.

Private and Municipal Well Review

Prior to initiating the PFAS groundwater monitoring investigation a comprehensive private and municipal water supply well review and database search will be completed within 1 mile of the former Mirro Plant No. 9 site. Private and municipal wells identified within 1 mile of the facility will be evaluated, tabled, identified on a figure, and the potential for the water supply to be affected will be discussed in the *Groundwater Investigation Report*. Recommendations for sampling of any identified water supply wells will be included in the *Groundwater Investigation Report*.

REPORTING

In accordance with WAC NR 716.14, Ramboll will prepare brief notification letters with sampling results to the WDNR within 10 business days of receiving the laboratory analytical report and completing a quality assurance review of the PFAS data. We are asking for additional time for data notification given the need to perform a QA review of the PFAS data. A separate notification letter will be sent to the CDA.

Additionally, a *Groundwater Investigation Report* will be submitted within 60 days of receiving the laboratory analytical report. The *Groundwater Investigation Report* will include the results of PFAS analytical data obtained from the groundwater sampling activities, property utility corridor assessment, and private and municipal well database assessment proposed herein. The report will discuss potential source(s) of PFAS including potential other sources in the site area and outline next steps for further investigation if necessary.

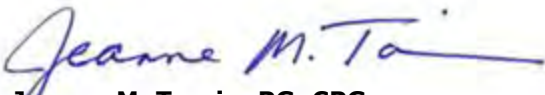
SCHEDULE

The investigation activities described herein are anticipated to be completed within 1 month of NOC obtaining access to the former Mirro Plant No. 9 site and the City of Manitowoc ROW. The *Groundwater Investigation Report* will be submitted within 60 days of receiving the laboratory analytical report.

If you have any questions concerning this Work Plan, please call me at your convenience.

Sincerely,

Ramboll US Corporation



Jeanne M. Tarvin, PG, CPG

Managing Principal

D 262 901 0085

jtarvin@ramboll.com

cc: Kristin Holloway Jones, Newell Operating Company
Gabriel Rodriguez, Schiff Hardin



TABLE

Table 1
Monitoring Well Construction
and Laboratory Analysis Schedule
Former Mirro Plant No. 9
Newell

Monitoring Well	Total Well Depth (feet-bgs)	Screen Length (feet)	Top of PVC Elevation (feet AMSL)	Screen Interval		Groundwater Laboratory Analyses
				Top (feet AMSL)	Bottom (feet AMSL)	
AMEC MW-14	13.86	10	605.61	601.75	591.75	PFAS (Wisconsin List of 36 analytes)
AMEC MW-15	15.10	10	601.20	596.10	586.10	
AMEC MW-16	29.25	10	599.36	580.11	570.11	
AMEC MW-16A	14.87	5	599.06	589.19	584.19	
AMEC MW-17	15.14	10	600.49	595.35	585.35	
AECOM MW-18	20.28	10	606.86	596.58	586.58	
AECOM MW-19	18.51	10	607.16	598.65	588.65	
MW-3	15	10	606.17	601.17	591.17	
MW-5	10	5	604.5	599.5	594.5	
MW-6	15	10	605.79	600.79	590.79	
MW-7	20	10	606.78	596.78	586.78	
MW-8	15	10	606.46	601.46	591.46	
MW-9	15	10	606.49	601.49	591.49	
MW-12	17	10	606.54	599.54	589.54	
MW-15	17	10	606.43	599.43	589.43	
MW-16	16	10	606.81	600.81	590.81	
MW-17	17	10	606.79	599.79	589.79	
MW-19	15	10	605.08	600.08	590.08	
MW-25	15	10	606.52	601.52	591.52	
MW-29	7	5	606.51	604.51	599.51	
MW-31	17	10	607.11	600.11	590.11	
MW-37	17	10	606.46	599.46	589.46	
MW-48	12	10	603.55	601.55	591.55	
MW-60	15	10	606.6	601.6	591.6	
MW-67	17	10	607.12	600.12	590.12	
MW-82	15	10	606.36	601.36	591.36	
MW-99	13	10	603.47	600.47	590.47	
MW-121	15	10	600.1	595.1	585.1	
RMW-1 (Proposed MW)	15	10	NA	NA	NA	
RMW-2 (Proposed MW)	15	10	NA	NA	NA	
RMW-3 (Proposed MW)	15	10	NA	NA	NA	
RMW-4 (Proposed MW)	15	10	NA	NA	NA	

Notes:

Monitoring wells surveyed by others.

bgs = below ground surface

AMSL = above mean sea level

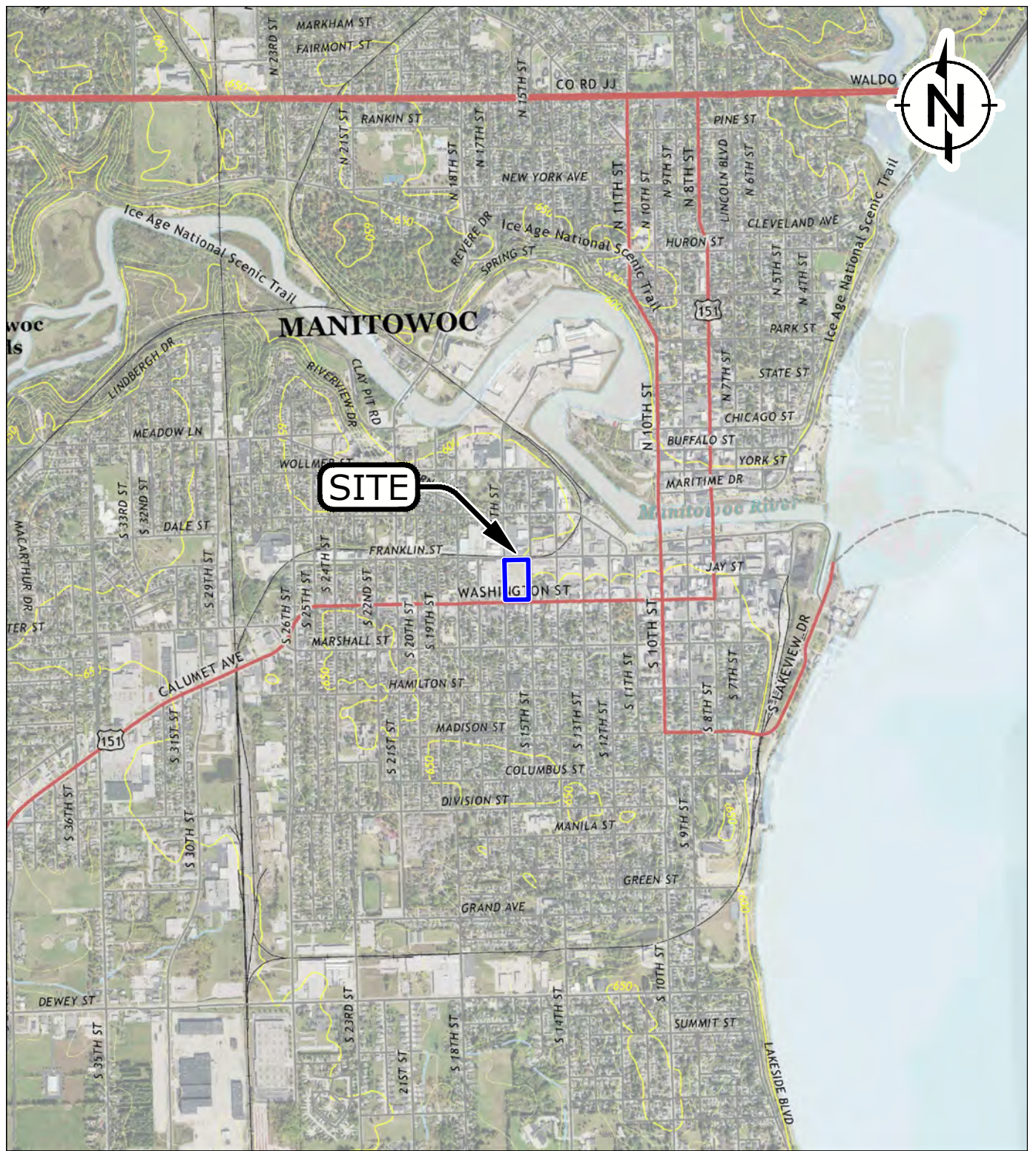
NA = Not Available

PFAS = per- and polyfluoroalkyl substances

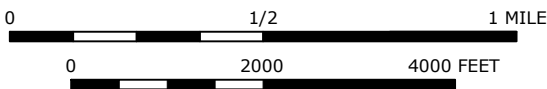


FIGURES

E:_CAD\NO#00_P21-18211\PH\01_Site Location Map (Mirro).dwg



CONTOUR INTERVAL 10 FEET



LEGEND:

PROPERTY BOUNDARY (APPROXIMATE)

SOURCE:
2018 USGS 7.5 Minute Series Manitowoc, Wisconsin Topographic Quadrangle.
Site Location; N: 44.089945 W: 87.668256 WGS84



QUADRANGLE LOCATION

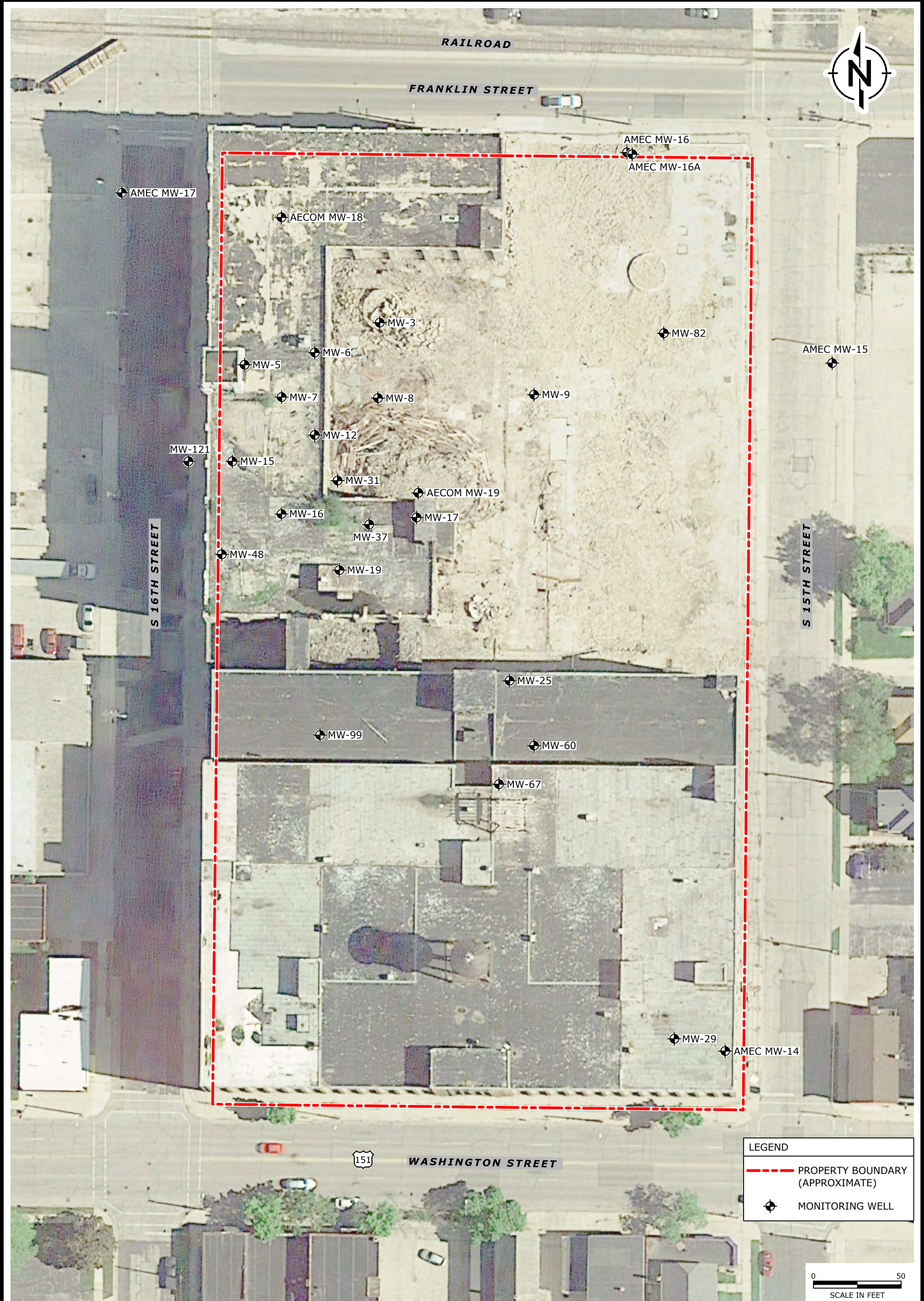


SITE LOCATION MAP
 FORMER MIRRO SITE
 1512 WASHINGTON STREET
 MANITOWOC, WISCONSIN

FIGURE
1

DRAFTED BY: APR

DATE: 11/28/18



SOURCE: AERIAL IMAGERY: GOOGLE EARTH™, IMAGE DATED 06/01/2015.

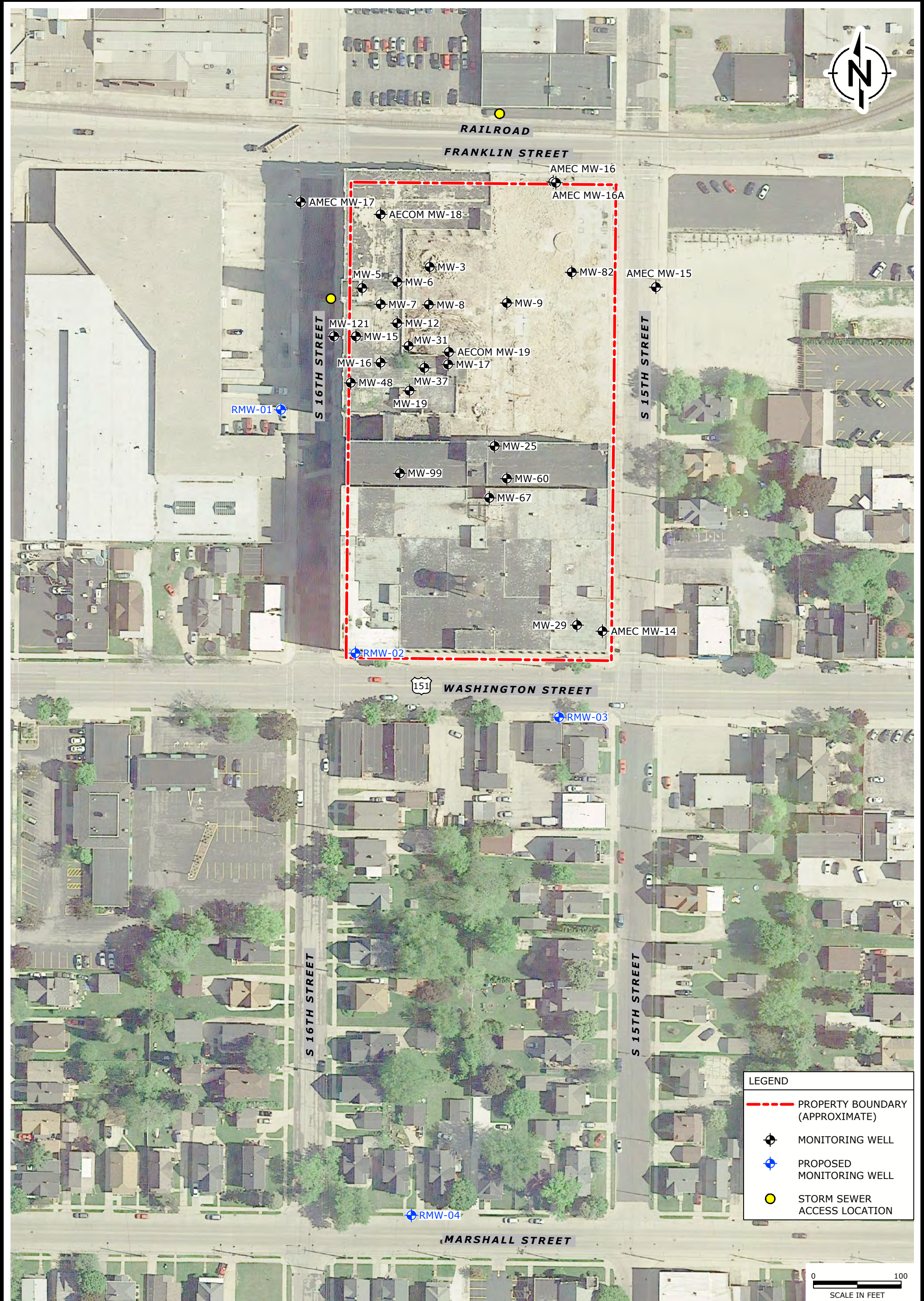
RAMBOLL

DRAFTED BY: HJW DATE: 7/14/20

SITE LAYOUT
 FORMER NEWELL SITE (MIRRO PLANT NO. 9)
 1512 WASHINGTON STREET
 MANITOWOC, WISCONSIN

FIGURE
2

1690011063



SOURCE: AERIAL IMAGERY: GOOGLE EARTH™, IMAGE DATED 06/01/2015.

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DRAFTED BY: HJW DATE: 7/15/20

PROPOSED MONITORING WELL LOCATIONS
 FORMER NEWELL SITE (MIRRO PLANT NO. 9)
 1512 WASHINGTON STREET
 MANITOWOC, WISCONSIN

FIGURE
3

1690011063