From: Schmidt, Molly E - DNR
Sent: Wednesday, November 1, 2023 1:01 PM
To: Byers, Harris
Cc: Beggs, Tauren R - DNR
Subject: RE: Request for a Letter of Acknowledgement for the Manitowoc CDA's FY24 USEPA Brownfield Cleanup Grant Application

Harris,

RR program asked that request letters be sent in by Oct. 25 – as soon as possible would be best.

Thanks,

We are committed to service excellence.
Visit our survey at http://dnr.wi.gov/customersurvey to evaluate how I did.

Molly E. Schmidt
Brownfields Policy Coordinator, Remediation and Redevelopment Program
Division of Environmental Management
Wisconsin Department of Natural Resources
Mobile phone: (608) 219-2153
MollyE.Schmidt@wisconsin.gov

dnr.wi.gov

From: Byers, Harris <Harris.Byers@stantec.com>
Sent: Wednesday, November 1, 2023 12:12 PM
To: Schmidt, Molly E - DNR <MollyE.Schmidt@wisconsin.gov>
Cc: Beggs, Tauren R - DNR <Tauren.Beggs@wisconsin.gov>
Subject: RE: Request for a Letter of Acknowledgement for the Manitowoc CDA's FY24 USEPA Brownfield Cleanup Grant Application

No worries; Tauren and I connected yesterday afternoon on strategy a bit further. Stick with that Summer 2024 date for the purpose of your letter.

** But we will do our BEST to find funding to get this done sooner so we can start the coordinated approval process with enough lead-time to be shovels in the ground by Fall 2024.

Thanks for the support.

** Question – the City of Manitowoc also wants to apply for a CWA as well. When do you need that letter request in?

Thanks!
Harris

From: Schmidt, Molly E - DNR <MollyE.Schmidt@wisconsin.gov>
Sent: Wednesday, November 1, 2023 7:59 AM
To: Byers, Harris <Harris.Byers@stantec.com>
Cc: Beggs, Tauren R - DNR <Tauren.Beggs@wisconsin.gov>
Subject: RE: Request for a Letter of Acknowledgement for the Manitowoc CDA's FY24 USEPA Brownfield Cleanup Grant Application

Hello Harris,

Thank you!

Pardon, I didn't mean to imply the timeline wasn't acceptable, just wanted to clarify it. I don't anticipate any issues but we'll reach out to you right away if anything arises.

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Molly E. Schmidt
Brownfields Policy Coordinator, Remediation and Redevelopment Program
Division of Environmental Management
Wisconsin Department of Natural Resources
Mobile phone: (608) 219-2153
MollyE.Schmidt@wisconsin.gov

dnr.wi.gov

From: Byers, Harris <Harris.Byers@stantec.com>
Sent: Tuesday, October 31, 2023 3:32 PM
To: Schmidt, Molly E - DNR <MollyE.Schmidt@wisconsin.gov>
Cc: Beggs, Tauren R - DNR <Tauren.Beggs@wisconsin.gov>
Subject: RE: Request for a Letter of Acknowledgement for the Manitowoc CDA's FY24 USEPA Brownfield Cleanup Grant Application

Thanks for the follow-up; I realized I didn't fully answer you.

Please revise that to read.

> As described in the Stantec (2023) Analysis of Brownfield Cleanup Alternatives, waste characterization sampling is warranted to establish the necessary waste profiles to manage impacted soils. This work is likely to take place in Summer 2024, allowing the Remedial Action Plan and Material Management Plan to be developed in Summer 2024.

** Is this acceptable to the agency or is there another timeframe we need to be considering?

Sincerely,
Harris

From: Schmidt, Molly E - DNR <MollyE.Schmidt@wisconsin.gov>
Sent: Tuesday, October 31, 2023 3:29 PM
To: Byers, Harris <Harris.Byers@stantec.com>
Cc: Beggs, Tauren R - DNR <Tauren.Beggs@wisconsin.gov>
Subject: RE: Request for a Letter of Acknowledgement for the Manitowoc CDA's FY24 USEPA Brownfield Cleanup Grant Application

Hello Harris,

Did the city/Stantec intend that language to read “developed in Spring 2024”?

Please pardon the repeat question, however, I need a clear (yes/no) answer to ensure sure we do not misrepresent Stantec/the city in the response letter.

Or, if the city/Stantec would like to amend the timeline portion of the request with different language, please let me know.

Thank you,

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Molly E. Schmidt
Brownfields Policy Coordinator, Remediation and Redevelopment Program
Division of Environmental Management
Wisconsin Department of Natural Resources
Mobile phone: (608) 219-2153
MollyE.Schmidt@wisconsin.gov

dnr.wi.gov

From: Byers, Harris <Harris.Byers@stantec.com>
Sent: Tuesday, October 31, 2023 3:01 PM

To: Schmidt, Molly E - DNR <MollyE.Schmidt@wisconsin.gov>
Cc: Beggs, Tauren R - DNR <Tauren.Beggs@wisconsin.gov>
Subject: RE: Request for a Letter of Acknowledgement for the Manitowoc CDA's FY24 USEPA Brownfield Cleanup Grant Application

Molly and Tauren.

Thanks for reaching out; this was carry-over text for sure.

I understand the developer has a tax credits secured that will require breaking ground ASAP. USEPA as initially nodded they are open to early work requests, so the cleanup will (aggressive schedule) be Fall 2024. If all aligns, the slab will be poured in October 2024 so the building can go vertical through Winter 2024-Spring 2025.

Tauren – by chance, did you just call Madi Edwards? She mentioned someone from WDNR called, but apparently didn't know who it was (sorry).

Give me a call if you have a moment. In the interim, the DRAFT ABCA is attached to this email to bring you in the loop on the location/scope of this project (see figures). Will for sure want to be in close coordination in November/December on getting this ready for cleanup in the summer.

Sincerely,

Harris Byers, Ph.D.
Sr. Brownfields Project Manager
Contaminant Hydrogeologist / Urban Geochemist

Direct: 414 581-6476
Harris.Byers@stantec.com

Stantec
12080 Corporate Parkway Suite 200
Mequon WI 53092-2649

From: Schmidt, Molly E - DNR <MollyE.Schmidt@wisconsin.gov>
Sent: Tuesday, October 31, 2023 2:53 PM
To: Byers, Harris <Harris.Byers@stantec.com>
Cc: Beggs, Tauren R - DNR <Tauren.Beggs@wisconsin.gov>
Subject: RE: Request for a Letter of Acknowledgement for the Manitowoc CDA's FY24 USEPA Brownfield Cleanup Grant Application

Hello Harris,

In the request below – the last few words of the last paragraph – does the city/Stantec intend it to read "developed in Spring 2024"?

> As described in the Stantec (2023) Analysis of Brownfield Cleanup Alternatives, waste characterization sampling is warranted to establish the necessary waste profiles to manage impacted soils. This work is likely to take place in Winter 2023, allowing the Remedial Action Plan and Material Management Plan to be developed in Spring 2023.

Thank you,

We are committed to service excellence.
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Molly E. Schmidt
Brownfields Policy Coordinator, Remediation and Redevelopment Program
Division of Environmental Management
Wisconsin Department of Natural Resources
Mobile phone: (608) 219-2153
MollyE.Schmidt@wisconsin.gov

dnr.wi.gov

From: Byers, Harris <Harris.Byers@stantec.com>
Sent: Thursday, October 19, 2023 2:02 PM
To: Schmidt, Molly E - DNR <MollyE.Schmidt@wisconsin.gov>; Beggs, Tauren R - DNR <Tauren.Beggs@wisconsin.gov>; Adam Tegen <ategen@manitowoc.org>
Subject: Request for a Letter of Acknowledgement for the Manitowoc CDA's FY24 USEPA Brownfield Cleanup Grant Application

Molly:

On behalf of the Community Development Authority (CDA) of the City of Manitowoc, Wisconsin (City; cc'd) I am writing to request a letter of acknowledgement to support the CDA's USEPA FY2024 brownfield cleanup grant application.

** Tauren, as we discussed previously and to assist with this letter request, Stantec prepared the attached summary letter comparing cumulative assessment work completed to date to the proposed remedial alternative and proposed Site reuse features.

Below are the details of the project to support the letter of acknowledgement:

1. **Type of Grant**: $2,000,000 cleanup grant

2. **Applicant**: Adam Tegen
   Executive Director
   Community Development Authority of the City of Manitowoc, Wisconsin
   900 Quay Street
   Manitowoc, Wisconsin 54220
   ategen@manitowoc.org

3. **Community Concerns About the Property**: The City of Manitowoc (City), Wisconsin is located on the western shoreline of Lake Michigan at the confluence of the Manitowoc River (River). Development in Manitowoc in the early 1800s by European settlers was agricultural, fishing, lumber, and shipbuilding. Settlement was followed in the mid-late 19th Century by large-scale industrial development (tanneries and metal works/foundry operations) along the Washington Street and Franklin Street Corridors.

   With respect to the target property (1512 Washington Street), in 1898, Henry Vits converted his tannery on the property for the manufacturing of aluminum products. By 1927, the property was occupied by a parcel-wide 3.7-acre multi-story industrial complex utilized for the manufacturing of aluminum goods (referred to as "Mirro Plant 9", also referred to herein as the target "Site"); industrial operations continued at the Site by the Mirro Aluminum Company until 1986. The Community Development Authority of the City of Manitowoc (CDA; the grant applicant) involuntarily acquired the property in June 2016 for the purpose of blight elimination. The CDA demolished the remaining structures in 2017 with site investigation activities continuing in a phase manner between 2017 and 2023. Assessment work has identified significant subsurface impacts from hazardous substance (e.g., VOCs, PAHs/SVOCs, PCBs, heavy metals), emerging contaminants (PFAS and other fluorinated compounds), and petroleum that require mitigation to facilitate the proposed multi-family residential redevelopment targeted specifically to low to moderate income (LMI) households. The developer has secured/stacked funding to begin the project; however, the cost burden for addressing residual contamination is beyond their funding stack.

   The cleanup and eventual redevelopment of the Target Property and the greater Washington and Franklin Street corridors is consistent with community needs and will bring catalytic improvements to the quality of life in Manitowoc to address significant blight, poor economic conditions, and welfare.

   All structures at the Property were razed by the CDA in 2017, and the Property is unoccupied. This Property represents a significant opportunity to provide healthy housing options to LMI households.

4. **Site-Specific Details for Cleanup Grants**

   Property Address. Phase 2 Redevelopment Area of the River Point District, 13th Street and River Point Drive; Manitowoc, Wisconsin

   History of Ownership. As described in the Stantec (2016b) Phase I ESA, the property appears undeveloped in 1835. By 1878 the property was platted as 18 contiguous parcels of land within lot 246. By 1893, the property was occupied by the Henry Vits tannery and 6 apparent residential structures. In 1898, Henry Vits converted his tannery located at the northeast corner of the subject property for the manufacturing of aluminum products as the Manitowoc Novelty Company. By 1909 Henry Vits consolidated aluminum manufacturing operations at the target property with Joseph Koening and the New Jersey Aluminum Company and constructed a large multi-story aluminum manufacturing plant on the northeast quarter of the property operated as the Aluminum Goods Manufacturing Company. In 1917, the company undertook an aggressive sales and advertising campaign to introduce the tradename "Mirro," and by 1927, Sherman Creek (which formerly bisected the northeast portion of the property) had been contained within a culvert,

residential structures removed, and the property occupied by a parcel-wide 3.7-acre multi-story industrial complex utilized for the manufacturing of aluminum goods. In 1957, stockholders voted in favor of changing the company's name to the Mirro Aluminum Company for the purpose of improving brand recognition.

Industrial operations ceased at the Site in 1986 when the Mirro Aluminum Company was acquired by the Newell Company; however, Mirro corporate and engineering offices remained on the 6th and 7th floors until 2001. The property was purchased from Newell Holdings Delaware, Inc. by Union Street Partners, LLC on March 26, 2004 who sold the property to Kenneth J. Lemberger, Sr. on November 18, 2005. The property was then transferred to Mirro Building, LLC on March 23, 2006. EJ Spirtas Manitowoc, LLC purchased the property from Mirro Building, LLC on June 2, 2006 and initiated demolition of site buildings in 2014. The Community Development Authority of the City of Manitowoc involuntarily took ownership of the property on June 29, 2016 for the purpose of blight elimination in an environmental justice community.

Current Owner. A Phase I ESA was completed on behalf of the current owner/grant applicant (the Community Development Authority of the City of Manitowoc) on June 28, 2016 by Stantec (2016b) utilizing USEPA Brownfield Assessment grant funding provided to the City of Manitowoc**.** The Community Development Authority of the City of Manitowoc involuntarily took ownership of the property on June 29, 2016 for the purpose of blight elimination in an environmental justice community and subsequently received a Local Governmental Unit (LGU) Environmental Liability Exemption from the Wisconsin Department of Natural Resources (WDNR) per ch. 292.11(9). To facilitate redevelopment of the Property following acquisition, the CDA continued environmental assessment activities at as documented in the reports outlined in Section 6(e). The Phase II ESAs [i.e., Stantec 2017j, 2019, 2020a-c) were all completed per ASTM E1903-19 with subsequent Site Investigations [i.e., Stantec 2021, Ramboll 2020, 2021a-c, 2022a-c, 2023a-c] conducted under state cleanup program oversight.

Since taking ownership, the CDA has maintained compliance with the required continuing obligations and no records have been identified indicating the CDA is considered potentially liable or known to be affiliated with any other person that is potentially liable for contamination at the Property.

Current BRRTS Numbers. Numerous prior environmental investigations were completed at the Property while the property was owned by the former industrial operator [03-36-000085 (Closed); 02-36-216391 (Closed); and 03-36-274209 (Closed)]. Work completed after the CDA acquired the property is being tracked under BRRTS Case No. 02-36-545108.

Need for Cleanup. The WDNR (2016) letter prepared for the current owner prior to acquisition and subsequent assessment work acknowledges multiple hazardous substance constituents of concern are known to exist at the property, including known releases of VOCs, PAHs, PCBs, SVOCs, and heavy metals (see figures in the attached letter). As documented through the extensive investigation history (e.g., AECOM 2009a,b; Stantec 2016a-2021; Ramboll 2020-2023c), significant residual soil and groundwater impacts from petroleum and/or hazardous substances (including emerging contaminants, such as PFAS) associated with prior industrial use and/or placement of historic fill are present and will complicate redevelopment. However, given the current economic condition of the City, the local community cannot self-fund this work; therefore, a cleanup grant is being sought from USEPA.

Statement on VPLE. The City does not plan to enroll the project in VPLE.

Schedule. As described in the recent Site Investigation Status Update Letter, site investigation activities have not yet been completed nor has Wisconsin DNR yet approved a Site Investigation under Wis. Admin. Code ch. NR 716. However, subsurface impacts in the Phase I Redevelopment Area appear sufficiently known to implement the selected remedial alternative. It is acknowledged that post construction monitoring of sub-slab vapor and groundwater will likely

be required, but the scope is not yet determined. In addition, a formal remediation documentation report will be prepared following construction of the final engineered barrier surface(s).

As described in the Stantec (2023) Analysis of Brownfield Cleanup Alternatives, waste characterization sampling is warranted to establish the necessary waste profiles to manage impacted soils. This work is likely to take place in Winter 2023, allowing the Remedial Action Plan and Material Management Plan to be developed in Spring 2023.

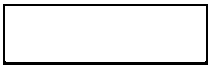
Please call with any questions on this request. We look forward to working with WDNR as the redevelopment.

Sincerely,

Harris Byers, Ph.D.
Sr. Brownfields Project Manager
Contaminant Hydrogeologist / Urban Geochemist

Direct: 414 581-6476
Harris.Byers@stantec.com

Stantec
12080 Corporate Parkway Suite 200
Mequon WI 53092-2649



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DRAFT ANALYSIS OF BROWNFIELD CLEANUP ALTERNATIVES

Phase 1 Redevelopment Area
1512 Washington Street, Manitowoc, Wisconsin

WDNR BRRTS CASE IDs: 02-36-545108 (LGU; Open)
03-36-000085 (Closed)
02-36-216391 (Closed)
03-36-274209 (Closed)

USEPA ACRES ID: 169132

Harris L. Byers, Ph.D.
Sr. Brownfields Project Manager

Stu Gross, P.G.
QA/QC Manager

Stantec

October 26, 2023 (Rev 2)
Project Number 193708490

TABLE OF CONTENTS

FIGURES

TABLES

APPENDIX

GENERAL INFORMATION

FACILITY:	Phase 1 Redevelopment Area, 1512 Washington Street; Manitowoc, Wisconsin
PARCEL IDs	Southern 2.3 acres of PIN: 05200024600000
SIZE:	2.3 Acres
USEPA ACRES ID:	169132
WDNR BRRTS NOs.:	02-36-545108 (LGU; Open) 03-36-000085 (Closed) 02-36-216391 (Closed) 03-36-274209 (Closed)
PROPERTY LOCATION:	SW1/4 of the NE 1/4 of Section 30, Township 19 North, Range 24 East, Manitowoc County, Wisconsin
PROPERTY OWNER:	Community Development Authority of the City of Manitowoc City of Manitowoc 900 Quay Street Manitowoc, WI 54220-4543
Contact:	Mr. Adam Tegen Community Development Director City of Manitowoc, Wisconsin 900 Quay Street Manitowoc, WI 54220-4543 Phone: 920-686-6931 Email: ategen@manitowoc.org
CONSULTANT:	Stantec Consulting Services Inc. 12075 Corporate Parkway, Suite 200 Mequon, Wisconsin 53089
Contact:	Harris Byers, Ph.D. Sr. Brownfields Project Manager Phone: 414-581-6476 Email: harris.byers@stantec.com
WDNR OVERSIGHT:	Wisconsin Department of Natural Resources 2984 Shawano Avenue, Green Bay, Wisconsin 54313
Contact:	Mr. Tauren Beggs Hydrogeologist Phone: 920-662-5178 Email: Tauren.Beggs@wisconsin.gov

1.0 EXECUTIVE SUMMARY

Stantec Consulting Services Inc. (Stantec) completed this **DRAFT** Analysis of Brownfields Cleanup Alternatives (ABCA) on behalf of the City of Manitowoc (City) and the Community Development Authority of the City of Manitowoc (CDA; current owner) for the southern 2.3 acres of land (herein referred to as the "Phase 1 Redevelopment Area") within the former 3.7 acre industrial property (herein referred to as the "Subject Property") located at 1512 Washington Street in the City of Manitowoc. The locations of the Phase 1 Redevelopment Area 1 (shaded purple) and the Subject Property (outlined in green) relative to regional topography are illustrated on **Figure 1.** The locations of the Phase 1 Redevelopment Area (outlined in purple) and the Subject Property (outlined in green) relative to various Site features overlaying a 2020 Orthophotograph are illustrated on **Figure 2** through **Figure 7c**. Please note for the purpose of this **DRAFT** ABCA, given the locations/extents of polychlorinated biphenyl (PCB) impacts to soil relative to the Phase I Redevelopment Area, the proposed remedial area also includes the "Loading Dock" source area.

This **DRAFT** ABCA was prepared utilizing the framework provided in ch. NR 722 Wisconsin Administrative Code (WAC) (NR 722) for a Remedial Action Options Report (RAOR).

The United States Environmental Protection Agency (USEPA) Assessment, Cleanup and Redevelopment Exchange System (ACRES) identification numbers associated with prior assessment work at the Subject Property is 169132.

The Wisconsin Department of Natural Resources (WDNR, 2016) letter prepared for the current owner prior to acquisition and subsequent assessment work acknowledges multiple hazardous substance constituents of concern are known to exist at the property, including known releases of volatile organic compounds [VOCs], polycyclic aromatic hydrocarbons [PAH], polychlorinated biphenyls [PCBs], semivolatile organic compounds [SVOCs], asbestos, and heavy metals. As documented through the extensive investigation history, significant residual soil, and groundwater impacts from petroleum and/or hazardous substances (including emerging contaminants per- and polyfluorinated compounds [PFAS]) associated with prior industrial use and/or placement of historic fill are present and will complicate redevelopment, as summarized below.

> Soil. As illustrated on **Figures 3a-3d**, VOCs, PAHs, PCBs, and heavy metals were detected in soil at concentrations greater than applicable health-based ch. NR 720 WAC (NR 720) Residual Contaminant Levels (RCLs) and/or Background Threshold Values (BTVs). In addition, total PCB concentrations in soil exceed 50 milligrams per kilogram in some areas.
>
> Groundwater. The potentiometric surface of shallow groundwater grades downward towards the Manitowoc River, which serves as a constant head boundary for regional groundwater. As illustrated on **Figures 4a-4c** VOCs, PAHs, PCBs, and heavy metals were detected in groundwater at concentrations greater than applicable health-based ch. NR 140 WAC (NR 140) groundwater quality standards. PFAS compounds were also detected at varying concentrations at the Subject Property.
>
> Vapor Intrusion. The Property is currently vacant. Therefore, the vapor intrusion pathway cannot be quantitatively evaluated. However, soil and/or groundwater with residual VOC impacts likely extend beneath areas of the proposed multi-family residential redevelopment area and/or in areas bisected by the utility tunnel network. Depending on final reuse plans and building alignments, residual VOC impacts could pose a threat to indoor air quality due to vapor intrusion directly into the structure and/or through new or future preferential flow pathways into the structure. Any new occupied structures at this property must consider implementation of vapor mitigation technologies in accordance Wisconsin remedial action laws.

A developer has secured/stacked the necessary funding to redevelop the Phase I Redevelopment Area for low to moderate income (LMI) multi-family housing. As illustrated on **Figure 5** and **Appendix A**, the redevelopment will include:

- Multi-Family Building (20,408 square feet; ft^2),
- Landscaped/Greenspace (0.8 acres),
- Asphalt-Paved Parking Lot (0.8 acres), and
- Sidewalks (9,700 ft^2).

However, remedial action activities are warranted to facilitate redevelopment at the Property. Based on the evaluation described herein, the selected remedial approach under this **DRAFT** ABCA includes:

1. Removal of the former building slab to access subsurface impacts and facilitate construction of engineered barriers and crush concrete for beneficial reuse onsite;
2. Limited excavation and offsite disposal of soil with total PCB concentrations greater than 50 milligrams per kilogram as a source control measure for comingled PCBs and VOCs;
3. Abandonment of the subsurface utility tunnel network with onsite crushed concrete to reduce the risk for vapor migration;
4. Construct the subbase portion of the engineered barrier in the parking lot using onsite crushed concrete to prevent direct contact with impacted soil and reduce the risk for soil impacts to migrate to groundwater;
5. Importing clean soil to construct the soil portion of the engineered barriers within the sidewalk and building footprints to prevent direct contact with impacted soil and reduce the risk for soil impacts to migrate to groundwater;
6. Excavation and offsite disposal of impacted soil from the future landscaped areas to facilitate construction of vegetated soil engineered barriers;
7. Importing clean clay and topsoil to construct the vegetated soil engineered barriers to prevent direct contact with impacted soil and reduce the risk for soil impacts to migrate to groundwater; and
8. Design of SSDS to prevent the risk for vapor intrusion into the multi-family residential structure.

The following additional remedial activities to facilitate the proposed non-industrial redevelopment will be completed in the future by others and therefore are not evaluated in this ABCA:

- Construction of finished surfaces of the sitewide engineered barrier (e.g., softscape [topsoil, turf, plantings] and hardscaped [asphalt, concrete] features);
- Construction of stormwater infrastructure/best management practices;
- Establishing appropriate plant materials (i.e., turf, perennials, bushes, trees) in the vegetated areas
- Post-construction groundwater monitoring;
- Installing new utilities, including clay plugs in utility trenches;
- Installation of a SSDS below the multi-family residential building;
- Post-construction sub-slab vapor sampling; and/or
- Establishing institutional controls, continuing obligations and maintenance plans to provide for long-term control of residual soil, groundwater, and vapor impacts, as warranted.

2.0 BACKGROUND INFORMATION

Stantec completed this **DRAFT** ABCA on behalf of the City and the CDA for the 2.3-acre Phase 1 Redevelopment Area within the former 3.7-acre Subject Property located at 1512 Washington Street in the City of Manitowoc. The locations of the Phase 1 Redevelopment Area 1 (shaded purple) and the Subject Property (outlined in green) relative to regional topography are illustrated on **Figure 1**. The locations of the Phase 1 Redevelopment Area (outlined in purple) and the Subject Property (outlined in green) relative to various Site features overlaying a 2020 Orthophotograph are illustrated on **Figure 2** through **Figure 7c**. Please note for the purpose of this **DRAFT** ABCA, given the locations/extents of PCB impacts to soil relative to the Phase I Redevelopment Area, the proposed remedial area also includes the "Loading Dock" source area.

This **DRAFT** ABCA was prepared utilizing the framework provided in ch. NR 722 WAC for a RAOR.

2.1 HISTORIC PROPERTY USE/OCCUPANCY

Industrial Development and Operation. As described in the Stantec (2016b) Phase I ESA, the Subject Property appears undeveloped in 1835. By 1878, the property was platted as 18 contiguous parcels within lot 246; however, development had not yet occurred. A plat map published in 1878 indicates Sherman Creek bisected the far northwestern portion of the property and the creek flowed north to the Manitowoc River. Initial development of the property appears to have occurred between 1878 and 1893, at which time, the property was occupied by a tannery and 6 apparent residential structures. By 1906, the property consisted of 13 individual residential dwellings and associated automobile garages, a tannery, and a small aluminum manufacturing plant. By 1921, Sherman Creek had been contained within a culvert, residential structures removed, and most the property occupied by a large industrial facility utilized for the manufacturing of aluminum goods. Significant development of the property for industrial use as a multi-story aluminum goods manufacturing facility occurred between 1906 and 1912 and again between 1912 and 1927. The final multi-story building was constructed at the property adjacent to Washington Street by 1929. Industrial operations ceased at the Site in 1986; however, the Mirro Aluminum Company corporate and engineering offices remained on the 6th and 7th floors of the building until 2001.

Property Ownership. The property was purchased from Newell Holdings Delaware, Inc. by Union Street Partners, LLC on March 26, 2004 who sold the property to Kenneth J. Lemberger, Sr. on November 18, 2005. The property was transferred to Mirro Building, LLC on March 23, 2006, and EJ Spirtas Manitowoc, LLC purchased the property from Mirro Building, LLC on June 2, 2006. EJ Spirtas Manitowoc, LLC razed the 3-story building previously located on the northeast corner of the property and several smaller buildings in March 2014. A Phase I ESA was completed by Stantec (2016b) per the All Appropriate Inquiries rule detailed in 40 CFR §312.21 utilizing ASTM E1527-13 on behalf of the CDA on June 28, 2016. The CDA involuntarily took ownership of the property on June 29, 2016 for the purpose of blight elimination and secured a liability exemption for local governmental units (LGUs) from WDNR per ch. 292.11(9) WAC. To facilitate redevelopment of the Property, the City began conducting the subsurface investigation in a phased manner, as documented in work listed in the references section of this **DRAFT** ABCA (Section 5).

Since taking ownership, the CDA has maintained compliance with the required continuing obligations and no records have been identified indicating the CDA is considered potentially liable or known to be affiliated with any other person that is potentially liable for contamination at the Property. Proposed redevelopment for the Property is illustrated on **Figure 5** and **Appendix A** and includes a multi-story multi-family residential building and associated greenspace and parking.

2.2 ENVIRONMENTAL SITE INVESTIGATIONS

Stantec (2016b) Phase I ESA. The Stantec (2016b) Phase I ESA identified the following recognized environmental conditions (RECs):

- REC 1: Historic Site Operations
- REC 2: Documented Residual Impacts to Soil, Groundwater, and/or Building Materials
- REC 3: Storage, Use, and Handling of Hazardous Substances and Petroleum in Inaccessible Potential Source Areas
- REC 4: Release of Lead-based Paint (LBP)/Asbestos-containing Materials (ACM)

- REC 5: Potential Petroleum and Hazardous Substance Releases to Building Materials
- REC 6: Release to Tunnel System
- REC 7: Potential Releases to Sewer System

Subsurface Environmental Investigations (e.g., Phase II ESAs [i.e., Stantec 2017j, 2018a, 2019, 2020a-c] and subsequent Site Investigations [i.e., Stantec 2021, Ramboll 2020, 2021a-c, 2022a-c, 2023a-c]). The WDNR (2016) letter prepared for the current owner prior to acquisition and subsequent assessment work acknowledges multiple hazardous substance constituents of concern are known to exist at the property, including known releases of VOCs, PAHs, PCBs, SVOCs, asbestos, and heavy metals. As documented through the extensive investigation history (e.g., AECOM 2009a,b; Stantec 2016a-2021; Ramboll 2020-2023c), significant residual soil and groundwater impacts from petroleum and/or hazardous substances (including emerging contaminants, such as PFAS) associated with prior industrial use and/or placement of historic fill are present and will complicate redevelopment, as summarized below.

Soil. As illustrated on **Figures 3a-3d**, VOCs, PAHs, PCBs, and heavy metals were detected in soil at concentrations greater than applicable health-based ch. NR 720 WAC (NR 720) Residual Contaminant Levels (RCLs) and/or Background Threshold Values (BTVs). In addition, total PCB concentrations in soil exceed 50 milligrams per kilogram.

Groundwater. The potentiometric surface of shallow groundwater grades downward towards the Manitowoc River, which serves as a constant head boundary for regional groundwater. As illustrated on **Figures 4a-4c** VOCs, PAHs, PCBs, and heavy metals were detected in groundwater at concentrations greater than applicable health-based ch. NR 140 WAC (NR 140) groundwater quality standards. PFAS compounds were also detected at varying concentrations at the Subject Property.

Vapor Intrusion. The Property is currently vacant. Therefore, the vapor intrusion pathway cannot be quantitatively evaluated at this point. However, soil and/or groundwater with residual VOC impacts likely extend beneath areas of the proposed multi-family residential redevelopment area and/or in areas bisected by the utility tunnel network. Depending on final reuse plans and building alignments, residual VOC impacts could pose a threat to indoor air quality due to vapor intrusion directly into the structure and/or through new or future preferential flow pathways into the structure. Any new occupied structures at this property must consider implementation of vapor mitigation technologies in accordance Wisconsin remedial action laws.

3.0 REMEDIAL ACTION OPTIONS EVALUATION

3.1 PROPOSED PROPERTY REDEVELOPMENT

The redevelopment of the Subject Property has been part of the vision for the City since the former industrial operator vacated the property. The greatest community need in the City of Manitowoc is healthy housing, especially for LMI households in environmental justice areas. The proposed project will redevelop the Phase I Redevelopment Area for multi-family residential use with a mixture of one, two, and three-bedroom units targeted specifically for LMI families. Architectural renderings are illustrated on **Figure 5** and **Appendix A**, and include the following:

- Multi-Family Building (20,408 ft^2),
- Landscaped/Greenspace (0.8 acres),
- Asphalt-Paved Parking Lot (0.8 acres), and
- Sidewalks (9,700 ft^2).

However, as illustrated on **Figure 6**, significant soil and groundwater impacts remain in the Phase I Redevelopment Area and must be mitigated to facilitate the proposed reuse.

3.2 CLEANUP STANDARDS AND APPLICABLE LAWS

Although the City has an LGU exemption granted under ch. 292.11(9) WAC, remedial activities proposed under this **DRAFT** ABCA will be completed per the requirements of ch. NR 700 WAC. The WDNR will provide regulatory oversight of the project, including reviewing/approving plans and reports described in Section 4 of this **DRAFT** ABCA.

Cleanup soil quality standards are established in ch. NR 720 WAC and groundwater quality standards are established in ch. NR 140 WAC. Criteria for beneficial reuse of soil/fill at the Property are established under ch. NR 718 WAC. Toxicity thresholds specified in 40 CFR 261 and PCB disposal requirements specified in 40 CFR 761 will be used to determine proper waste/material management. Impacted soil/fill generated during excavation will be managed per ch. NR 600 WAC and ch. NR 500 WAC.

PCB cleanup objectives in soil are based on occupancy (“high occupancy” vs. “low occupancy”) as defined in 40 CFR 761.61. For comparison purposes, in addition to comparing to NR 720 RCLs, pursuant to the One Cleanup Program Memorandum of Agreement (WDNR PUB RR-786), Total PCB concentrations will be compared to the following cleanup action levels per 40 CFR 761.61(a)(4)(i)(A) and 40 CFR 761.61(a)(4)(i)(B).

3.3 REMEDIAL ACTION OPTIONS EVALUATION

Soil and groundwater impacts relative to proposed reuse features are illustrated on **Figure 6** and indicate significant soil and groundwater impacts extend below the Phase I Redevelopment Area. As such, remedial action activities are warranted to facilitate redevelopment at the Property described in Section 3.2. An evaluation of three remedial options was conducted utilizing criteria presented in ch. NR 722.07(4) WAC and ch. NR 722.09(2m) WAC to address legacy environmental impacts to facilitate redevelopment for non-industrial purposes. As summarized on **Table 1**, the remedial options evaluated under this **DRAFT** ABCA includes:

1. Natural Attenuation (no action).
2. Excavate all impacted soils and transport offsite for disposal at appropriate landfills; backfill with clean fill materials to final grade; and establish an institutional control to manage residual groundwater impacts.
3. Removal of the former building slab to access subsurface impacts and facilitate construction of engineered barriers and crush concrete for beneficial reuse onsite; limited excavation and offsite disposal of soil with total PCB concentrations greater than 50 milligrams per kilogram as a source control measure for comingled PCBs and VOCs; abandonment of the subsurface utility tunnel network with onsite crushed concrete to reduce the risk for vapor migration; construct the base of the engineered barrier in the parking lot using onsite crushed concrete to prevent direct contact with impacted soil and reduce the risk for soil impacts to migrate to groundwater; importing clean soil to construct the soil portion of the engineered barriers within the sidewalk and building footprints to prevent direct contact with impacted soil and reduce the risk for soil impacts to migrate to

groundwater; importing clean clay and topsoil to construct the vegetated soil engineered barrier to prevent direct contact with impacted soil and reduce the risk for soil impacts to migrate to groundwater; design of a Sub-Slab Depressurization System (SSDS) to mitigate the risk of vapor intrusion.

In general, each remedial option is considered technically feasible; however, the short-term and long-term effectiveness of each remedial option's capability to be protective of public health, safety, or welfare or the environment, reasonableness of the alternative, the resilience to address potential adverse impacts caused by extreme weather events, and the cost associated with each approach varies greatly.

Alternative 1. Although the cost to implement remedial Alternative 1 is the least of the three options, constituents associated with residual impacts are considered recalcitrant to natural attenuation. The overall magnitude, mobility, and toxicity of impacts would not decrease, and Property restoration will not occur within a reasonable timeframe. Following redevelopment, impacts would be near sensitive receptors and impacts could be mobilized during extreme weather events. Therefore, Remedial Alternative 1 is not considered a prudent approach.

Alternative 2. Excavation and offsite disposal of impacted soils proposed in Alternative 2 will be effective in long-term elimination of the mobility, toxicity, and magnitude of residual soil impacts and would not be impacted by extreme weather events. However, the cost for Alternative 2 is excessive (estimated over $4,500,000; which is double the cost for Alternative 3). Further, Alternative 2 will require transporting a considerable volume of soil for disposal in a landfill [estimated 34,000 cubic yards (yd^3)] and require an equal volume of clean fill to be imported to the Property just to bring the Property back to current grade. Therefore, Alternative 2 is not considered a sustainable option.

Alternative 3. Remedial Alternative 3 will consist of:

- Removal of the existing 104,000 ft^2 concrete slab to access subsurface impacts for cleanup purposes and facilitate construction of sitewide engineered barriers/caps. Crush concrete [estimated 3,850 yd^3] for beneficial reuse onsite.
- Removal and offsite disposal of soil from two PCB-source areas with Total PCBs greater than 50 milligrams per kilogram as source control. Two PCB removal areas are labeled as Area 8 and Loading Dock, illustrated on **Figure 7a,** and will generate two waste streams, as summarized below:

PCB Remedial Area	Volume of Soil Transported to TSCA Landfill (yd^3)	Volume of Soil Transported to Licensed Solid Waste Landfill (yd^3)
Area 8 (**Figure 7b)**	350	475
Loading Dock (**Figure 7c**)	600	575

TSCA = Toxic Substance Control Act

- Demolish and abandon the utility tunnel network [estimated 1,500 linear feet (lf)] to reduce the risk for vapor migration below the Property.
- Construct the subbase portion of the engineered barrier in the parking lot (0.8 acres) using onsite crushed concrete to prevent direct contact with impacted subsurface soils and reduce the risk for soil impacts to migrate to groundwater.
- Importing clean soil (3,400 yd^3) to construct the soil portion of the engineered barriers within the sidewalk (9,700 ft^2) and building (20,408 ft^2) footprints to prevent direct contact with impacted subsurface soils and reduce the risk for soil impacts to migrate to groundwater.
- Excavation and offsite disposal of impacted soil (2,800 yd^3) from the future landscaped areas as additional source control and to facilitate construction of vegetated soil engineered barriers;
- Importing clean clay and topsoil (2,800 yd^3) to construct the vegetated soil engineered barrier (0.8 acres) to prevent direct contact with impacted soil and reduce the risk for soil impacts to migrate to groundwater.
- Design of SSDS to prevent the risk for vapor intrusion into the multi-family residential structure.

Excavation and offsite disposal of soil from the two PCB source areas will serve as source control for two significant comingled PCB and VOC releases with immediate and permanent removal of impacts.

Abandonment of the subsurface tunnel network will reduce the potential for vapor migration. Removal of the existing concrete slab and removal of soil from the future landscaped areas will prepare the areas for importing clean fill to construct the final engineered barriers. The engineered barriers will prevent direct contact with soil impacts while mitigating the risk for potential adverse extreme weather events exacerbated by climate change (such as mobilization of impacts during flood events). Designing the SSDS will provide for a plan to install the system during future construction. Completion of the hardscape engineered barriers/caps outside of the scope of this **DRAFT** ABCA is likely to include Property amenities (e.g., building, parking lot, playground/outdoor space, sidewalks), as illustrated on **Figure 5** and **Appendix A**.

Remedial Alternative 3 will cost-effectively provide for long-term reduction in the mobility, toxicity, and magnitude of impacts. Institutional controls will provide for long-term maintenance of the engineered barrier and will prevent groundwater consumption. Remedial Alternative 3 is considered the most reasonable and cost-effective approach to facilitate proposed redevelopment. Remedial Alternative 3 is the selected remedial alternative based on its short-term and long-term effectiveness, ability to be implemented within the proposed development, restoration time frame, economic feasibility, and sustainability.

4.0 SELECTED REMEDIAL ACTION OPTION

4.1 SELECTED REMEDIAL ACTION OPTION

The selected remedial action option includes up to 12 tasks, as described below:

Task 1. Waste Characterization Sampling. Representative samples of soil targeted for offsite disposal will be collected and submitted to an analytical laboratory for waste characterization. Based on the results of the sampling, multiple waste profiles/manifests will be established with a licensed solid waste landfill and a TSCA landfill.

Task 2. Develop a Remedial Action Plan / Material Management Plan and Seal Monitoring Well Network. A combined remedial action plan (RAP) and material management plan (MMP) will be completed and submitted to WDNR for approval. The RAP/MMP will discuss beneficial reuse of cementitious material generated in Task 4 for use in abandoning the tunnel network (Task 5) and constructing the base of the engineered barrier in the parking lot (Task 6). The RAP/MMP will describe the soils targeted for use in the engineered barrier (e.g., quality, placement location, placement depth, etc.) and outline contingency plans for managing fluids (e.g., infiltrated groundwater, stormwater, etc.) and/or other materials encountered during construction. Groundwater monitoring wells in the Phase I Redevelopment Area (n=25) will be sealed per ch. NR 141 WAC in Task 2.

Task 3. Removal of Existing Concrete Slab to Prepare for Construction of Engineered Barriers. Demolition of the existing concrete slab (104,000 ft^2) is estimated to generate approximately 3,850 yd^3 of cementitious demolition debris to be crushed onsite for beneficial reuse in Task 5 and Task 6.

Task 4. Removal and Offsite Disposal of Soil from Two PCB-Source Areas with Total PCBs Greater than 50 Milligrams per Kilogram. Removal will generate approximately 950 yd^3 of soil to be transported to a landfill capable of managing TSCA waste. An additional 1050 yd^3 of non-TSCA waste will be generated to create an OSHA-safe slope to the excavation; this material will be transported to a licensed solid waste landfill for disposal. Area to be backfilled with clean imported soil.

Task 5. Abandonment of the Tunnel Network to Prevent Contaminant Migration. The existing tunnel network in the Phase I Redevelopment Area will be abandoned in place per WDNR requirements. This is likely to include breaking the floor of the tunnel and creating clay plugs throughout the tunnel network to prevent migration of contaminants. The tunnel network will be filled with crushed concrete generated during Task 3.

Task 6. Construction of the Subbase Portion of the Engineered Barrier in the Parking Lot. Approximately 1,900 yd^3 of crushed concrete generated in Task 3 will be placed/graded/compacted to construct the base of the engineered barrier below the proposed parking lot.

Task 7. Importing Clean Fill to Construct the Soil Portion of the Engineered Barriers below the Multi-Family Residential Building and Sidewalks. Clean granular fill will be imported and placed to construct the soil portion of the engineered barriers within the sidewalk (9,700 ft^2) and building (20,408 ft^2) footprints to prevent direct contact with impacted subsurface soils and reduce the risk for soil impacts to migrate to groundwater.

Task 8. Excavation and Offsite Disposal of Soil from the Future Landscaped Areas. Approximately 2,800 yd^3 of impacted soil will be excavated and hauled to a licensed solid waste landfill. This removal is necessary to reach the pre-construction grade to facilitate construction of a vegetated barrier suitable for the protection of human health and the environment.

Task 9. Importing Clean Fill to Construct the Vegetated Soil Engineered Barriers. Approximately 2,800 yd^3 of clean fill (18-inches of clay and 6-inches of topsoil) will be imported and placed in the future landscaped areas (0.8 acres) to construct an engineered barrier suitable to prevent direct contact with underlying impacted soils.

Task 10. Design SSDS for Multi-Family Residential Building. A SSDS will be designed for the multi-family residential building to mitigate the risk for vapor intrusion**.** Plans will be submitted to WDNR for concurrence.

Task 11. Construction Documentation Report. A construction documentation report will be prepared following completion of Task 9. The report will be submitted to WDNR for agency records.

Task 12. Engineering, Permitting, Contractor Oversight, Program Management, Community Outreach, Supplies, and WDNR Review Fees. Engineering and design services, procurement of necessary permits to complete the proposed cleanup activities, oversight of contractor work, and community outreach activities will be performed.

4.2 SCHEDULE

A proposed schedule for the implementation of Remedial Alternative 3 is presented on the table below.

Schedule for Remedial Alternative 3

Task #	Task Description	Weeks to Complete
1	Waste Characterization Sampling	2-3 Weeks
2	Develop a Remedial Action Plan / Material Management Plan and Seal Monitoring Well Network	2-4 Weeks, pending the results of Task 1
3	Removal of Existing Concrete Slab to Prepare for Construction of Engineered Barriers	2-4 Weeks, depending on waste profile/manifest approvals by the landfills
4	Removal and Offsite Disposal of Soil from Two PCB-Source Areas with Total PCBs Greater than 50 Milligrams per Kilogram	1-2 Months
5	Abandonment of the Tunnel Network to Prevent Contaminant Migration	2-4 Weeks, to be completed concurrently/ following crushing of debris from Task 3
6	Construction of the Subbase Portion of the Engineered Barrier in the Parking Lot	1-2 Weeks, to be completed concurrently/ following crushing of debris from Task 3
7	Importing Clean Fill to Construct the Soil Portion of the Engineered Barriers below the Multi-Family Residential Building and Sidewalks	2-4 Weeks, immediately following Task 3 and completed concurrently with Task 9
8	Excavation and Offsite Disposal of Soil from the Future Landscaped Areas	2-4 Weeks, pending landfill approval of waste profile
9	Importing Clean Fill to Construct the Vegetated Soil Engineered Barriers	1-2 Weeks, to be completed concurrently with Task 8, pending availability of suitable clean fill
10	Design SSDS for Multi-Family Residential Building	1-2 Weeks, following final building design
11	Construction Documentation Report	2-3 Weeks, following completion of Tasks 1-10
12	Engineering, Permitting, Contractor Oversight, Program Management, Community Outreach, Supplies, and WDNR Review Fees	Duration of Remedial Alternative 3 (Anticipated to be 6-12 months on an aggressive time schedule)

4.3 ESTIMATED COST

A preliminary estimate of the total cost for implementation of Remedial Alternative 3 is presented on the table below.

Cost Estimate for Remedial Alternative 3

Task #	Item	Potential Cost
1	Waste Characterization Sampling	$36,900
2	Develop a Remedial Action Plan / Material Management Plan and Seal Monitoring Well Network	$32,500
3	Removal of Existing Concrete Slab to Prepare for Construction of Engineered Barriers (104,000 ft^2 @ $3 per ft^2)	$312,000
4	Removal and Offsite Disposal of Soil from Two PCB-Source Areas with Total PCBs Greater than 50 Milligrams per Kilogram (2000 yd^3 @ $440 per yd^3)	$880,000

5	Abandonment of the Tunnel Network to Prevent Contaminant Migration (1,500 lf @ $20 per lf)	$30,000
6	Construction of the Subbase Portion of the Engineered Barrier in the Parking Lot (0.8 acres @ $3 per ft^2)	$101,400
7	Importing Clean Fill to Construct the Soil Portion of the Engineered Barriers below the Multi-Family Residential Building and Sidewalks (3,400 yd^3 @ $30 per yd^3)	$102,000
8	Excavation and Offsite Disposal of Soil from the Future Landscaped Areas (2,800 yd^3 @ $90 per yd^3)	$252,000
9	Importing Clean Fill to Construct the Vegetated Soil Engineered Barriers (2,800 yd^3 @ $19 per yd^3)	$53,200
10	Design SSDS for Multi-Family Residential Building	$12,000
11	Construction Documentation Report	$15,000
12	Engineering, Permitting, Contractor Oversight, Program Management, Community Outreach, Supplies, and WDNR Review Fees	$134,500
	Total remedial cost	**$1,961,500**

4.4 RESTORATION TIME FRAME

Many of the tasks described in Section 4.2 can be completed concurrently. Given the developer's aggressive construction schedule, implementation of Remedial Alternative 3 is anticipated to take 3-6 months to complete with the goal of vertical building construction in very early spring 2025. Once the final engineered barriers are constructed by the developer, long-term maintenance will include annual inspections of the engineered barrier and regular maintenance of the SSDS.

4.5 PERFORMANCE MEASURES

Confirmation samples will not be collected as part of the proposed work.

4.6 TREATMENT RESIDUALS

No additional treatment of residuals is anticipated as part of the proposed work.

4.7 SUSTAINABLE REMEDIAL ACTION CONSIDERATIONS

The described remedial approach relies on utilizing an engineered barrier, which will be constructed in part by raising the elevation of the Property to the proposed grade. This approach minimizes transporting of soil for offsite disposal in a landfill. The existing concrete slab will be demolished/crushed onsite for beneficial reuse in constructing the engineered barrier subbase for the parking lot and abandoning the tunnel network. Low sulfur diesel can be used, and a no-idle policy will reduce the carbon footprint.

4.8 ADDITIONAL REMEDIAL ACTIONS

This **DRAFT** ABCA evaluated a set of remedial actions to address residual soil and groundwater impacts within the Phase 1 Redevelopment Area to prepare the property for redevelopment. Additional remedial actions to be discussed in a future RAP not described in this **DRAFT** ABCA could, if required by WDNR, include:

- Construction of finished surfaces of the sitewide engineered barrier (e.g., softscape [topsoil, turf, plantings] and hardscaped [asphalt, concrete] features);
- Construction of stormwater infrastructure/best management practices;
- Establishing appropriate plant materials (i.e., turf, perennials, bushes, trees) in the vegetated areas
- Post-construction groundwater monitoring;
- Installing new utilities, including clay plugs in utility trenches;
- Installation of a SSDS below the multi-family residential building;
- Post-construction sub-slab vapor sampling; and/or
- Establishing institutional controls, continuing obligations, and maintenance plans to provide for long-term control of residual soil, groundwater, and vapor impacts, as warranted.

5.0 DISCLAIMER AND LIMITATIONS

The conclusions in this report are Stantec's professional opinion, as of the time of the report, and concerning the scope described in the report. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. The report relates solely to the specific project for which Stantec was retained and the stated purpose for which the report was prepared. The report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from the City/CDA and third parties in the preparation of the report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This report is intended solely for use by the City/CDA in accordance with Stantec's contract. While the report may be provided to applicable authorities having jurisdiction and others for whom the City/CDA is responsible, Stantec does not warrant the services to any third party. The report may not be relied upon by any other party without the express written consent of Stantec, which may be withheld at Stantec's discretion.

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FIGURES

Figure No.
1

Title
Subject Property, Regional Topography, and Phase I Redevelopment Area

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 550 1,100
Feet

N

Legend

- Subject Property
- Phase I Redevelopment Area

Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet

Stantec

Figure No.
2

Title
Subject Property and
2020 Orthophotograph

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 45 90
Feet

N

Legend

- Subject Property
- Phase I Redevelopment Area

Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Proposed reuse features digitized from Enberg Anderson (2023)
3. Orthophotograph from the City of Manitowoc (2020)

Stantec

Figure No.
3a

Title
PCB Impacts to Soil

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment

0 Area 45 90
Feet

N

Legend

- PCBs > IDC RCL
- PCBs > NIDC RCL
- PCBs > Soil to Groundwater RCL
- Phase I Redevelopment Area
- Subject Property

Notes

1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Data Sources Include:
Orthophotography: 2020 City of Mantiowoc
Data Adapted From: Ramboll 2022
3. PCB = polychlorinated biphenyls, IDC = Industrial Direct Contact RCL, NIDC = Non-Industrial Direct Contact RCL, RCL = Residual Contaminant Level, > = constituent greater than, RCLs per ch. NR720 of the Wisconsin Administrative Code

Stantec

Figure No.
3b

Title
PAH Impacts to Soil

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 45 90
Feet

N

Legend

- PAHs > IDC RCL
- PAHs > NIDC RCL
- PAHs > Soil to Groundwater RCL
- Phase I Redevelopment Area
- Subject Property

Notes

1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Data Sources Include:
Orthophotography: 2020 City of Mantiowoc
Data Adapted From: Ramboll 2022
3. PAH = polycyclic aromatic hydrocarbons, IDC = Industrial Direct Contact RCL, NIDC = Non-Industrial Direct Contact RCL, RCL = Residual Contaminant Level, > = constituent greater than, RCL per ch. NR720 of the Wisconsin Administrative Code

Stantec

Figure No.
3c

Title
VOC Impacts to Soil

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 50 100
Feet

N

Legend

- VOCs > IDC RCL
- VOCs > NIDC RCL
- VOCs > Soil to Groundwater RCL
- Phase I Redevelopment Area
- Subject Property

Notes

1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Data Sources Include:
Orthophotography: 2020 City of Mantiowoc
Data Adapted From: Ramboll 2022
3. VOC = volatile organic compounds, IDC = Industrial Direct Contact RCL, NIDC = Non-Industrial Direct Contact RCL, RCL = Residual Contaminant Level, > = constituent greater than, RCL per ch. NR720 Wisconsin Administrative Code

Stantec

Figure No.
3d

Title
Heavy Metal Impacts to Soil

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment

0 Area 45 90
Feet

N

Legend

- Heavy Metals > IDC RCL
- Heavy Metals > NIDC RCL
- Metals > Soil to Groundwater RCL
- Phase I Redevelopment Area
- Subject Property

Notes

1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Data Sources Include:
Orthophotography: 2020 City of Mantiowoc
Data Adapted From: Ramboll 2022
3. RCRA = Resource Conservation and Recovery Act, IDC = Industrial Direct Contact RCL, NIDC = Non-Industrial Direct Contact RCL, RCL = Residual Contaminant Level, > = constituent greater than, RCLs per ch. NR720 of the Wisconsin Administrative Code

Stantec

Figure No.
4a

Title
PCB **and** VOC **I**mpacts **to Groundwater**

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 50 100
Feet

N

Legend

- PCBs > ES
- PCBs > PAL
- VOCs > ES
- VOCs > PAL
- Phase I Redevelopment Area
- Subject Property

Notes

1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Data Sources Include:
Orthophotography: 2020 City of Mantiowoc
Data Adapted From: Ramboll 2022
3. PCBs = polychlorinated biphenyls, VOCs = Volatile Organic Compounds, ES = Enforcement Standard as established in ch. NR 140 WAC, PAL = Preventative Action Limit as established in ch. NR 140

Stantec

Figure No.
4b

Title

PAH **and** RCRA Metal **Impacts to** Groundwater

Client/Project

City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 70 140
Feet

N

Legend

- PAHs > ES
- PAHs > PAL
- Dissolved RCRA Metals > ES
- Dissolved RCRA Metals > PAL
- Phase I Redevelopment Area
- Subject Property

Notes

1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Data Sources Include:
Orthophotography: 2020 City of Mantiowoc
Data Adapted From: Ramboll 2022
3. PCBs = polychlorinated biphenyls, VOCs = Volatile Organic Compounds, ES = Enforcement Standard as established in ch. NR 140 WAC, PAL = Preventative Action Limit as established in ch. NR 140

Stantec

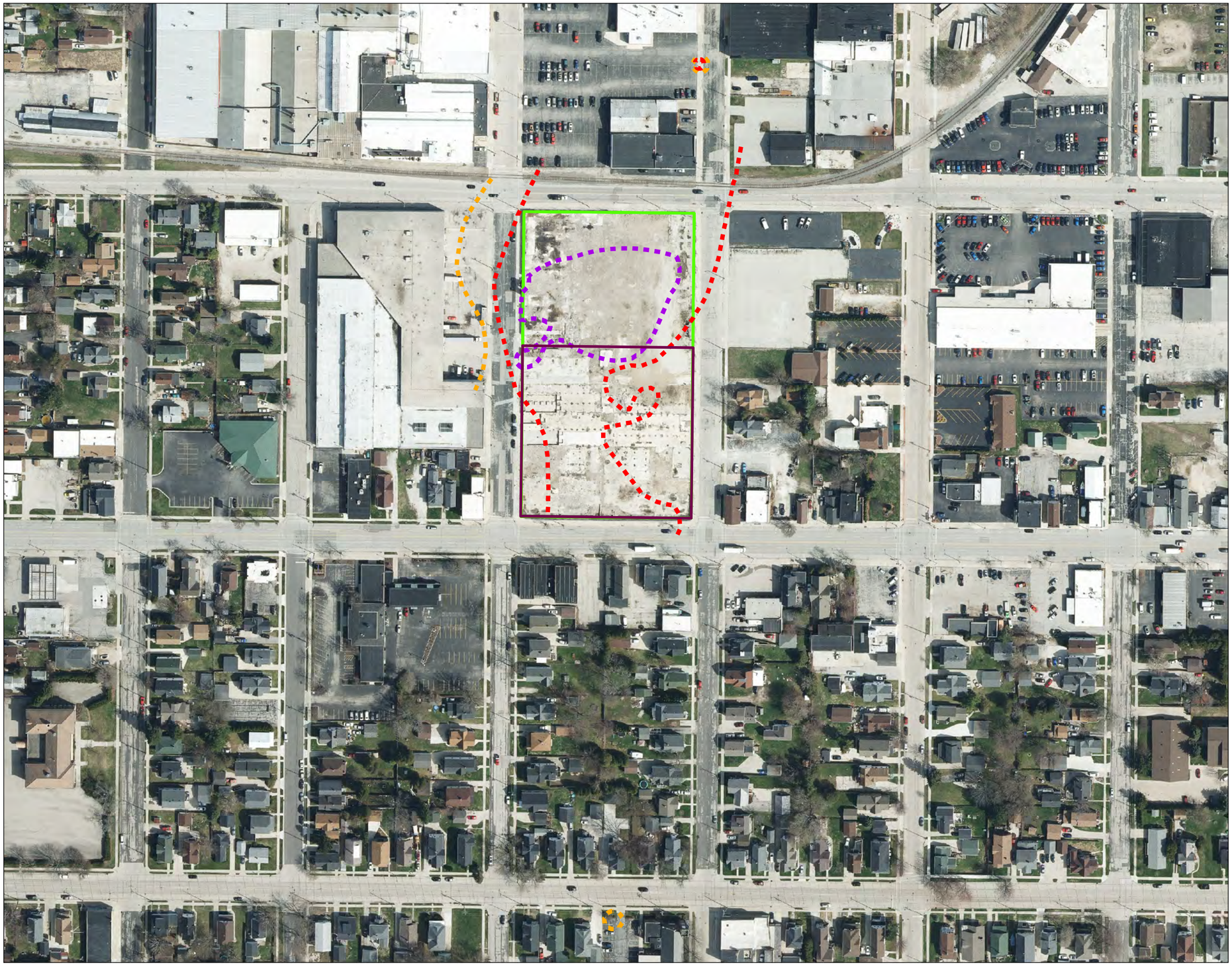


Figure No.
4c

Title
Concentrations of PFAS in Groundwater

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 135 270
Feet

Legend

- PFAS > 2,000 ng/L
- PFAS > 200 ng/L
- PFAS > 20 ng/L
- Phase I Redevelopment Area
- Subject Property

N

Notes

1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Data Sources Include:
Orthophotography: 2020 City of Mantiowoc
Data Adapted From: Ramboll 2022
3. PFAS = per- and polyfluoroalkyl substances, > = greater than, ng/L = nanograms per liter.
4. No groundwater quality standards exist for PFAS compounds at this

Stantec

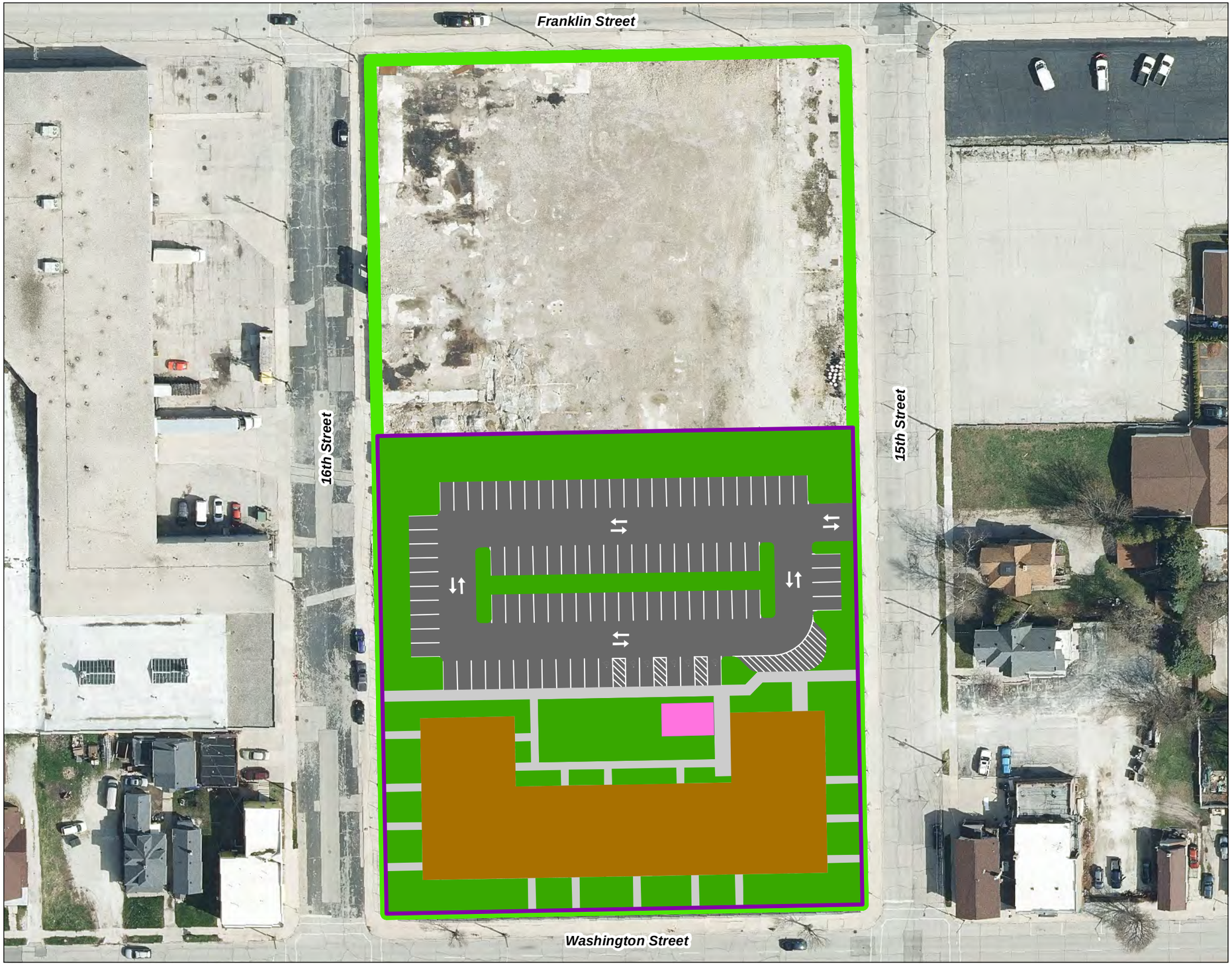


Figure No.
5

Title
Proposed Reuse Features

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 45 90
Feet

N

Legend

- Subject Property
- Phase I Redevelopment Area

Proposed Reuse Features

- Multi-Family Building
- Parking Lot
- Outdoor Play Area
- Sidewalk
- Landscaping

Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Proposed reuse features digitized from Enberg Anderson (2023)
3. Orthophotograph from the City of Manitowoc (2020)

Stantec

Figure No.
6

Title

Impacts to Soil and Groundwater and Proposed Reuse Features

Client/Project

City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 62.5 125
Feet

N

Legend

- Subject Property
- Phase I Redevelopment Area

PCB Release Areas

- PCBs > 50 PPM

Extent of Soil and Groundwater Impacts (Onsite Only)

- Groundwater Impacts > Enforcement Standard
- Groundwater Impacts > Preventive Action Limit
- Soil Impacts > Industrail Direct Contact RCL
- Soil Impacts > Non-Industrail Direct Contact RCL
- Soil Impacts > Soil to Groundwater RCL
- Landscaping

Proposed Reuse Features

- Multi-Family Building
- Parking Lot
- Outdoor Play Area
- Sidewalk

Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Proposed reuse features digitized from Enberg Anderson (2023)
3. Orthophotograph from the City of Manitowoc (2020)
4. Extents of impacts adapted from data illutrated by Ramboll (2020).

RCL = residual contaminant level per ch. NR 700 WAC; Groundwater

Stantec

Figure No.
7a

Title
Proposed Reuse Features and
Two Proposed PCB Removal Areas

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 45 90 Feet

193706270
Prepared by HLB on 1/20/2020

N

Legend

- Target Parcel
- Phase I Redevelopment Area

Proposed PCB Removal Areas

- PCBs < 50 PPM
- PCBs > 50 PPM

Proposed Reuse Features

- Multi-Family Building
- Parking Lot
- Outdoor Play Area
- Sidewalk
- Landscaping

Notes
1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Data Sources Include:
   Orthophotography: 2020 City of Mantiowoc
   Data Adapted From: Symbiont (2016) and AES (2011)

Stantec

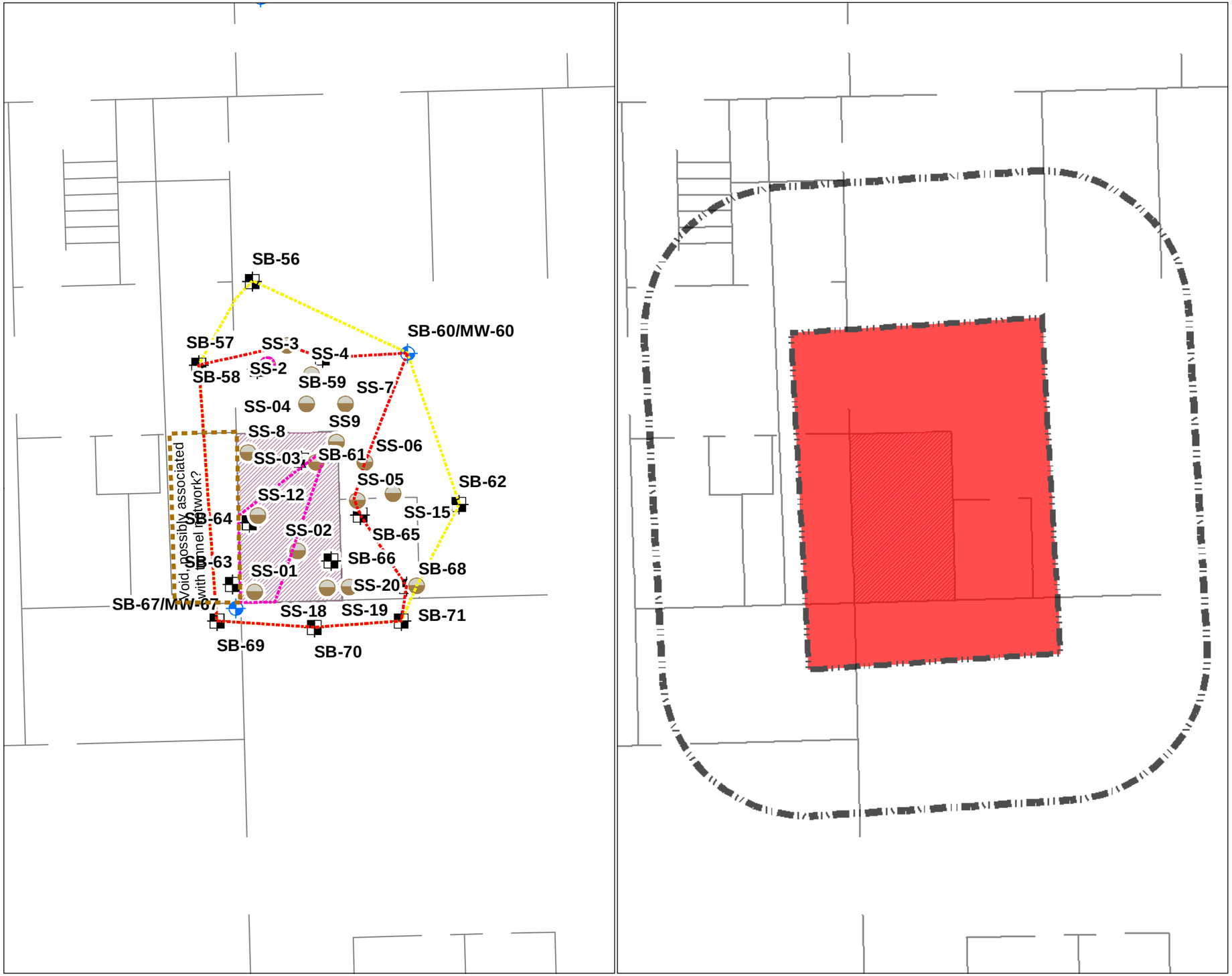


Figure No.
7b

Title
PCB Impacts to Soil in Area 8 and Proposed Soil Removal Area

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 5 10
Feet

N

Legend

- Former Building Walls
- Former Transformer Pad

Phase II ESA Sample Locations

- Soil Boring / Monitoring Well (3)
- Soil Boring (14)
- Surface Soil Samples

Total PCB Concentrations (mg/kg)

- < 50 (720 sf)
- < 100 (500 sf)
- > 1000 (70 sf)

Proposed Removal Area

- PCBs < 50 PPM (3500 sf)
- PCBs > 50 PPM (900 sf)

Notes
1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Data Adapted From Stantec (2020)

Stantec

Figure No.
7c

Title
PCB Impacts to Soil in the Loading Dock and Proposed Soil Removal Area

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

193706270
Prepared by HLB on 1/20/2020

0 10 20
Feet

N

Legend

- Former Building Walls

Phase II ESA Sample Locations

- Soil Boring / Monitoring Well (6)
- Soil Boring (18)
- Surface Soil Sample Locations (31)

Total PCB Concentrations (mg/kg)

- < 50 (1760 sf)
- <100 (1130 sf)
- <1000 (450 sf)

Proposed Removal Area

- PCBs < 50 PPM (4,900 sf)
- PCBs > 50 PPM (1,800 sf)

Notes
1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Data Sources Include:
   Orthophotography: 2017 City of Mantiowoc
   Data Adapted From: Symbiont (2016) and AES (2011)

Stantec

TABLE

Table 1
Analysis of Brownfields Cleanup Alternatives
1512 Washington Street
Manitowoc, Wisconsin

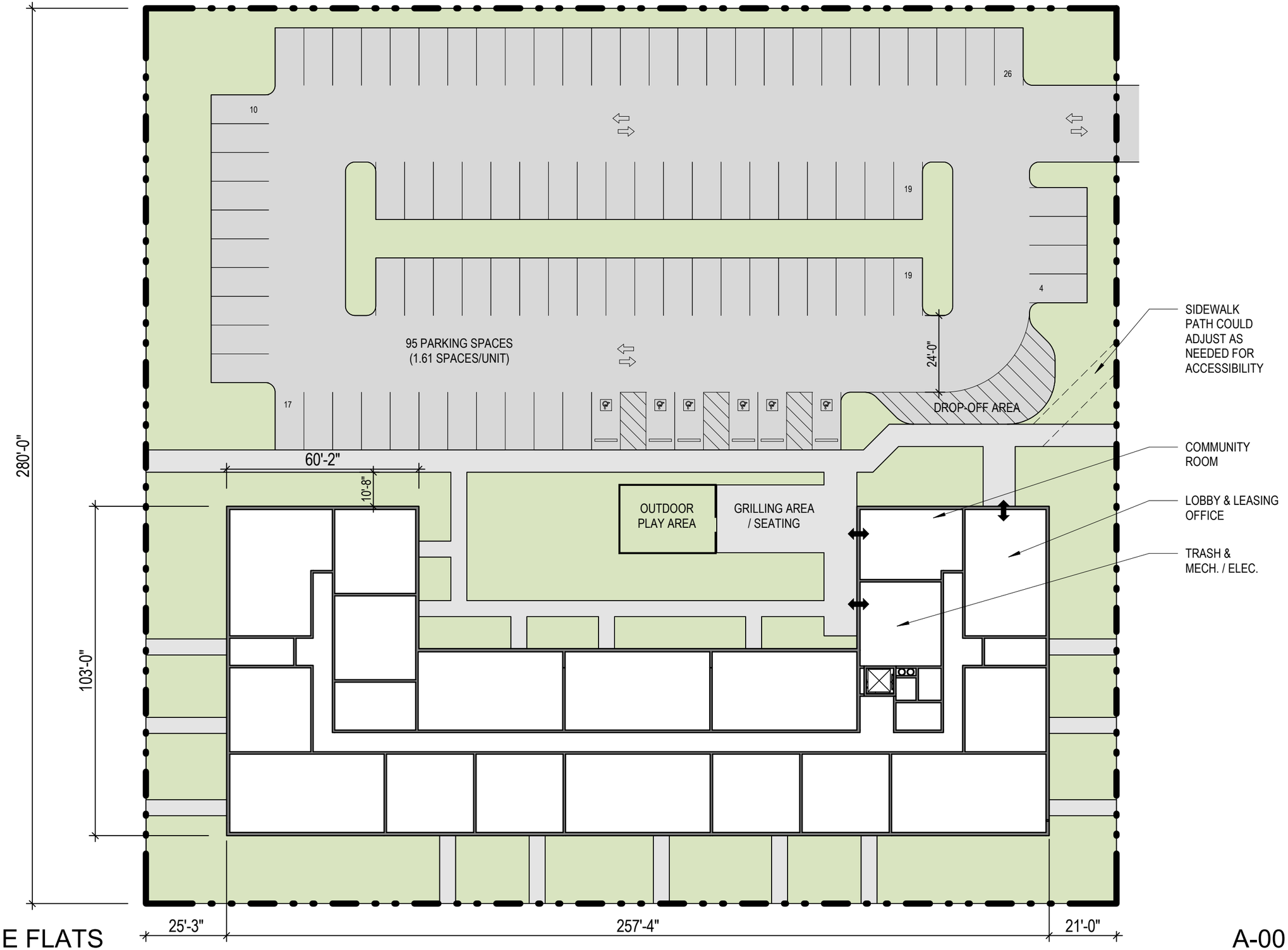
Remedial Action Area Description:	The target remedial area consists of 2.3 acres of former industrial property. Concentrations of hazardous substances and petroleum are present in soil/fill at concentrations greater than health-based ch. NR 720 WAC non-industrial direct contact and/or ch. NR 720 WAC soil to groundwater residual contaminant levels (RCLs). In addition, PCBs are present in soil at concentrations significantly greater than 100 milligrams per kilogram. Finally, concentrations of hazardous substances and petroleum are present in groundwater at concentrations that exceed ch. NR 140 WAC groundwater enforcement standards (ESs) and/or preventive action limits (PALs).										
Exposure Routes of Concern (*Check Boxes As Applicable*):	**Soil**				**Groundwater**		**Sub-Slab Vapor**		**Building Materials**		
	Direct Contact	*Yes*	Soil to Groundwater	*Yes*	Consumption	*Yes*	Vapor Intrusion	*Possibly; VOCs detected in soil/groundwater*	Lead Paint	*No*	Asbestos	*No*

Media	**Remedial Alternative**	**Remedial Action Options Evaluation**					
		Technical Feasibility - ch. NR 722.07(4)(a)				**Economic Feasibility ch. NR 722.07(4)(b)**	**Sustainability ch. NR 722.09(2m)**
		Long-Term Effectiveness	*Short Term Effectiveness*	*Implementability*	*Restoration Time Frame*		
Soil and Groundwater	Alt 1 - Natural Attenuation	Natural attenuation of residual petroleum and solvent impacts to soil and groundwater is possible. However, heavy metal and PCB impacts in soil are considered recalcitrant to natural attenuation. Therefore natural attenuation would not reduce the overall heavy metal and PCB toxicity, mobility, and volume of impacts. Natural attenuation would not be protective of public health, safety, or welfare or the environment in the short-term or long-term time periods.		Implementation of Alt 1 is technically feasible; however, monitoring the effectiveness of the remedial action is impractical. Redevelopment potential would be impeded.	As heavy metal and PCB constituents associated with residual impacts are considered recalcitrant, the overall magnitude, mobility, and toxicity of impacts would not decrease and Site restoration will not occur within a reasonable timeframe.	Initial and capital costs to implement Alt 1 are minimal; however, future potential costs associated with monitoring natural attenuation could be significant as constituents are recalcitrant to natural attenuation.	The carbon footprint and energy use associated with Alt 1 is considered minimal. However, Alt 1 is not considered to be protective of health/safety/env. within a reasonable timeframe.
	Alt 2 - Excavate all impacted soil; backfill excavation to proposed final grade; establish an institutional control to prevent groundwater consumption	Excavation of impacted soil/fill will provide for immediate and permanent reduction in the toxicity, mobility, and volume of contaminants and would protect public health, safety, welfare and the environment in a short-term time frame. An institutional control is considered effective for prevention of groundwater consumption while residual impacts naturally degrade.		Alt 2 is technically feasible and technology is available for implementation. Waste disposal approval will be needed from a TSCA landfill and from a licensed solid waste landfill.	The Property would be restored concurrent with redevelopment. Institutional controls will be needed to provide for long-term control of residual impacts.	Source removal capital includes excavation and offsite disposal of a considerable volume of fill and backfilling the excavation to current grade with imported fill (estimated $4,500,000). Establishing the institutional control to control groundwater consumption will occur with final closure ($10,000).	Extraordinary energy and fuel use will be incurred with offsite disposal of building materials and backfilling the excavation; however low sulfur diesel can be used and a no-idle policy will reduce the carbon footprint. Alt. 2 will maximize energy use and soil disturbance. Alternative 2 allows for maximum reuse of the Property.
	Alt 3 - 8.Limited excavation and offsite disposal of soil with total PCB concentrations greater than 100 milligrams per kilogram as a source control measure for comingled PCBs and VOCs; abandonment of the subsurface utility tunnel network to reduce the risk for vapor migration; removal of the former building slab and excavation and offsite disposal impacted soil from the future landscaped areas; importing clean fill to construct the base of the sitewide engineered barrier to mitigate the potential for direct contact with residual soil impacts and reduce the risk for mobilization of soil impacts to groundwater; and design of a SSDS to mitigate the risk of vapor intrusion.	Excavation and removal of soil with comingled PCB and VOC impacts is effective in both the short and long-term time frames. Removal of the existing concrete slab and construction of a sitewide engineered barrier would provide for short-term protection of public health, safety, welfare and the environment. However, long-term effectiveness will depend on maintenance of the engineered barrier. Residual groundwater impacts will be effectively managed by an institutional control. Abandoning the tunnel network and designing a SSDS will mitigate the risk for vapor intrusion, if the SSDS is installed and properly maintained with an institutional control.		Alt 3 is technically feasible and technology is available for implementation.	The Property would be restored concurrent with redevelopment. Institutional controls will be needed to provide for long-term control of residual impacts.	Removal of highly impacted PCB/VOC soils (2,000 cy; $880,000); removal of the concrete slab (104,000 ft2; $312,000) and abandonment of the tunnel network ($30,000) will occur first. Removal and offsite disposal of soil from the future landscaped areas (2,800cy @ $90/cy = $252,000) will follow. Final work will include importing clean fill (6,200 cy; $155,200) to bring the site to rough grade while constructing the base of the necessary engineered barriers and constructing the subbase portion of the parking lot cap ($101,400). Fill may be available at no cost to the City pending future City project schedules, and pending approval the fill could be used to construct a portion of the engineered barriers. Engineering/prefield studies/program management/reporting ($230,900).	Crushed concrete will be reused onsite to abandon the tunnel network and construct the subbase portion of the parknig lot. Energy and fuel use would be minimized; however, local infrastructure (roads) could be impacted during importation of soil; however low sulfur diesel can be used and a no-idle policy will reduce the carbon footprint.

APPENDIX A
Architectural Renderings

BUILDING AREA (GSF):

1ST FLOOR:	20,400 SF
2ND - 4TH FLOORS:	19,000 SF/FLOOR
TOTAL:	**77,400 SF**



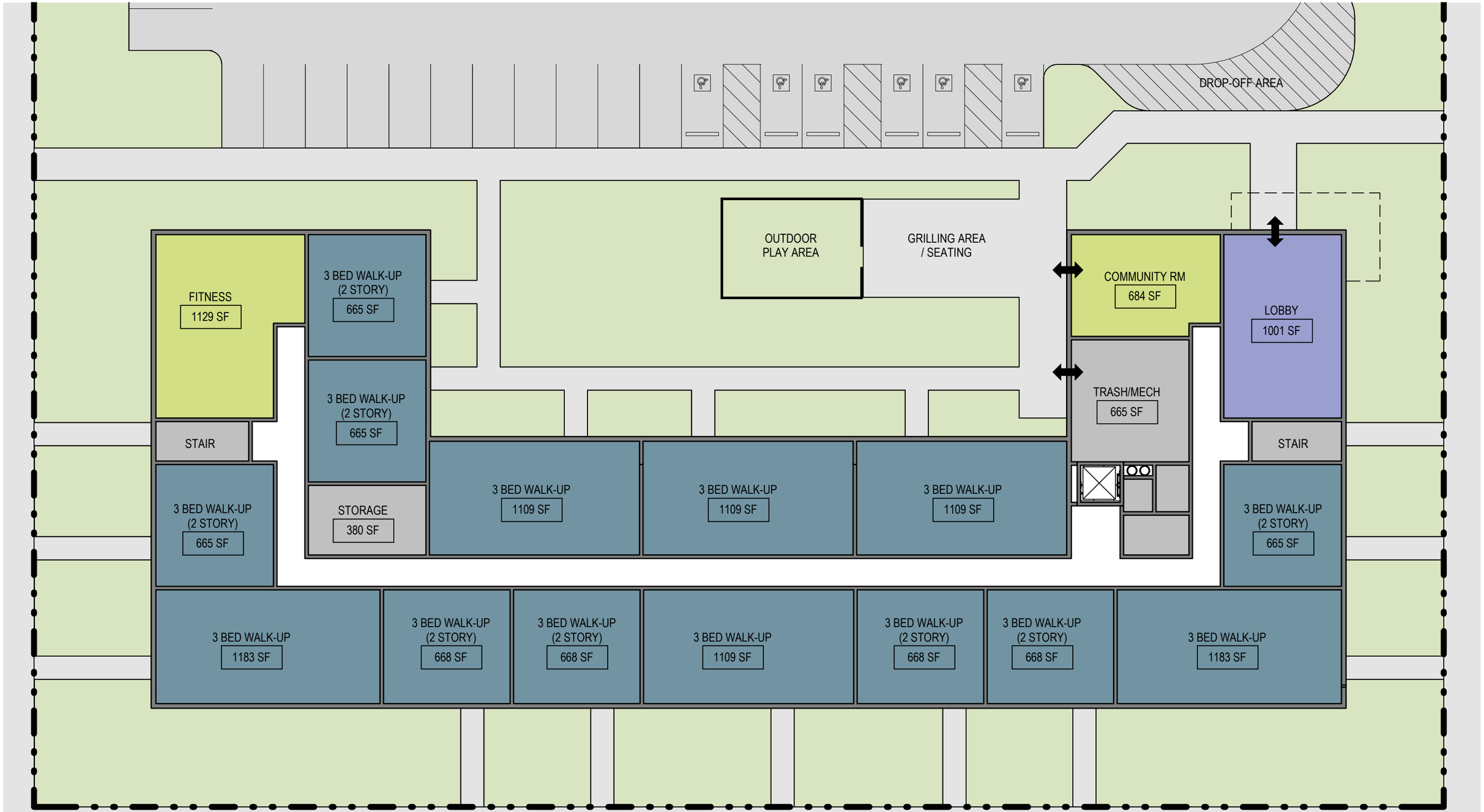
Engberg Anderson ARCHITECTS
MILWAUKEE | MADISON | TUCSON | CHICAGO

MARITIME FLATS

SITE PLAN
SCALE: 1" = 30'-0"
Engberg Anderson Project No. 213319.00

A-00

10/18/2023



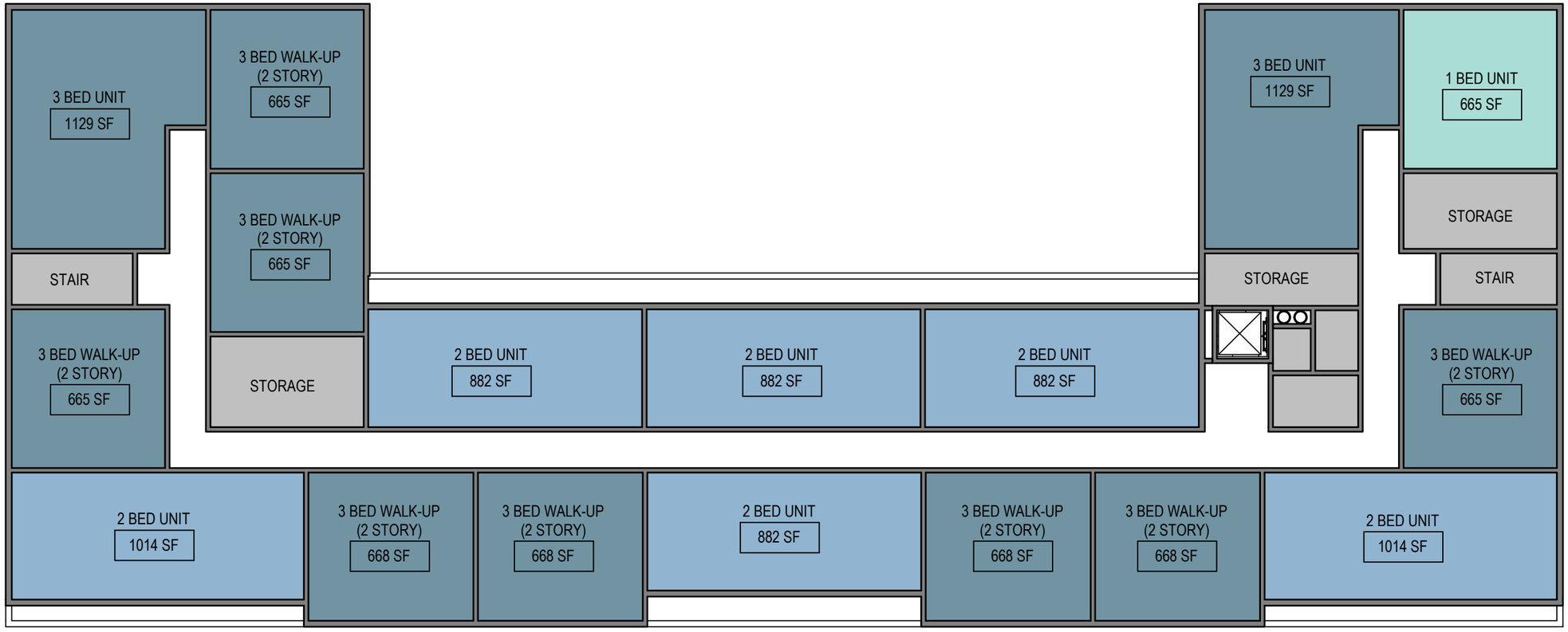
Engberg Anderson ARCHITECTS
MILWAUKEE | MADISON | TUCSON | CHICAGO

MARITIME FLATS

A-01

1ST FLOOR PLAN
SCALE: 1" = 20'-0"
Engberg Anderson Project No. 213319.00

10/18/2023



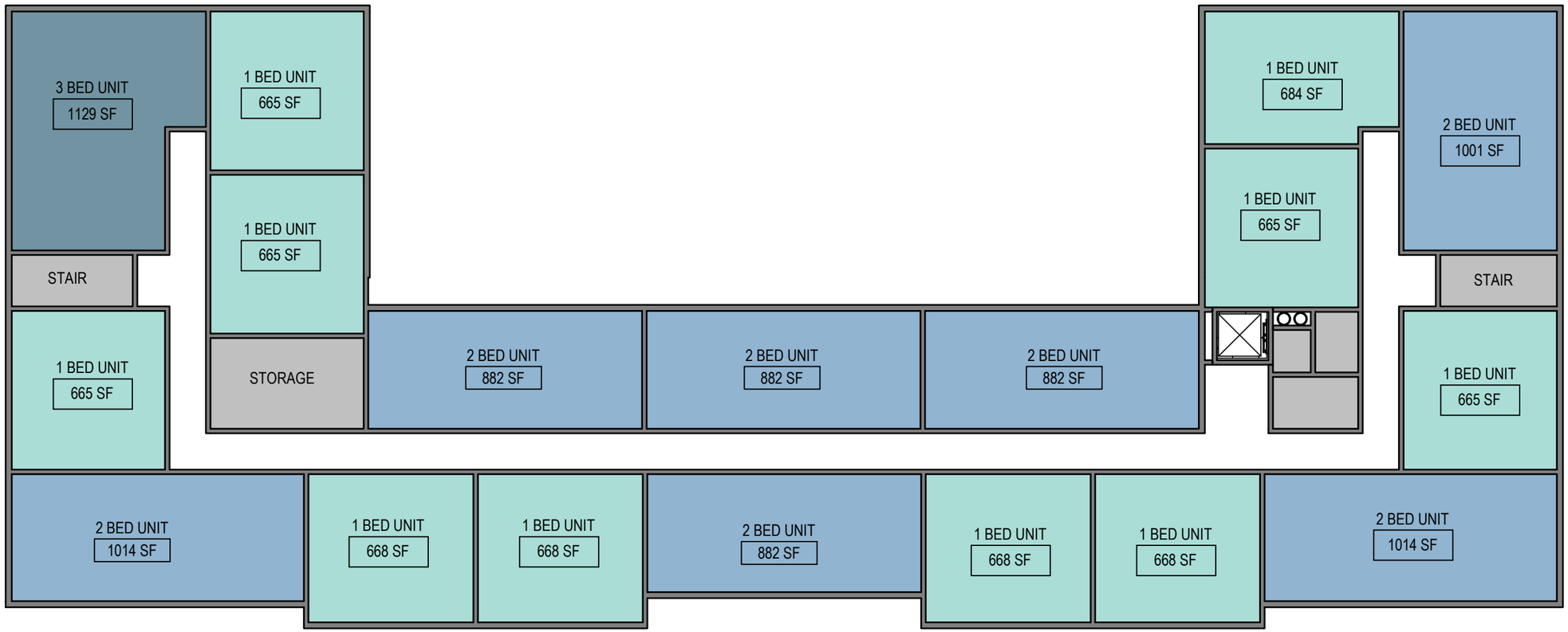
Engberg Anderson ARCHITECTS
MILWAUKEE | MADISON | TUCSON | CHICAGO

MARITIME FLATS

A-02

2ND FLOOR PLAN
SCALE: 1" = 20'-0"
Engberg Anderson Project No. 213319.00

10/18/2023



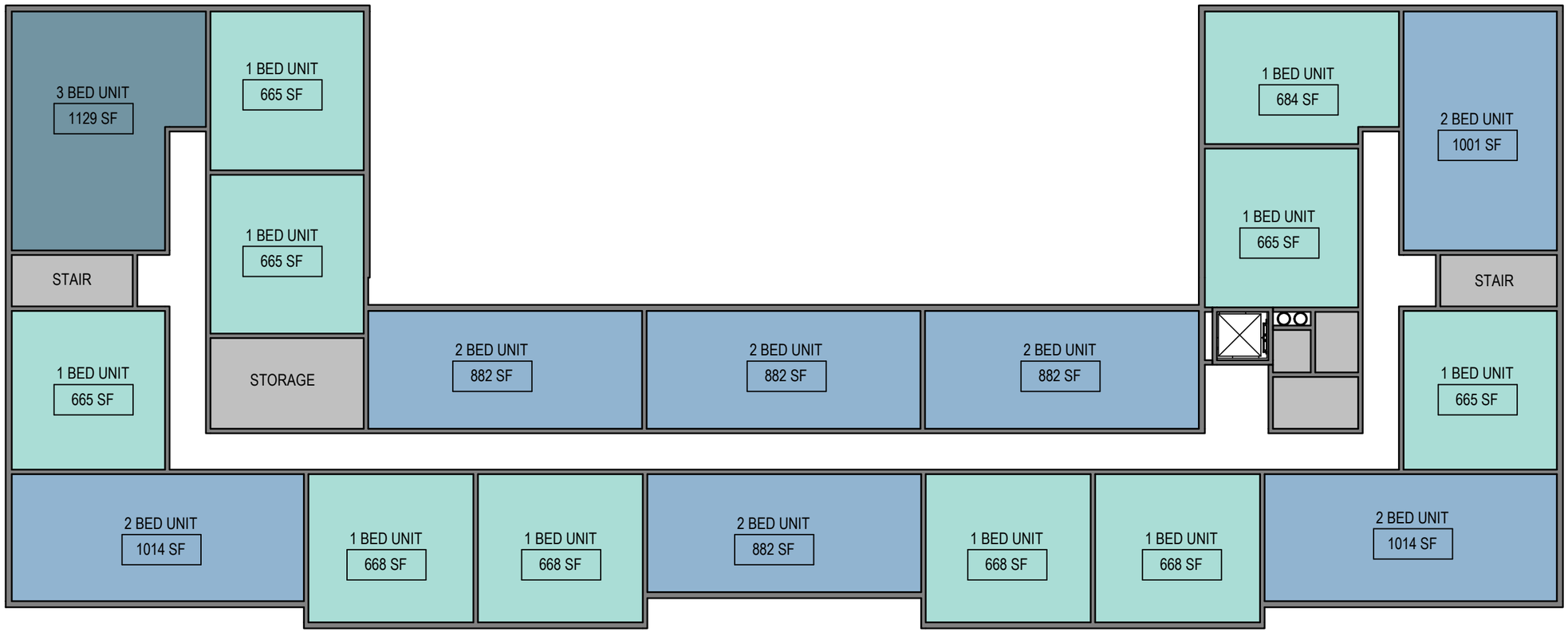
Engberg Anderson ARCHITECTS
MILWAUKEE | MADISON | TUCSON | CHICAGO

MARITIME FLATS

A-03

3RD FLOOR PLAN
SCALE: 1" = 20'-0"
Engberg Anderson Project No. 213319.00

10/18/2023



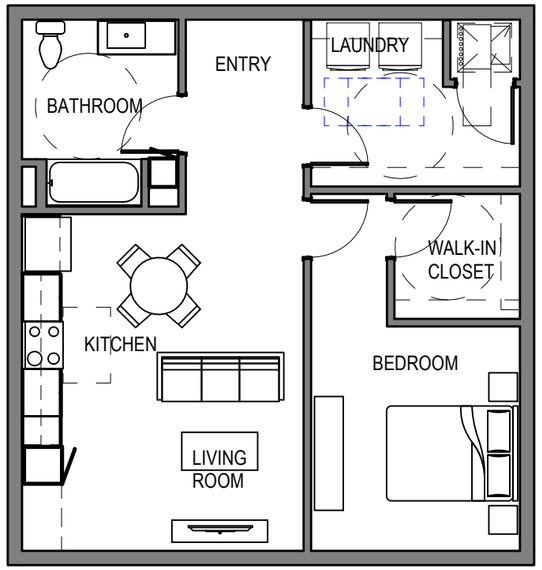
Engberg Anderson ARCHITECTS
MILWAUKEE | MADISON | TUCSON | CHICAGO

MARITIME FLATS

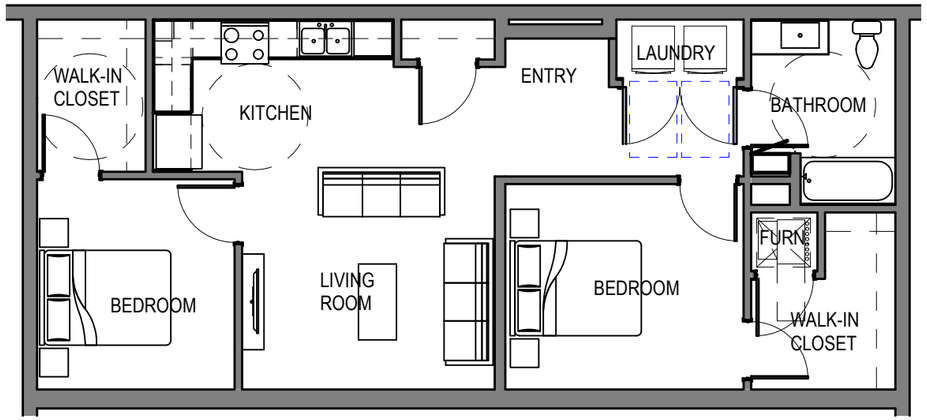
A-04

4TH FLOOR PLAN
SCALE: 1" = 20'-0"
Engberg Anderson Project No. 213319.00

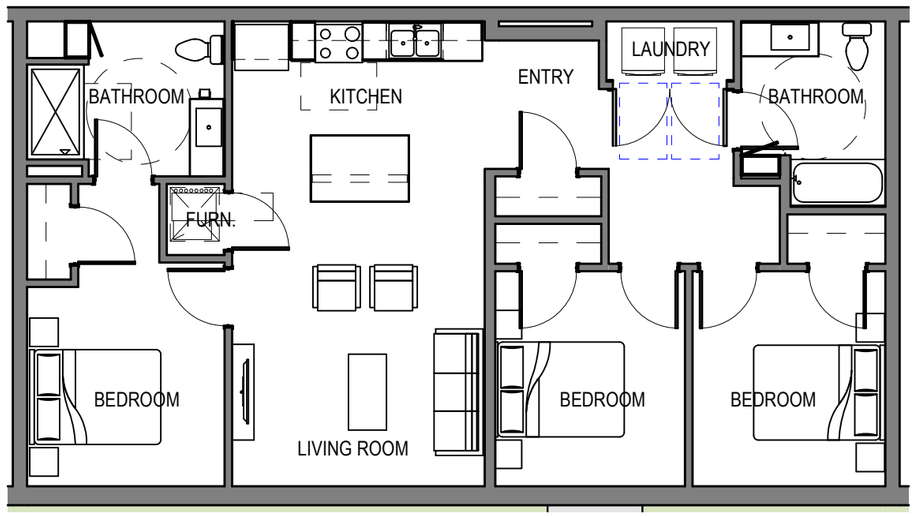
10/18/2023



1 TYPICAL ONE BEDRROM UNIT
1/8" = 1'-0"



2 TYPICAL TWO BEDROOM UNIT
1/8" = 1'-0"



3 TYPICAL THREE BEDROOM UNIT
1/8" = 1'-0"

Engberg Anderson ARCHITECTS
MILWAUKEE | MADISON | TUCSON | CHICAGO

MARITIME FLATS

A-05

TYPICAL UNIT PLANS
SCALE: 1/8" = 1'-0"
Engberg Anderson Project No. 213319.00

10/18/2023

Stantec Consulting Services Inc.
12080 Corporate Parkway, Suite 200
Mequon WI 53092-2661

October 18, 2023

Project/File: 193708490

Attention: Mr. Tauren Beggs
Hydrogeologist, Remediation and Redevelopment Program
Wisconsin Department of Natural Resources
Northeast Region, Green Bay Service Center
2984 Shawano Ave
Green Bay, WI 54313-6727

Reference: Site Investigation Status Review
Phase 1 Redevelopment Area; 1512 Washington Street; Manitowoc, Wisconsin
Open BRRTS # 02-36-545108 (LGU; Open)

Dear Mr. Beggs,

On behalf of the City of Manitowoc (City) and City of Manitowoc Community Development Authority (CDA), Stantec Consulting Services, Inc. (Stantec) prepared this status review of ongoing site investigation activities in the 2.1-acre Phase 1 Redevelopment Area within the former 3.7-acre Subject Property located at 1512 Washington Street in the City of Manitowoc. The locations of the Phase 1 Redevelopment Area 1 (shaded purple) and the Subject Property (outlined in green) relative to regional topography are illustrated on **Figure 1**. The locations of the Phase 1 Redevelopment Area (outlined in purple) and the Subject Property (outlined in green) relative to various Site features overlaying a 2020 Orthophotograph are illustrated on **Figure 2** through **Figure 7c**. Please note for the purpose of this review, given the locations/extents of polychlorinated biphenyl (PCB) impacts to soil relative to the Phase I Redevelopment Area, the proposed remedial area also includes the "Loading Dock" source area.

As a Wis. Admin. Code ch. NR 716 Site Investigation has not yet been approved, the purpose of this review is to compare the assessment work completed to date with the proposed remediation scope of work included in a FY24 USEPA Brownfield Cleanup Grant application that is being prepared by the CDA. If funded, the Brownfield Cleanup Grant will be utilized to prepare the redevelopment of the first phase on the property, called the Phase 1 Redevelopment Area for multi-family residential redevelopment specifically targeted for low to moderate income (LMI) households.

ENVIRONMENTAL SITE INVESTIGATIONS

Extensive site investigation activities have occurred on the subject property (e.g., AECOM 2009a,b; Stantec 2016a-2021; Ramboll 2020-2023c). Significant residual soil and groundwater impacts from petroleum and hazardous substances (including emerging contaminants, such as PFAS) associated with prior industrial use and placement of historic fill are present. These conditions will complicate non-industrial redevelopment. By environmental media, the known conditions are as summarized below.

Soil. As illustrated on **Figures 3a-3d**, VOCs, PAHs, PCBs, and heavy metals were detected in soil at concentrations greater than applicable health-based Wis. Admin. Code ch. NR 720 Residual Contaminant Levels (RCLs) and/or Background Threshold Values (BTVs). In addition, total PCB concentrations in soil exceed 50 milligrams per kilogram in two release areas.

Reference: **Site Investigation Status Review; Phase 1 Redevelopment Area; 1512 Washington Street; Manitowoc, Wisconsin; Open BRRTS # 02-36-545108 (LGU; Open)**

Groundwater. The potentiometric surface of shallow groundwater grades downward towards the Manitowoc River, which serves as a constant head boundary for regional groundwater. As illustrated on **Figures 4a-4c** VOCs, PAHs, PCBs, and heavy metals were detected in groundwater at concentrations greater than applicable health-based Wis. Admin. Code ch. NR 140 groundwater quality standards. PFAS compounds were also detected at varying concentrations at the Subject Property.

Vapor Intrusion. The Property is currently vacant. Therefore, the vapor intrusion pathway cannot be quantitatively evaluated at this point. However, soil and/or groundwater with residual VOC impacts likely extend beneath areas of the proposed multi-family residential redevelopment area and/or in areas bisected by the utility tunnel network. Depending on final reuse plans and building alignments, residual VOC impacts may pose a threat to indoor air quality due to vapor intrusion directly into the structure and/or through new or future preferential flow pathways into the structure. Any new occupied structures at this property must consider implementation of vapor mitigation technologies in accordance Wisconsin remedial action laws.

PROPOSED REUSE

A developer has secured/stacked the necessary funding to redevelop the Phase I Redevelopment Area for low to moderate income (LMI) multi-family housing. As illustrated on **Figure 5**, the redevelopment will include:

- Multi-Family Building (23,510 square feet; ft^2),
- Landscaped/Greenspace (0.7 acres),
- Asphalt-Paved Parking Lot (0.9 acres),
- Outdoor Recreation/Playground (1,100 ft^2), and
- Sidewalks (2,340 ft^2).

However, as illustrated on **Figure 6**, significant soil and groundwater impacts remain in the Phase I Redevelopment Area and must be mitigated to facilitate the proposed reuse.

REMEDIAL ACTION OPTIONS EVALUATION

An evaluation of three remedial options was conducted by Stantec (2023) utilizing criteria presented in Wis. Admin. Code §§ NR 722.07(4) and NR 722.09(2m) to address environmental impacts to facilitate redevelopment for non-industrial purposes.

The selected alternative will consist of:

- Removal and offsite disposal of soil from two PCB-source areas with Total PCBs greater than 50 milligrams per kilogram. Two PCB removal areas are labeled as Area 8 and Loading Dock, illustrated on **Figure 7a,** and will generate two waste streams, as summarized below:

PCB Remedial Area	Volume of Soil Transported to TSCA Landfill (yd3)	Volume of Soil Transported to Licensed Solid Waste Landfill (yd3)
Area 8 (**Figure 7b)**	350	475
Loading Dock (**Figure 7c**)	600	575

TSCA = Toxic Substance Control Act

Reference: **Site Investigation Status Review; Phase 1 Redevelopment Area; 1512 Washington Street; Manitowoc, Wisconsin; Open BRRTS # 02-36-545108 (LGU; Open)**

- Removal of the existing 92,000 ft^2 concrete slab (estimated to generate 3,400 yd^3 of concrete debris). Removed concrete is targeted for crushing and reuse onsite to abandon the utility tunnel network (estimated 1,500 linear feet (lf) of tunnel approximately 5 feet high by 6 feet wide) and to construct the subbase of the parking lot (37,500 ft^2).
- Excavation and offsite disposal of impacted soil from the future landscaped/greenspace areas (estimated 2,050 yd^3).
- Importing clean fill to construct the base of the landscaped area (2,050 yd^3); sidewalk (100 yd^3); playground/outdoor area (50 yd^3); and future building (3,500 yd^3).
- Design of Sub-Slab Depressurization System (SSDS)

Excavation and offsite disposal of soil from the two PCB source areas will serve as source control for two significant comingled PCB and VOC releases with immediate and permanent removal of impacts. Abandonment of the subsurface tunnel network will reduce the potential for vapor migration. Removal of the existing concrete slab and removal of soil from the future landscaped areas will prepare the areas for importing clean fill to construct the final engineered barriers. The engineered barriers will prevent direct contact with soil impacts while mitigating the risk for potential adverse extreme weather events exacerbated by climate change (such as mobilization of impacts during flood events). Designing the SSD System will provide for a plan to install the system during future construction. Completion of the hardscape engineered barriers/caps outside of the scope of this ABCA is likely to include Property amenities (e.g., building, parking lot, playground/outdoor space, sidewalks), as illustrated on **Figure 5**.

The selected remedial alternative will cost-effectively provide for long-term reduction in the mobility, toxicity, and magnitude of impacts. Institutional controls will provide for long-term maintenance of the engineered barrier and will prevent groundwater consumption. This approach is considered the most reasonable and cost-effective approach to facilitate proposed redevelopment. This approach is the selected remedial alternative based on its short-term and long-term effectiveness, ability to be implemented within the proposed development, restoration time frame, economic feasibility, and sustainability.

SCOPE AND SCHEDULE FOR FUTURE WORK

Stantec proposes to implement the selected remedial alternative in 10 tasks, as summarized below:

Task #	Task Description	Weeks to Complete
1	Waste Characterization Sampling	2-3 Weeks
2	Develop a Remedial Action Plan / Material Management Plan and Seal Monitoring Well Network	2-4 Weeks, pending the results of Task 1
3	Removal and Offsite Disposal of Soil from Two PCB-Source Areas with Total PCBs Greater than 50 Milligrams per Kilogram	2-4 Weeks, depending on waste profile/manifest approvals by the landfills
4	Removal of Existing Concrete Slab to Prepare for Construction of Engineered Barriers	1-2 Months
5	Abandonment of the Tunnel Network to Prevent Contaminant Migration	2-4 Weeks, to be completed concurrently/ following crushing of debris from Task 4
6	Construction of the Subbase Engineered Barrier in the Parking Lot	1-2 Weeks, to be completed concurrently/ following crushing of debris from Task 4

Reference: **Site Investigation Status Review; Phase 1 Redevelopment Area; 1512 Washington Street; Manitowoc, Wisconsin; Open BRRTS # 02-36-545108 (LGU; Open)**

Task #	Task Description	Weeks to Complete
7	Excavation and Offsite Disposal of Soil from the Future Landscaped Areas	2-4 Weeks, immediately following Task 4 and completed concurrently with Task 8
8	Importing Clean Fill to Construct the Base of the Engineered Barriers	2-4 Weeks, pending availability of a suitable quantity of fill
9	Construction Documentation Report	1-2 Weeks, following completion of Task 8
10	Engineering, Permitting, Contractor Oversight, Program Management, and Community Outreach	Duration of Remedial Alternative (Anticipated to be 3-6 months on an aggressive time schedule)

Stantec understands site investigation activities have not yet been completed nor has Wisconsin DNR yet approved the complete Site Investigation under Wis. Admin. Code ch. NR 716. However, subsurface impacts in the Phase I Redevelopment Area appear sufficiently known to implement the selected remedial alternative. It is acknowledged that post construction monitoring of sub-slab vapor and groundwater will likely be required, but the scope is not yet determined. In addition, a formal remediation documentation report will be prepared following construction of the final engineered barrier surface(s).

We look forward to continuing to work with you and the City and CDA to facilitate non-industrial redevelopment at 1512 Washington Street.

Regards,

STANTEC CONSULTING SERVICES INC.

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STANTEC CONSULTING SERVICES INC.

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Enclosures: Figures

References

For references mentioned in this letter, please see:

Stantec, 2023, Analysis of Brownfield Cleanup Alternatives, *in press.*

Limitations

The conclusions in this letter are Stantec's professional opinion, as of the time of the letter, and concerning the scope described in the letter. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. The letter relates solely to the specific project for which Stantec was retained and the stated purpose for which the letter was prepared. The letter is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Reference: Site Investigation Status Review; Phase 1 Redevelopment Area; 1512 Washington Street; Manitowoc, Wisconsin; Open BRRTS # 02-36-545108 (LGU; Open)

Stantec has assumed all information received from the City/CDA and third parties in the preparation of the letter to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This letter is intended solely for use by the City/CDA in accordance with Stantec's contract. While the letter may be provided to applicable authorities having jurisdiction and others for whom the City/CDA is responsible, Stantec does not warrant the services to any third party. The report may not be relied upon by any other party without the express written consent of Stantec, which may be withheld at Stantec's discretion.

FIGURES

Figure No.
1

Title
Subject Property, Regional Topography, and Phase I Redevelopment Area

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 550 1,100
Feet

N

Legend

- Subject Property
- Phase I Redevelopment Area

Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet

Stantec

Figure No.
2

Title
Subject Property and
2020 Orthophotograph

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 45 90
Feet

N

Legend

- Subject Property
- Phase I Redevelopment Area

Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Proposed reuse features digitized from Enberg Anderson (2023)
3. Orthophotograph from the City of Manitowoc (2020)

Stantec

Figure No.
3a

Title
PCB Impacts to Soil

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment

0 Area 45 90
Feet

N

Legend

- PCBs > IDC RCL
- PCBs > NIDC RCL
- PCBs > Soil to Groundwater RCL
- Phase I Redevelopment Area
- Subject Property

Notes

1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Data Sources Include:
Orthophotography: 2020 City of Mantiowoc
Data Adapted From: Ramboll 2022
3. PCB = polychlorinated biphenyls, IDC = Industrial Direct Contact RCL, NIDC = Non-Industrial Direct Contact RCL, RCL = Residual Contaminant Level, > = constituent greater than, RCLs per ch. NR720 of the Wisconsin Administrative Code

Stantec

Figure No.
3b

Title
PAH Impacts to Soil

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 45 90
Feet

N

Legend

- PAHs > IDC RCL
- PAHs > NIDC RCL
- PAHs > Soil to Groundwater RCL
- Phase I Redevelopment Area
- Subject Property

Notes

1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Data Sources Include:
Orthophotography: 2020 City of Mantiowoc
Data Adapted From: Ramboll 2022
3. PAH = polycyclic aromatic hydrocarbons, IDC = Industrial Direct Contact RCL, NIDC = Non-Industrial Direct Contact RCL, RCL = Residual Contaminant Level, > = constituent greater than, RCL per ch. NR720 of the Wisconsin Administrative Code

Stantec

Figure No.
3c

Title
VOC Impacts to Soil

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 50 100
Feet

N

Legend

- VOCs > IDC RCL
- VOCs > NIDC RCL
- VOCs > Soil to Groundwater RCL
- Phase I Redevelopment Area
- Subject Property

Notes

1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Data Sources Include:
Orthophotography: 2020 City of Mantiowoc
Data Adapted From: Ramboll 2022
3. VOC = volatile organic compounds, IDC = Industrial Direct Contact RCL, NIDC = Non-Industrial Direct Contact RCL, RCL = Residual Contaminant Level, > = constituent greater than, RCL per ch. NR720 Wisconsin Administrative Code

Stantec

Figure No.
3d

Title
Heavy Metal Impacts to Soil

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment

0 Area 45 90
Feet

N

Legend

- Heavy Metals > IDC RCL
- Heavy Metals > NIDC RCL
- Metals > Soil to Groundwater RCL
- Phase I Redevelopment Area
- Subject Property

Notes

1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Data Sources Include:
Orthophotography: 2020 City of Mantiowoc
Data Adapted From: Ramboll 2022
3. RCRA = Resource Conservation and Recovery Act, IDC = Industrial Direct Contact RCL, NIDC = Non-Industrial Direct Contact RCL, RCL = Residual Contaminant Level, > = constituent greater than, RCLs per ch. NR720 of the Wisconsin Administrative Code

Stantec

Figure No.
4a

Title
PCB **and** VOC **I**mpacts **to Groundwater**

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 50 100
Feet

N

Legend

- PCBs > ES
- PCBs > PAL
- VOCs > ES
- VOCs > PAL
- Phase I Redevelopment Area
- Subject Property

Notes

1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Data Sources Include:
Orthophotography: 2020 City of Mantiowoc
Data Adapted From: Ramboll 2022
3. PCBs = polychlorinated biphenyls, VOCs = Volatile Organic Compounds, ES = Enforcement Standard as established in ch. NR 140 WAC, PAL = Preventative Action Limit as established in ch. NR 140

Stantec

Figure No.
4b

Title

PAH **and** RCRA Metal **Impacts to** Groundwater

Client/Project

City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 70 140
Feet

N

Legend

- PAHs > ES
- PAHs > PAL
- Dissolved RCRA Metals > ES
- Dissolved RCRA Metals > PAL
- Phase I Redevelopment Area
- Subject Property

Notes

1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Data Sources Include:
Orthophotography: 2020 City of Mantiowoc
Data Adapted From: Ramboll 2022
3. PCBs = polychlorinated biphenyls, VOCs = Volatile Organic Compounds, ES = Enforcement Standard as established in ch. NR 140 WAC, PAL = Preventative Action Limit as established in ch. NR 140

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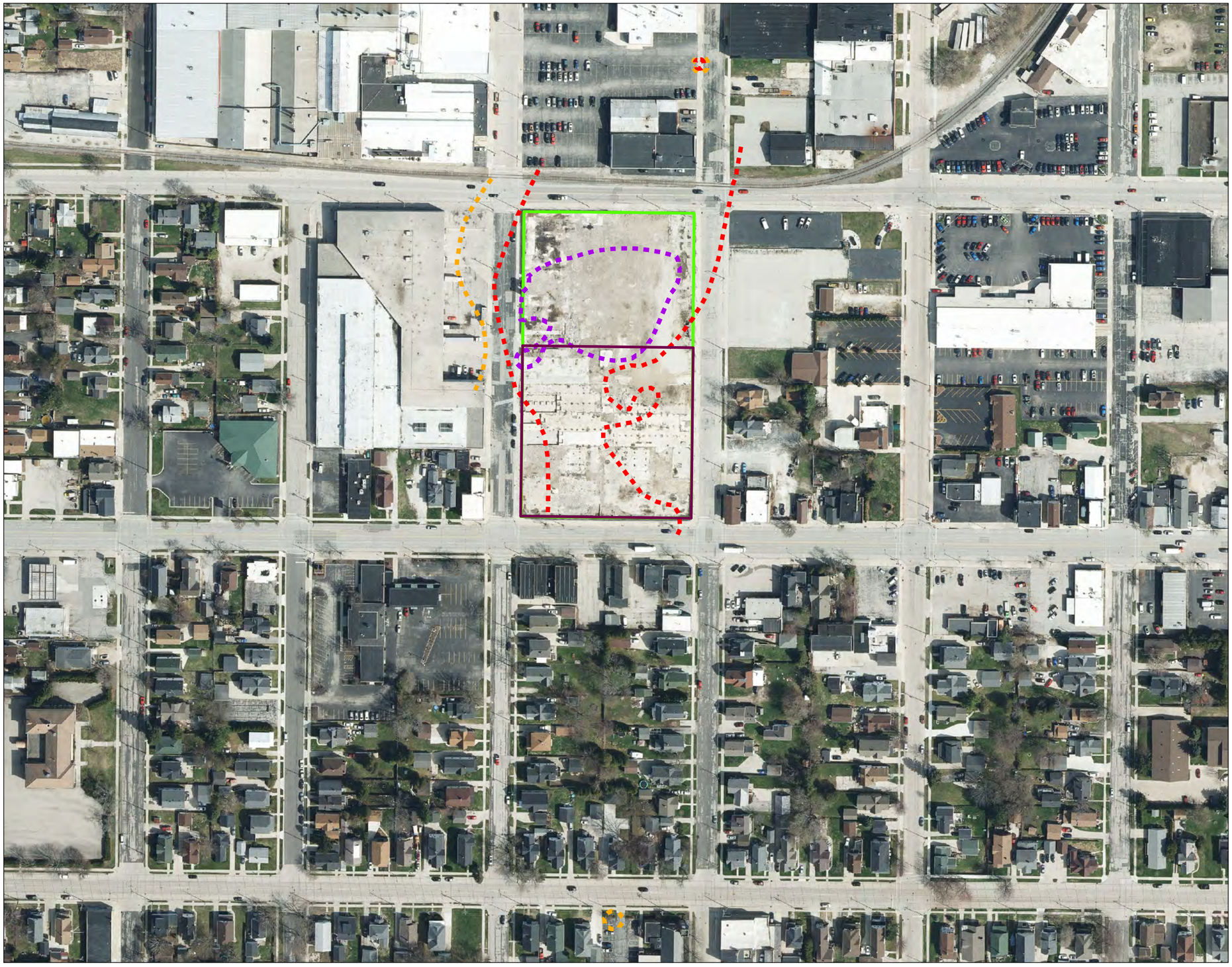

Figure No.
4c

Title
Concentrations of PFAS in Groundwater

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 135 270
Feet

Legend

- PFAS > 2,000 ng/L
- PFAS > 200 ng/L
- PFAS > 20 ng/L
- Phase I Redevelopment Area
- Subject Property

N

Notes

1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Data Sources Include:
Orthophotography: 2020 City of Mantiowoc
Data Adapted From: Ramboll 2022
3. PFAS = per- and polyfluoroalkyl substances, > = greater than, ng/L = nanograms per liter.
4. No groundwater quality standards exist for PFAS compounds at this

Stantec

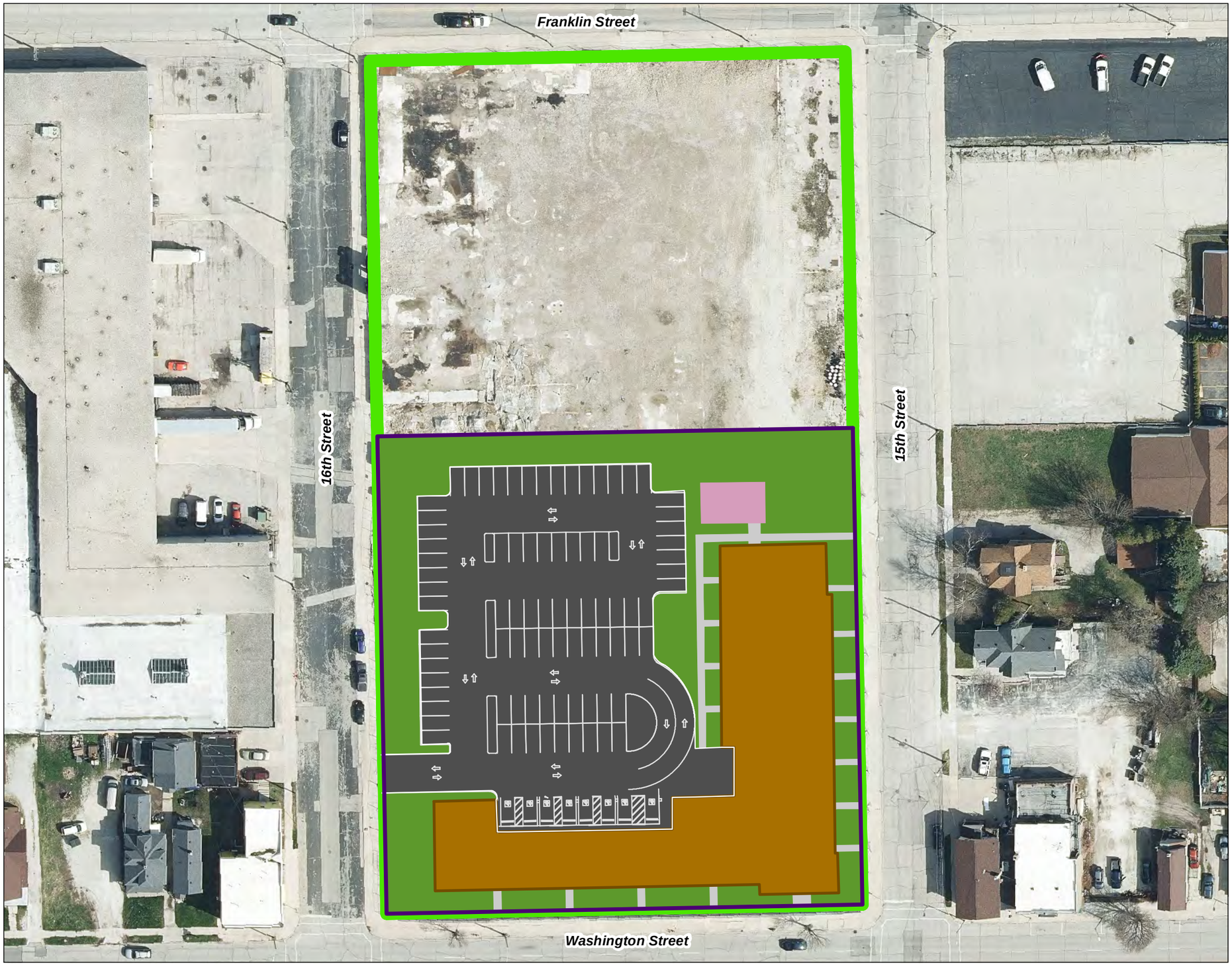

Figure No.
5

Title
Proposed Reuse Features

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 45 90
Feet

N

Legend

- Subject Property
- Phase I Redevelopment Area

Proposed Reuse Features

- Building
- Landscaping
- Parking
- Sidewalk
- Recreation

Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Proposed reuse features digitized from Enberg Anderson (2023)
3. Orthophotograph from the City of Manitowoc (2020)

Stantec

Figure No.
6

Title
Impacts to Soil and Groundwater and Proposed Reuse Features

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 62.5 125
Feet

N

Legend

- Subject Property
- Phase I Redevelopment Area

PCB Release Areas
- PCBs > 50 PPM

Proposed Reuse Features
- Building
- Landscaping
- Parking
- Sidewalk

Extent of Soil and Groundwater Impacts (Onsite Only)
- Groundwater Impacts > Enforcement Standard
- Groundwater Impacts > Preventive Action Limit
- Soil Impacts > Industrail Direct Contact RCL
- Soil Impacts > Non-Industrail Direct Contact RCL
- Soil Impacts > Soil to Groundwater RCL

Notes
1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Proposed reuse features digitized from Enberg Anderson (2023)
3. Orthophotograph from the City of Manitowoc (2020)
4. Extents of impacts adapted from data illutrated by Ramboll (2020).
RCL = residual contaminant level per ch. NR 700 WAC; Groundwater

Stantec

Figure No.
7a

Title
Proposed Reuse Features and
Two Proposed PCB Removal Areas

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 45 90 Feet

193706270
Prepared by HLB on 1/20/2020

N

Legend

- Target Parcel
- Phase I Redevelopment Area

Proposed Reuse Features

- Building
- Landscaping
- Parking
- Sidewalk
- Recreation

Proposed PCB Removal Areas

- PCBs < 50 PPM
- PCBs > 50 PPM

Notes
1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Data Sources Include:
   Orthophotography: 2020 City of Mantiowoc
   Data Adapted From: Symbiont (2016) and AES (2011)

Stantec

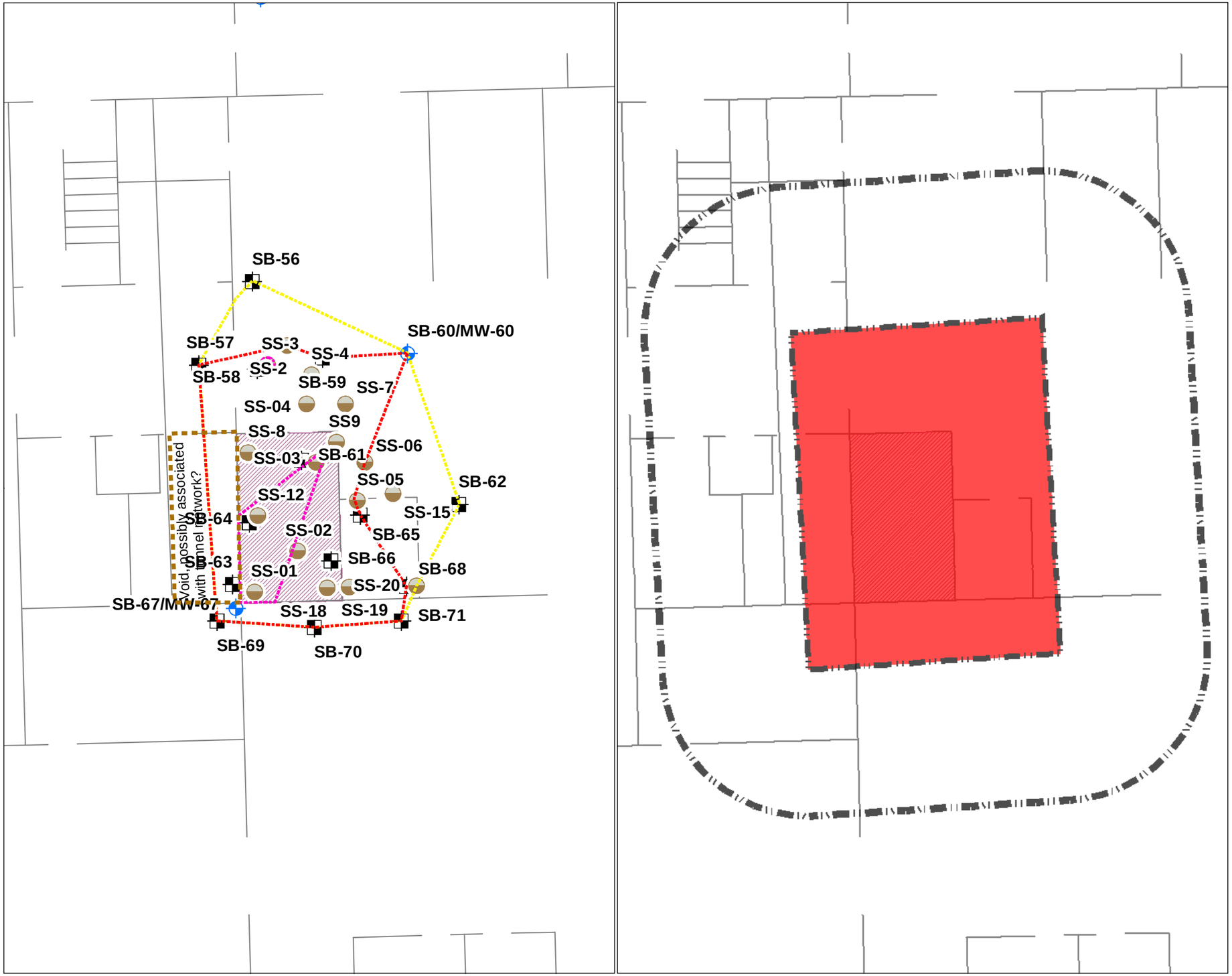

Figure No.
7b

Title
PCB Impacts to Soil in Area 8 and Proposed Soil Removal Area

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

0 5 10
Feet

N

Legend

- Former Building Walls
- Former Transformer Pad

Phase II ESA Sample Locations

- Soil Boring / Monitoring Well (3)
- Soil Boring (14)
- Surface Soil Samples

Total PCB Concentrations (mg/kg)

- < 50 (720 sf)
- < 100 (500 sf)
- > 1000 (70 sf)

Proposed Removal Area

- PCBs < 50 PPM (3500 sf)
- PCBs > 50 PPM (900 sf)

Notes
1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Data Adapted From Stantec (2020)

Stantec

Figure No.
7c

Title
PCB Impacts to Soil in the Loading Dock and Proposed Soil Removal Area

Client/Project
City of Manitowoc CDA
Analysis of Brownfield Cleanup Alternatives
Former Mirro Property - Phase I Redevelopment Area

193706270
Prepared by HLB on 1/20/2020

0 10 20
Feet

N

Legend

- Former Building Walls

Phase II ESA Sample Locations

- Soil Boring / Monitoring Well (6)
- Soil Boring (18)
- Surface Soil Sample Locations (31)

Total PCB Concentrations (mg/kg)

- < 50 (1760 sf)
- <100 (1130 sf)
- <1000 (450 sf)

Proposed Removal Area

- PCBs < 50 PPM (4,900 sf)
- PCBs > 50 PPM (1,800 sf)

Notes
1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Data Sources Include:
   Orthophotography: 2017 City of Mantiowoc
   Data Adapted From: Symbiont (2016) and AES (2011)

Stantec