

Our ref: 003978-RPT-51

May 31, 2023

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**Vapor Intrusion Evaluation Summary Report
Wausau Water Supply NPL Site
Wausau, Wisconsin**

Dear Ms. Bianchin and Mr. Thompson:

1. Overview

The Wausau Superfund Site is located on the north side of the City of Wausau, in north central Wisconsin, along the Wisconsin River in Marathon County. Figure 1.1 shows the location of the Site. The Site consists of two contaminant source areas separated by the Wisconsin River. The East Bank portion of the Site is related to solvent spills on property operated by Wausau Chemical Corporation (WCC). The West Bank portion of the Site is related to the former City of Wausau landfill. The former landfill property is presently owned by Regal Beloit Corporation (formerly Marathon Electric Company). These two properties are considered source areas for contaminants in the aquifer, which is the source of drinking water for the City of Wausau. The East Bank and West Bank areas are depicted on the Site Plan, Figure 1.2.

On March 2, 2023 GHD performed additional field work to supplement existing Site data in an effort to better understand the potential for vapor intrusion (VI) risk in areas adjacent to the known groundwater plume footprints at the Site. These activities are listed below and summarized in greater detail in the sections to follow.

1. Installation of sub-slab vapor sampling points.
2. Collected additional sub-slab and indoor air samples at select commercial/industrial buildings on the West Bank and East Bank. East Bank sub-slab and indoor air sampling has occurred on seven occasions from April 2017 through September 2019 and again in March 2023. The East Bank results are summarized in Section 2.2. West Bank samples were collected on three occasions in March 2017, August 2017, and March 2023. The West Bank results are summarized in Section 2.4.
3. Collected preferential pathway samples from sanitary sewer manholes that are "up-flow" and "down-flow" of the Former Wausau Chemical Company.

2. Sub-slab and Indoor Air Sampling Results

Sub-slab vapor and indoor air sampling was conducted at any commercial buildings that were identified as potential vapor intrusion risks based on their proximity to source areas or elevated groundwater concentrations. The scope of this evaluation included assessing commercial/industrial buildings for occupancy, construction, basements, ventilation, and presence of radon mitigation system. Where access was granted, sub-slab and indoor air locations were sampled during the March 2023 event.

2.1 East Bank Sub-slab and Indoor Air Sampling

East Bank commercial sub-slab and indoor air has been conducted at two commercial properties (Bridge Community Clinic and D&J Rentals).

Sub-slab and indoor air sample locations are shown on Figure 2.1. Three sampling events have been performed in April 2017, July 2017, and March 2023. All samples were collected using vacuum canisters and laboratory analysis was performed using the TO-15 method for PCE, TCE, c12DCE, and vinyl chloride.

2.2 East Bank Small Commercial Sub-slab and Indoor Air Results

Two small commercial properties were evaluated as part of the sub-slab and indoor air investigation (Bridge Community Clinic and D&J Rentals). Samples have been collected in April 2017, July 2017, and March 2023, at the Bridge Community Clinic location. Additionally, samples have been collected in April 2019, September 2019, and March 2023 at D&J Rentals location. Samples collected from the East Bank were analyzed using the TO-15 method for PCE, TCE, c12DCE, and vinyl chloride. Sub-slab and indoor air laboratory results are presented in Table 1. Concentrations were assessed relative to the USEPA/WDNR small commercial screening levels and none of the results exceeded an action level.

PCE was also detected in one of the indoor air samples collected in the basement level of the Bridge Community Clinic building, but the concentration was far below the respective action level, as shown in Table 1. Based on the past and current East Bank residential and commercial indoor air results, there does not appear to be a health risk at the tested properties related to potential vapor intrusion of Site chemicals. No additional vapor intrusion evaluation is recommended.

2.3 West Bank Sub-slab and Indoor Air Sampling

Sub-slab and indoor air sampling on the West Bank was limited to the Marathon Electric (Regal) property. Groundwater results from residential areas hydraulically downgradient from Marathon Electric revealed that the shallow groundwater is not impacted. Thus, additional vapor intrusion evaluation of the West Bank residential area was not required.

Based on the close proximity of Marathon Electric buildings to the former City landfill, sub-slab sampling was performed at five total locations in the two buildings closest to the former landfill. Sub-slab and indoor air sample locations are shown on Figure 2.1. Three sampling events have been performed in March 2017, August 2017, and March 2023. All samples were collected using vacuum canisters and laboratory analysis was performed using the TO-15 method for TCE, c12DCE, CT, chloroform, and vinyl chloride.

2.4 West Bank Sub-slab and Indoor Air Results

West Bank sub-slab results are presented in Table 2. The vapor data were compared to sub-slab screening levels and indoor air action levels for large industrial buildings. The sub-slab TCE concentrations from the past and current sampling events at SS-2 beneath Building B and at SS-5 beneath Building A exceeded the screening level of 880 µg/m³. Chloroform and CT were also detected in some of the sub-slab samples, but all concentrations were below their respective screening levels.

Indoor air samples were collected from one location inside each building, as shown on Figure 2.1. There have been detections during the three sampling events varying from TCE, CT, and chloroform, however, all concentrations were far below the indoor air action levels for large industrial buildings.

Since the indoor air concentrations did not suggest a health risk to Marathon Electric employees, no additional vapor intrusion evaluation is recommended on the West Bank.

3. VI Preferential Pathway Sampling

The historical groundwater and VI analytical results do not indicate that any contaminated utility conduits exist, nor are they contributing to commercial or residential buildings. The City of Wausau provided utility maps showing the locations of sewer and water mains in the investigation areas. After reviewing these maps in relation to our investigation areas, there appear to be no direct connections to the commercial/industrial buildings. Specifically on the West Bank where the residential area is upgradient from the Site and the groundwater depth is significantly lower than the East Bank thus no preferential pathway samples were collected. Three locations were sampled on the East Bank as there are some residential homes near and downgradient from the Site.

Manhole vapor sampling was completed per the WDNR Guidance Document and followed the recommended sampling method for manholes. This consisted of collecting a grab sample with an evacuated canister. The opening to the manholes that were sampled were small enough to fit the tubing down, thus there was no need to seal the tubing. The tubing was placed down the manhole to a depth that was approximately 1 foot above the bottom of the sewer or top of liquid. A grab sample was collected using a one-liter summa canister.

Since sanitary sewers are not a concern for allowing vapor phase contaminants into occupied structures, these vapor samples will be analyzed for PCE, TCE, c12DCE, and vinyl chloride, similar to the other samples collected on the East Bank.

3.1 Manhole Vapor Sampling Results

Three manhole locations were sampled (MH1140, MH1282, and MH9122) and their locations are shown on Figure 3.1. The manhole location MH1132 that was proposed in the approved work plan could not be sampled due to the high traffic location of the manhole. An alternate manhole was selected approximately 300 feet to the west of MH1132. The alternate manhole location selected was MH1922 and is noted on Figure 3.1. The manhole vapor samples were analyzed for PCE, TCE, c12DCE, and vinyl chloride, similar to the other samples collected on the East Bank and the data is provided on Table 3.

Based on the *Wisconsin DNR vapor action level (VAL)*¹ with the attenuation factor of 0.03. There were no exceedances at the three locations that were sampled.

4. Recommendations

Based on the past and current East and West Bank residential and West Bank commercial indoor air results, there does not appear to be a health risk at the tested properties related to potential vapor intrusion of Site chemicals. In addition, the Preferential Pathway sample results indicated no exceedances. Given the data provided in this report, no additional vapor intrusion evaluation or Preferential Pathway is recommended.

¹ Guidance: Wisconsin Vapor Quick Look-Up Tables, Indoor Air Vapor Action Levels and Vapor Risk Screening Levels (Based on November 2022 U.S. EPA Regional Screening Levels)

Regards,

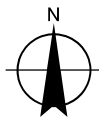
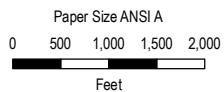
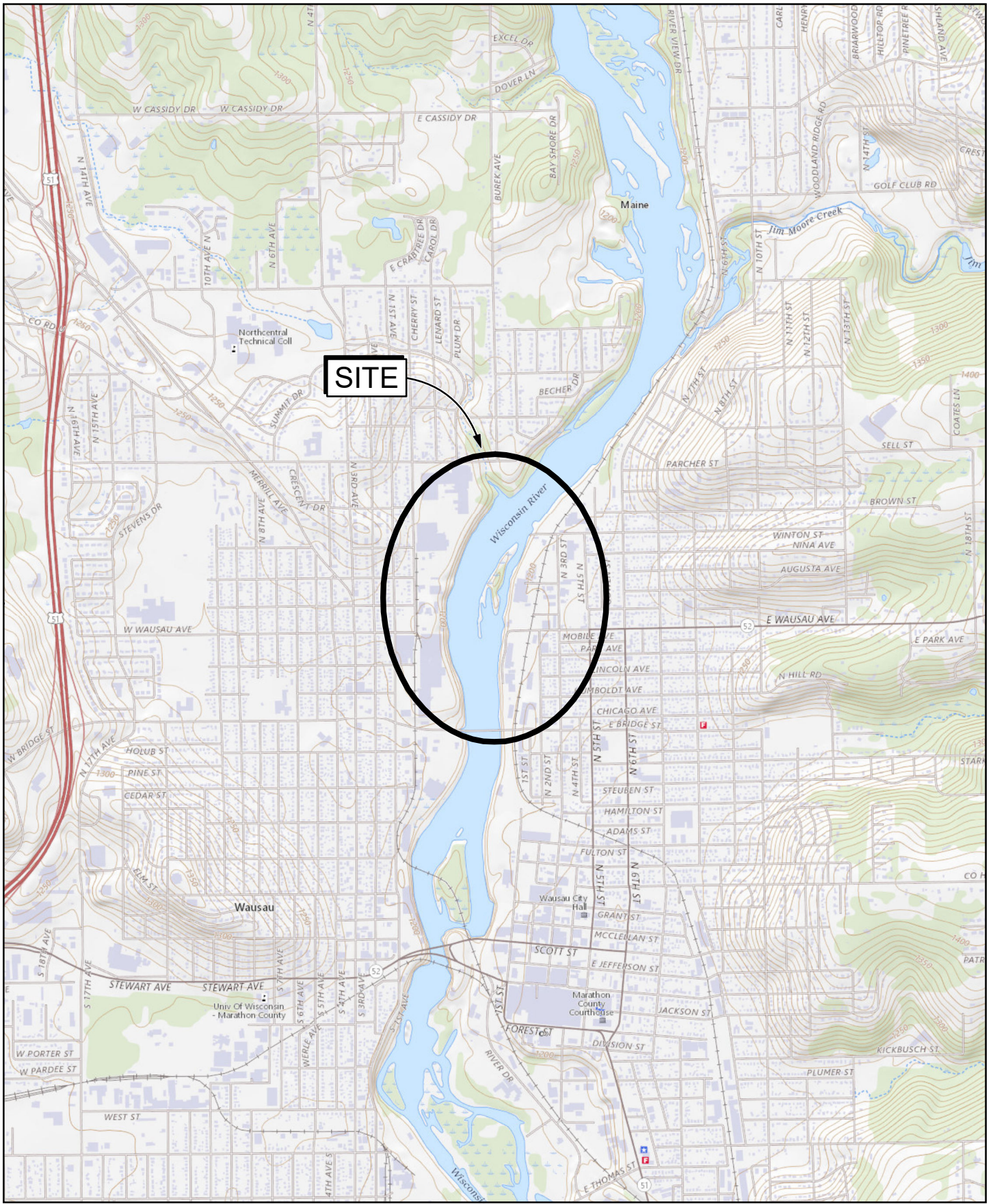
A handwritten signature in black ink, appearing to read "D. Ojinaga". The signature is stylized and cursive.

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OJ/kg/RPT-51

Figures



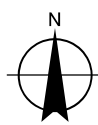
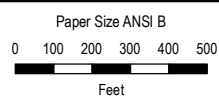
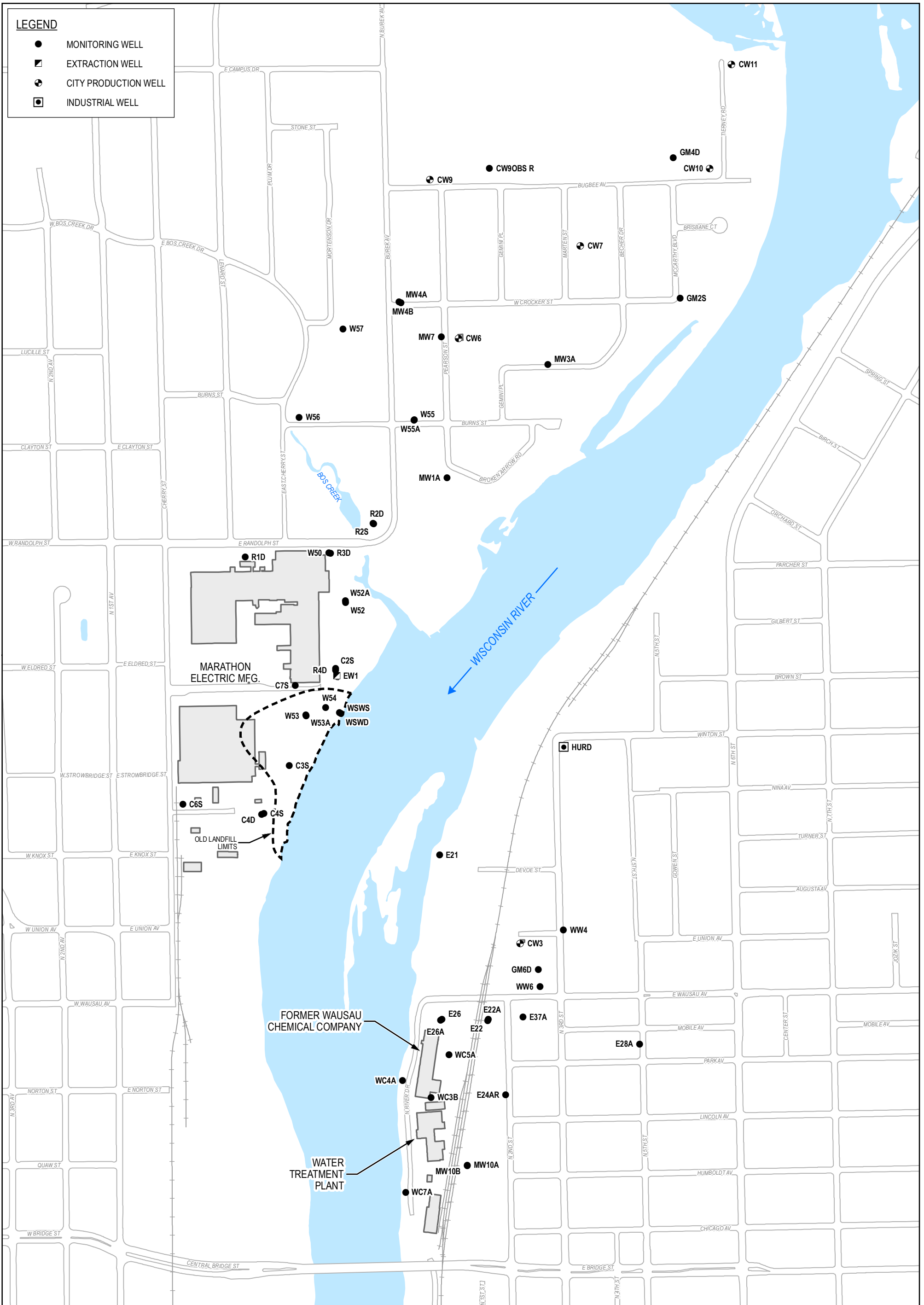
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 Grid: NAD 1983 HARN WISCRS Marathon County Feet

**WAUSAU WATER SUPPLY NPL SITE
 WAUSAU, WISCONSIN**

Project No. 003978-00
 Revision No. -
 Date 05/11/2023

SITE LOCATION

FIGURE 1.1



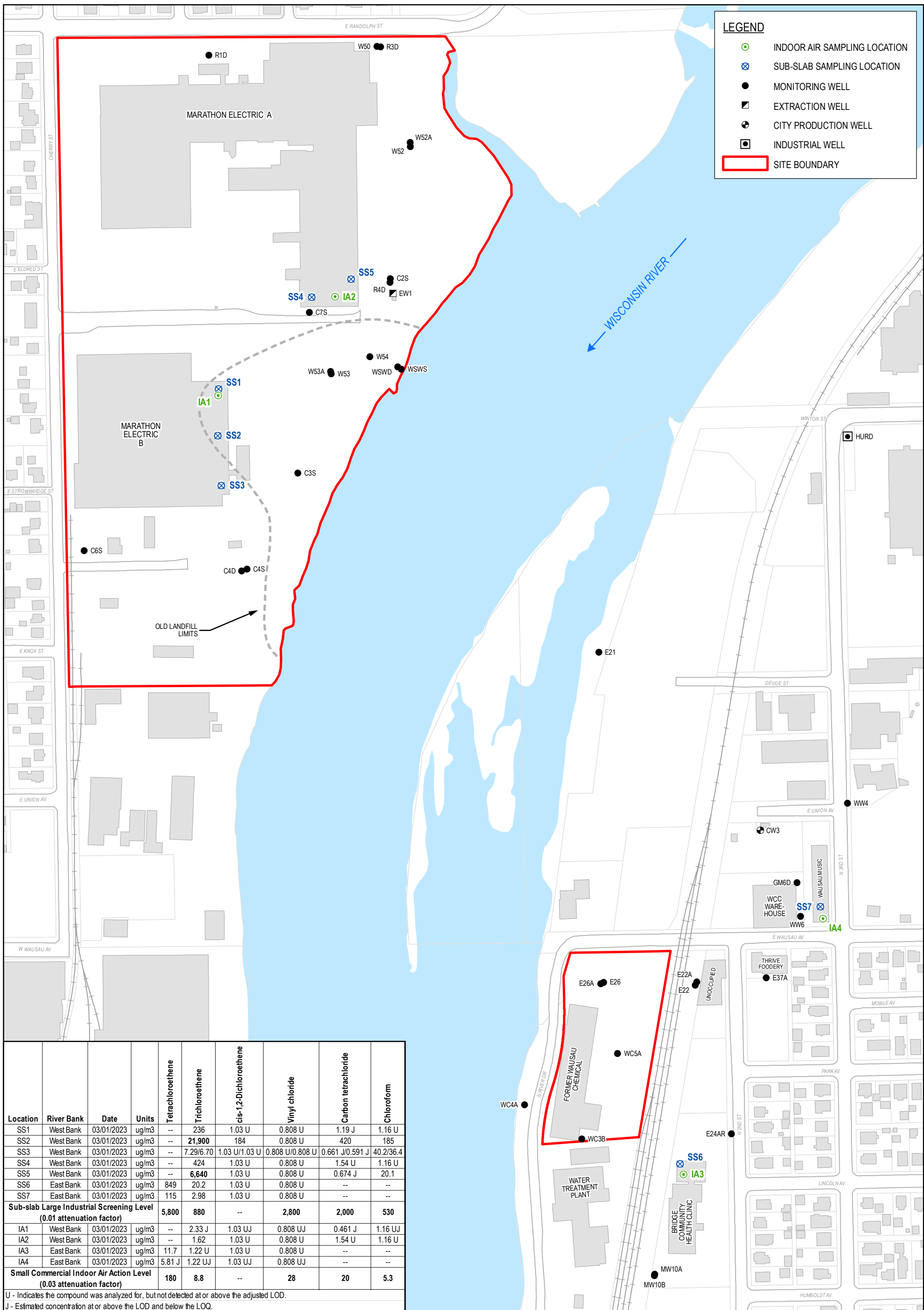
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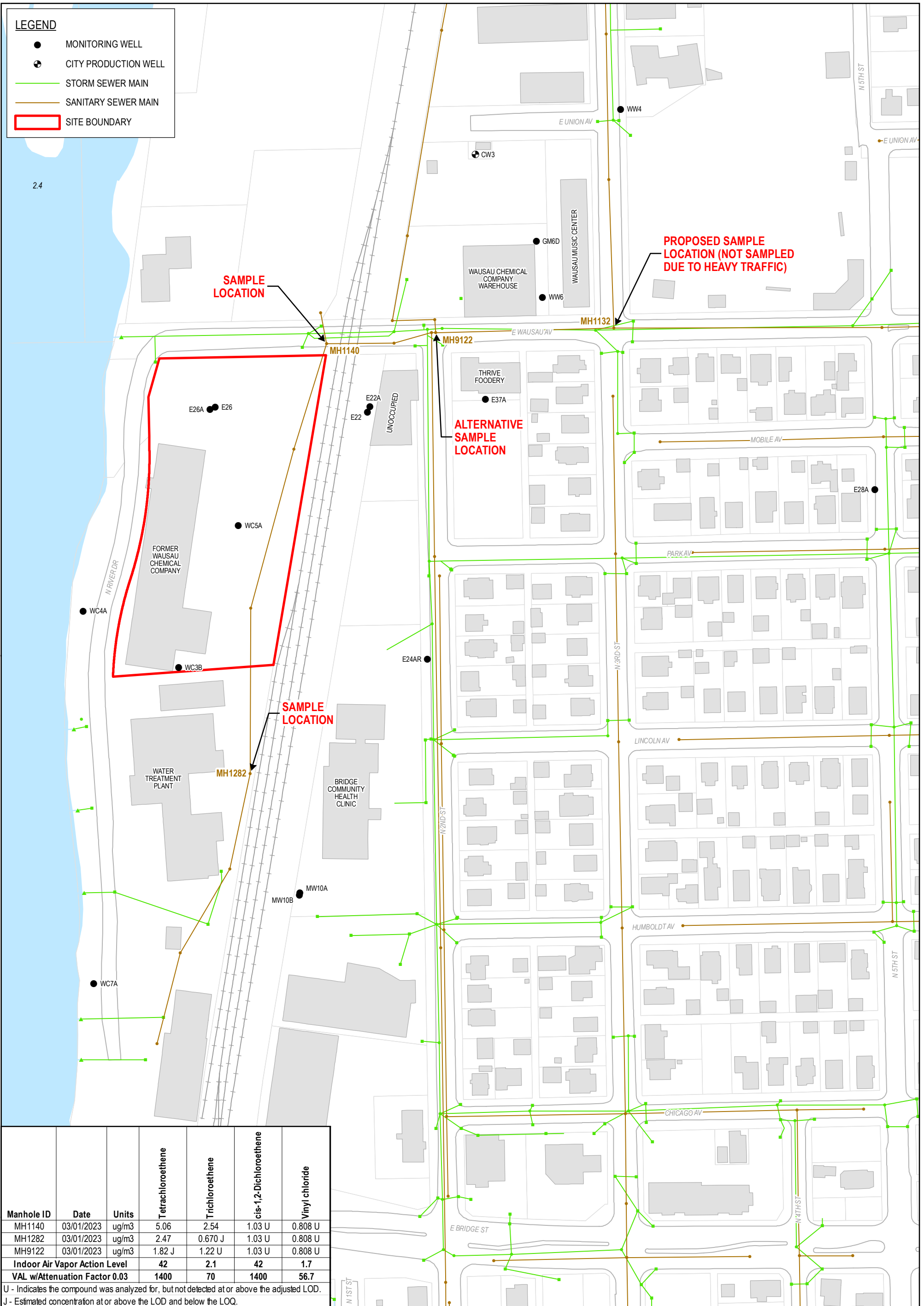
SITE PLAN

FIGURE 1.2



Location	River Bank	Date	Units	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	Vinyl chloride	Carbon tetrachloride	Chloroform
SS1	West Bank	03/01/2023	ug/m3	--	236	1.03 U	0.808 U	1.19 J	1.16 U
SS2	West Bank	03/01/2023	ug/m3	--	21,900	184	0.808 U	420	185
SS3	West Bank	03/01/2023	ug/m3	--	7.29/6.70	1.03 U/1.03 U	0.808 U/0.808 U	0.661 J/0.591 J	40.2/36.4
SS4	West Bank	03/01/2023	ug/m3	--	424	1.03 U	0.808 U	1.54 U	1.16 U
SS5	West Bank	03/01/2023	ug/m3	--	6,640	1.03 U	0.808 U	0.674 J	20.1
SS6	East Bank	03/01/2023	ug/m3	849	20.2	1.03 U	0.808 U	--	--
SS7	East Bank	03/01/2023	ug/m3	115	2.98	1.03 U	0.808 U	--	--
Sub-slab Large Industrial Screening Level (0.01 attenuation factor)				5,800	880	--	2,800	2,000	530
IA1	West Bank	03/01/2023	ug/m3	--	2.33 J	1.03 UJ	0.808 UJ	0.461 J	1.16 UJ
IA2	West Bank	03/01/2023	ug/m3	--	1.62	1.03 U	0.808 U	1.54 U	1.16 U
IA3	East Bank	03/01/2023	ug/m3	11.7	1.22 U	1.03 U	0.808 U	--	--
IA4	East Bank	03/01/2023	ug/m3	5.81 J	1.22 UJ	1.03 UJ	0.808 UJ	--	--
Small Commercial Indoor Air Action Level (0.03 attenuation factor)				180	8.8	--	28	20	5.3

U - Indicates the compound was analyzed for, but not detected at or above the adjusted LOD.
 J - Estimated concentration at or above the LOD and below the LOQ.

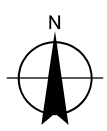
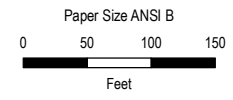


LEGEND

- MONITORING WELL
- ⊕ CITY PRODUCTION WELL
- STORM SEWER MAIN
- SANITARY SEWER MAIN
- ▭ SITE BOUNDARY

Manhole ID	Date	Units	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	Vinyl chloride
MH1140	03/01/2023	ug/m3	5.06	2.54	1.03 U	0.808 U
MH1282	03/01/2023	ug/m3	2.47	0.670 J	1.03 U	0.808 U
MH9122	03/01/2023	ug/m3	1.82 J	1.22 U	1.03 U	0.808 U
Indoor Air Vapor Action Level			42	2.1	42	1.7
VAL w/Attenuation Factor 0.03			1400	70	1400	56.7

U - Indicates the compound was analyzed for, but not detected at or above the adjusted LOD.
 J - Estimated concentration at or above the LOD and below the LOQ.



Map Projection: Lambert Conformal Conic
 Horizontal Datum: North American 1983 HARN
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WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

PREFERENTIAL PATHWAY
INVESTIGATION
SAMPLING LOCATIONS

Project No. 003978-00
 Revision No. -
 Date 05/11/2023

FIGURE 3.1

Tables

Table 1

**East Bank Subslab and Indoor Air Lab Results
Wausau Water Supply NPL Site
Wausau, Wisconsin**

SUB-SLAB						
Property Location	Date	Units	Tetrachloroethene	Trichloroethene	c-1,2-Dichloroethene	Vinyl chloride
Bridge Comm. Clinic	4/4/2017	ug/m3	3,000	58	7.6 U	5.9 U
Bridge Comm. Clinic	7/31/2017	ug/m3	2,700	65	6.7 U	5.2 U
Bridge Comm. Clinic	3/1/2023	ug/m3	849	20.2	1.03 U	0.808 U
D&J Showroom	4/25/2019	ug/m3	740	25	0.095U	0.074U
D&J South Storage	4/25/2019	ug/m3	97	15	0.40 J	0.074U
D&J South Storage Dup.	4/25/2019	ug/m3	100	16	1.6 J	0.074U
D&J Showroom	9/24/2019	ug/m3	1,100	37	0.40U	0.66U
D&J South Storage	9/24/2019	ug/m3	240	11	1.1 J	0.074U
D&J South Storage Dup	9/24/2019	ug/m3	220	10	1.1 J	0.074U
D&J South Storage	3/1/2023	ug/m3	115	2.98	1.03 U	0.808 U
Sub-slab Large Industrial Screening Level (0.01 attenuation factor)			5,800	880	--	2,800

INDOOR AIR						
Commercial Properties	Date	Sample Location	Tetrachloroethene	Trichloroethene	c-1,2-Dichloroethene	Vinyl chloride
Bridge Comm. Clinic	4/4/2017	Basement	16	0.44	0.095 U	0.074 U
Bridge Comm. Clinic	7/31/2017	Basement	2.1	0.34	0.095 U	0.074 U
Bridge Comm. Clinic	3/1/2023	Basement	11.7	1.22 U	1.03 U	0.808 U
D&J - Showroom	4/25/2019	Basement	0.68	0.098	0.95U	0.74U
D&J - Showroom	9/24/2019	Basement	2.2	0.088	0.04U	0.066U
D&J - Showroom	3/1/2023	Basement	5.81 J	1.22 UJ	1.03 UJ	0.808 UJ
Small Commercial Indoor Air Action Level (0.03 attenuation factor)			180	8.8	--	28

Note: All units µg/m3

Screening Levels and Action Levels are from Wisconsin DNR "WI Vapor Quick Look-Up Table, Indoor Air Vapor Action Levels and Vapor Risk Screening Levels. Based on November 2022 U.S.EPA Regional Screening Levels.

U - Indicates the compound was analyzed for, but not detected at or above the adjusted LOD.

J - Estimated concentration at or above the LOD and below the LOQ.

Table 2

**West Bank Sub-slab Vapor and Indoor Air Results
Wausau Water Supply NPL Site
Wausau, Wisconsin**

			Trichloroethene	c-1,2-Dichloroethene	Vinyl chloride	Carbon tetrachloride	Chloroform
Sub-slab Regal - March 2017	Date	Units					
SS-1 (north side Building B)	3/13/2017	ug/m3	270	1.3 J	0.37 U	0.47 U	0.40 J
SS-2 (middle Building B)	3/13/2017	ug/m3	9,400	150	21 U	1,200	220
SS-3 (south side Building B)	3/13/2017	ug/m3	0.78	0.95 U	0.74 U	0.62	0.17 J
SS-4 (southeast side Building A)	3/13/2017	ug/m3	220	0.99 J	0.25 U	5.3	1.5
SS-5 (southeast side Building A)	3/13/2017	ug/m3	4,800	17 U	13 U	17 U	41 J
Sub-slab Large Industrial Screening Level (0.01 attenuation factor)			880	--	2,800	2,000	530

Indoor Air Regal - March 2017

Indoor Air - Building B	3/13/2017	ug/m3	1.6	0.095 U	0.074 U	0.44 J	0.15 J
Indoor Air - Building A	3/13/2017	ug/m3	0.82	0.095 U	0.074 U	0.42 J	0.14 J
Industrial Indoor Air Action Level			8.8	--	28	20	5.3

Outdoor Air near Building B	3/13/2017	ug/m3	0.075 U	0.095 U	0.074 U	0.41 J	0.093 J
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Table 2

**West Bank Sub-slab Vapor and Indoor Air Results
Wausau Water Supply NPL Site
Wausau, Wisconsin**

			Trichloroethene	c-1,2-Dichloroethene	Vinyl chloride	Carbon tetrachloride	Chloroform
Sub-slab Regal - August 2017	Date	Units					
SS-1 (north side Building B)	8/1/2017	ug/m3	280	1.3 J	0.74 U	0.94 U	0.73 U
SS-2 (middle Building B)	8/1/2017	ug/m3	15,000	260	43 U	1,800	470
SS-3 (south side Building B)	8/1/2017	ug/m3	0.75 U	0.95 U	0.74 U	5.5	0.73 U
SS-4 (southeast Building A)	8/2/2017	ug/m3	9.4	0.95 U	0.74 U	0.94 U	0.73 U
SS-5 (southeast Building A)	8/1/2017	ug/m3	4,900	15 U	12 U	15 U	50 J
Sub-slab Large Industrial Screening Level (0.01 attenuation factor)			880	--	2,800	2,000	530
Indoor Air Regal - August 2017							
Indoor Air - Building B	8/1/2017	ug/m3	0.075 U	0.095 U	0.074 U	0.41 J	0.15 J
Indoor Air - Building A	8/1/2017	ug/m3	0.17 J	0.095 U	0.074 U	0.45 J	0.14 J
Industrial Indoor Air Action Level (0.01 attenuation factor)		(0.01)	8.8	--	28	20	5.3
Outdoor Air near Building B	8/1/2017	ug/m3	0.075 U	0.095 U	0.074 U	0.44 J	0.14 J

Table 2

**West Bank Sub-slab Vapor and Indoor Air Results
Wausau Water Supply NPL Site
Wausau, Wisconsin**

			Trichloroethene	c-1,2-Dichloroethene	Vinyl chloride	Carbon tetrachloride	Chloroform
Sub-slab Regal - March 2023							
	Date	Units					
SS-1 (north side Building B)	3/1/2023	ug/m3	236	1.03 U	0.808 U	1.19 J	1.16 U
SS-2 (middle Building B)	3/1/2023	ug/m3	21,900	184	0.808 U	420	185
SS-3 (south side Building B)	3/1/2023	ug/m3	7.29/6.70	1.03 U/1.03U	0.808 U/0.808 U	0.661 J/0.591J	40.2/36.4
SS-4 (southeast side Building A)	3/1/2023	ug/m3	424	1.03 U	0.808 U	1.54 U	1.16 U
SS-5 (southeast side Building A)	3/1/2023	ug/m3	6,640	1.03 U	0.808 U	0.674 J	20.1
Sub-slab Large Industrial Screening Level (0.01 attenuation factor)			880	--	2,800	2,000	530
Indoor Air - March 2023							
Indoor Air - Building B	3/1/2023	ug/m3	2.33 J	1.03 UJ	0.808 UJ	0.461 J	1.16 UJ
Indoor Air - Building A	3/1/2023	ug/m3	1.62	1.03 U	0.808 U	1.54 U	1.16 U
Industrial Indoor Air Action Level (0.01 attenuation factor)			8.8	--	28	20	5.3

Notes:

4,800 - Result exceeded applicable screening level

Note: All units µg/m3

Screening Levels and Action Levels are from Wisconsin DNR "WI Vapor Quick Look-Up Table, Indoor Air Vapor Action Levels and Vapor Risk Screening Levels. Based on November 2022 U.S.EPA Regional Screening Levels.

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J - Estimated concentration at or above the LOD and below the LOQ.

**Preferential Pathway Vapor Results
Wausau Water Supply NPL Site
Wausau, Wisconsin**

Manhole ID	Date	Units	Tetrachloroethene	Trichloroethene	c-1,2-Dichloroethene	Vinyl chloride
MH1140	3/1/2023	ug/m3	5.06	2.54	1.03 U	0.808 U
MH1282	3/1/2023	ug/m3	2.47	0.670 J	1.03 U	0.808 U
MH9122	3/1/2023	ug/m3	1.82 J	1.22 U	1.03 U	0.808 U
Indoor Air Vapor Action Level (VAL)			42.0	2.1	42	1.7
VAL w/Attenuation Factor 0.03			1400	70	1400	56.7

Note: All units µg/m3

Screening Levels and Action Levels are from Wisconsin DNR "WI Vapor Quick Look-Up Table, Indoor Air Vapor Action Levels and Vapor Risk Screening Levels. Based on November 2022 U.S.EPA Regional Screening Levels.

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