From: Knapke, Eric <Knapke.Eric@epa.gov>
Sent: Monday, July 24, 2023 4:08 PM
To: Byers, Harris; Adam Tegen; Beggs, Tauren R - DNR
Subject: RE: ABCA for the Phase 2 Redevelopment Area of the River Point District in Manitowoc, Wisconsin

Hello all,

I have reviewed and approved the ABCA for Phase 2 of the River Point District. I have no further comments or questions at this time. Thanks for submitting this.

Thanks,
Eric

From: Byers, Harris <Harris.Byers@stantec.com>
Sent: Friday, July 21, 2023 6:46 PM
To: Adam Tegen <ategen@manitowoc.org>; Knapke, Eric <Knapke.Eric@epa.gov>; Beggs, Tauren R - DNR <Tauren.Beggs@wisconsin.gov>
Subject: RE: ABCA for the Phase 2 Redevelopment Area of the River Point District in Manitowoc, Wisconsin

Tauren:

Just letting you know I was able to get the ABCA uploaded through the portal.

Sincerely,
Harris

From: Byers, Harris
Sent: Friday, July 21, 2023 4:06 PM
To: Adam Tegen <ategen@manitowoc.org>; Knapke.Eric@epa.gov; Beggs, Tauren R - DNR <Tauren.Beggs@wisconsin.gov>
Subject: ABCA for the Phase 2 Redevelopment Area of the River Point District in Manitowoc, Wisconsin

Team:

Attached is an Analysis of Brownfield Cleanup Alternatives (ABCA) for the Phase 2 Redevelopment Area of the River Point District in Manitowoc, Wisconsin.

This ABCA evaluates and summarizes remedial options described in:

- Stantec, 2023b, Remedial Action Plan & Materials Management Plan, River Point Drive Extension, Phase 2 Redevelopment Area of the River Point District; Manitowoc, Wisconsin, June 2, 2023.

- Stantec, 2023c, Remedial Action Plan for Removal of Apparent Oxide Box Waste Fill Materials, Phase 2 Redevelopment Area of the River Point District; Manitowoc, Wisconsin, June 2, 2023.

- Stantec, 2023d, Remedial Action Plan & Materials Management Plan, Buffalo Street Rights of Way, Phase 2 Redevelopment Area of the River Point District; Manitowoc, Wisconsin, *in press.*

Tauren, the RR Portal was having difficulty this afternoon. I'll try uploading again tonight and Monday as needed to get this to you.

The RAP/MMP for the Buffalo Street ROW is finished; I should have out by COB Monday, at the latest.

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

ANALYSIS OF BROWNFIELD CLEANUP ALTERNATIVES

Phase 2 Redevelopment Area
River Point District, Manitowoc, Wisconsin

1101 Buffalo Street

BRRTS ID: 02-36-585591 (Open ERP), 02-36-176478 (Closed) and 07-36-583000 (LGU)
ACRES ID: 239718

1110 Buffalo Street

BRRTS ID: 02-36-585591 (Open ERP), 03-36-001962 (Closed) and 07-36-583000 (LGU)
ACRES ID: 239716

1103 Chicago Street

BRRTS ID: 02-36-585591 (Open ERP) and 07-36-583000 (LGU)
ACRES ID: 239717

1200 Buffalo Street

BRRTS ID: 02-36-585591 (Open ERP) and 07-36-583000 (LGU)
ACRES ID: 239719

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

Jiyan Hatami, M.S.
Hydrogeologic Specialist

Lynelle Caine
Sr. Brownfields Project Manager

Stantec

July 18, 2023
Project Number 193708490

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FIGURES

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GENERAL INFORMATION

FACILITY:	Phase 2 Redevelopment Area, River Point District; Manitowoc, Wisconsin
PARCEL IDs (All or Portions of):	173000, 173001, 173020, 173022, 173023, 173030, 173040, 173060, 173070, 173080, 173110, 173150 and 173170.
SIZE:	8.4 Acres
USEPA ACRES ID: (All or Portions of):	239716, 239717, 239718, and 239719
WDNR BRRTS NO.:	03-36-001962 (Closed LUST), 07-36-583000 (LGU), and 02-36-585491 (Open ERP)
PROPERTY LOCATION:	NE 1/4 of the NE 1/4 of Section 30; Township 19 North, Range 24 East, Manitowoc, 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. 12080 Corporate Parkway, Suite 200 Mequon, Wisconsin 53092
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 Analysis of Brownfields Cleanup Alternatives (ABCA) on behalf of the City of Manitowoc (hereinafter referred to as the City) and the Community Development Authority of the City of Manitowoc (CDA; current owner) for the "Phase 2 Redevelopment Area" of the River Point District in the City of Manitowoc, Wisconsin (herein referred to as the "Phase 2 Redevelopment Area" or "the Property"). The Phase 2 Redevelopment Area consists of all or portions of 13 contiguous parcels of land owned by the CDA totaling approximately 8.4 acres. The locations of the River Point District and the Phase 2 Redevelopment Area are illustrated on **Figure 1** and **Figure 2**. The delineation of the Phase 2 Redevelopment Area coincides with planned redevelopment activities in 2023-2024. For continuity with prior work, the Phase 2 Redevelopment Area consists of portions of former railroad/industrial property generally located at 1101 Buffalo Street, 1110 Buffalo Street and 1200 Buffalo Street. This 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 this Property are 239716, 239717, 239718, and 239719.

As documented in previous Stantec reports (2019 through 2023), residual soil and groundwater impacts associated with prior commercial/industrial use and placement of historic fill are present and will complicate redevelopment, as summarized below.

> Soil. Site investigation work confirmed the presence of a contiguous sitewide surficial granular fill unit extending from the ground surface downward up to seven feet in depth. A spatial model estimates there are 40,690 cubic yards of granular fill in the Phase 2 Redevelopment Area. A variety of hazardous substances and/or petroleum constituents were detected in soil/fill at concentrations greater than health-based ch. NR 720 WAC residual contaminant levels (RCLs). Impacts associated with the sitewide surficial granular fill unit in the Phase 2 Redevelopment Area have not migrated downward to underlying native soils. Petroleum volatile organic compound (VOC) impacts to surficial fill and underlying native soils are likely associated with previous bulk petroleum storage/handling at the Property. Chlorinated solvents were previously detected in soil; however, solvents were not confirmed in soil during subsequent sampling events. A limited zone of fill material with Prussian blue coloration consistent with ferrocyanide salts in oxide box waste was encountered at approximately 2.5 feet below ground surface at the Property.
>
> Groundwater. The potentiometric surface of shallow groundwater grades downward in a radial manner towards the Manitowoc River, which serves as a constant head boundary for groundwater. Groundwater sampling confirmed the presence of arsenic in groundwater, which is considered representative of background concentrations and not indicative of a release to groundwater. The concentration of 1,1,2,2-Tetrachloroethane in groundwater at MW-157 was greater than the ch. NR 140 WAC Enforcement Standard (ES) and the concentration of benzene in groundwater at MW-157 was slightly greater than the ch. NR 140 WAC Preventive Action Limit (PAL). MW-157 is located adjacent to a former oil house and bulk petroleum storage facility, which is the most likely source of residual groundwater impacts.

Remedial action activities are warranted to facilitate redevelopment at the Property. Specific to this ABCA, the selected remedial approach includes:

- Transportation and offsite disposal of fill with heavy metal, VOC, and/or polycyclic aromatic hydrocarbon (PAH) impacts disturbed during utility installation in the proposed Buffalo Street rights of way;
- Limited excavation and offsite disposal of materials which may serve as a source for groundwater impacts (e.g., apparent oxide box waste fill materials); and
- Importing clean fill and constructing a soil engineered barrier to facilitate development of the River Point Drive rights of way.

Additional future remedial activities to facilitate non-industrial redevelopment to be completed in the future by others are likely to include:

- Construction of sitewide engineered barriers on parcels to be sold to private developers for non-industrial redevelopment to mitigate the potential for direct contact with residual soil impacts and reduce the risk for mobilization of soil impacts to groundwater;
- Construction of an engineered soil barrier along the Manitowoc River to mitigate the risk for direct contact with impacted soil/fill, reduce the risk of mobilization of soil/fill impacts to the river through stormwater runoff, and reduce the potential for leaching of residual impacts to groundwater;
- Potential transport and offsite disposal of impacted fill disturbed during future construction;
- Construction of sub-slab depressurization systems beneath newly constructed buildings to mitigate the risk for vapor intrusion; and
- Establishing institutional controls/continuing obligations and maintenance plans to provide for long-term control of residual soil and groundwater impacts.

2.0 BACKGROUND INFORMATION

Stantec completed this ABCA on behalf of the City and the CDA for the "Phase 2 Redevelopment Area" utilizing the framework provided in NR 722 for a Remedial Action Options Report (RAOR). The Phase 2 Redevelopment Area consists of all or portions of 13 contiguous parcels of land owned by the CDA totaling approximately 8.4 acres and forming the western portion of the larger 21-acre former railroad/industrial peninsula referred to locally as the "River Point District". The locations of the River Point District and the Phase 2 Redevelopment Area are illustrated on **Figure 1** and **Figure 2**. The delineation of the Phase 2 Redevelopment Area coincides with planned redevelopment activities in 2023-2024. For continuity with prior work, the Phase 2 Redevelopment Area consists of portions of former railroad/industrial property generally located at 1101 Buffalo Street, 1110 Buffalo Street, and 1200 Buffalo Street. Redevelopment plans for the Phase 2 Redevelopment Area and the River Point District as a whole are illustrated on **Figure 3.** As illustrated on **Figure 4**, the River Point District was recently rezoned "Central Business" with a Planned Unit Development to facilitate non-industrial redevelopment.

It is critical to realize that work proposed under this ABCA does not duplicate cleanup work previously completed in the River Point District using funds from a cleanup loan provided to the CDA from the City's FY13 USEPA Brownfield RLF program. In addition, work proposed under this ABCA does not duplicate cleanup work funded under a United States Environmental Protection Agency (USEPA) Brownfield Cleanup Grant awarded to the City of Manitowoc in 2022 under Cooperative Agreement BF00E03197.

2.1 HISTORIC PROPERTY USE/OCCUPANCY

Past Ownership and Property Uses in the River Point District
As described in the Stantec (2019) Phase I Environmental Site Assessment (ESA), the River Point District consists of a 20.1-acre peninsula bound to the north, south, and west by the Manitowoc River and bound to the east by North 10th Street and North 11th Street (**Figure 1**). The River Point District appears undeveloped in 1835; however, the proximity of the peninsula to the Lake Michigan/Great Lakes shipping route facilitated initial development in the Phase 2 Redevelopment Area by 1868 to support the shipping industry (**Figure 5**). Although ownership records are not available, the Phase 2 Redevelopment Area appears largely developed by 1886 and occupied by several large apparent industrial buildings and smaller apparent commercial buildings (**Figure 5**).

Historic records indicate the River Point District was transferred from the Manitowoc Terminal Company to the Manitowoc and Western Railroad Company on July 22, 1895, which is consistent with railroad development in the late 19th Century. Assessor records suggest the River Point District was later transferred to the Soo Line Railroad Company and ultimately transferred to Wisconsin Central, Ltd. (WCL) sometime during the latter half of the 20th Century. Railroad use of the River Point District ceased in the 1980s and the River Point District was formally decommissioned by the railroad in the 2000s. As summarized in the Stantec (2019) Phase I ESA, the PINs appear to correspond to leases between the previous owner and a variety of historic commercial/industrial tenants/occupants (discussed below).

Historic Uses/Tenants in the Phase 2 Redevelopment Area
Southeast Portion of Property, Former Grain Elevator (PINs 173080 and 173150)
A grain elevator was constructed on the southeast portion of the Property (PIN 173080) between 1894 and 1900 ("17" on **Figure 4b**), with expansion onto the north-adjoining parcel (PIN 173150) between 1900 and 1919 by "Northern Grain Co". As noted in Stantec (2021a), the grain elevator fell into disrepair in the late 20th Century and was ultimately demolished in 2001. Rail operations remained at the Property until the early 2000s when the remaining steel rails were removed.

The south-adjoining parcels to the Property were developed for railroad use by 1895 and included a cinder pit, railroad roundhouse, turntable and coal shed ("4" through "7" on **Figure 4b**, respectively) and multiple spurs/tracks. This area constitutes "Area B-1" of the River Point District (**Figure 2**) and is being investigated as part of a separate SI.

Northeast Portion of Property, Former Bulk Petroleum Storage (PINs 173020, 173022, 173023, 173030, 173040, 173060, 173070, 173110 and 173170)
As illustrated on **Figure 4a**, the Property was largely occupied by residences and dwellings in the late 19th Century. Records suggest large portions of the Property were leased to a variety of bulk fuel storage companies

operating under a variety of names during the early/mid-20th Century, including the Standard Oil Company bulk oil station on the Property. Historic Sanborn® fire insurance maps indicate use for bulk petroleum storage began between 1912 and 1919 when the Standard Oil Company installed four steel tanks, a 20,000-gallon iron oil tank, and a partially inground 20,000-gallon iron oil tank along a railroad spur present in the northwest portion of the Property. Records indicate most of the petroleum stored/handled at the Property was fuel oil. However, state records indicate a significant quantity of leaded and unleaded gasoline, diesel fuel, kerosene, and used/waste motor oil may have been stored in bulk. The locations of known historic features associated with bulk fuel storage by tenants are illustrated on **Figure 4b**. Bulk petroleum storage was consolidated by the Wingfield Oil Company (later renamed Holmes Oil Company) who continued to operate through the late 1990s. The Holmes Oil Corporation appears to have vacated the Property concurrent with removal of the final storage tanks by 1997. The large oil house depicted in the southeast portion of the Property on **Figure 4b** was demolished in the later portion of the 20th Century, and the slab was removed in August 2020 (Stantec, 2020b) to facilitate completion of this SI.

West Portion of Property, Former Railroad Use (PINs 173000 and 173170)
As illustrated on **Figure 4a**, several large buildings were present on and surrounding the west portion of the Property in the late 19th Century. As adapted from historic Sanborn® Fire Insurance Maps drawn in the late 19th Century, the west portion of the Property was once part of the Manitowoc River (**Figure 4a**). Placement of fill in the late 19th Century on the Property and nearby areas altered the bank of the Manitowoc River to its current location prior to acquisition of the River Point District by the Western Railroad Company on July 22, 1895. The majority of the Property was developed for railroad use by 1895 and included multiple spur lines depicted on **Figure 4b** and a rectangular warehouse ("35" on **Figure 4b**). The Property remained in railroad use through most of the 20th Century (Stantec, 2019).

Northern Portion of Property, Former Coal Transloading (PIN 173001). The northern portion of the Property was developed as a coal transloading yard in the late 19th Century (possibly as early as 1883) concurrent with the redevelopment of the River Point District for railroad use in the late 19th Century. Sanborn ® Fire Insurance Maps indicate the coal storage/transloading facility operated as the "Wisconsin Central RR Coal Dock" by the "C. Reiss Coal Co." through at least 1945. Historic orthophotographs indicate the northern portion of the Property was redeveloped for use as automotive parking by 1946 through at least 1976. Although records are sparse, the parking area appears to have been leased to the "Manitowoc Ship Building Company". The northern portion of the Property was leased to the "Laird Lumber Company" in 1950 and subsequently used for outdoor lumber/material storage into the 21st Century.

Past Ownership in the Phase 2 Redevelopment Area
Historic records indicate the Property was transferred from the Manitowoc Terminal Company to the Manitowoc and Western Railroad Company on July 22, 1895, which is consistent with railroad development in the late 19th Century. Assessor records suggest the Property was later transferred to the Soo Line Railroad Company and ultimately transferred to Wisconsin Central, Ltd. (WCL) sometime during the latter half of the 20th Century. Railroad use of the Property ceased in the 1980s and the Property was decommissioned in the 2000s. The CDA acquired the Property on April 12, 2019 for the purpose of blight elimination and subsequently received a Local Government Unit (LGU) Environmental Liability Exemption from WDNR on March 18, 2019 with a Bureau for Remediation and Redevelopment Site (BRRTS) activity number of 07-36-583000.

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 3** and includes a mixture of road rights of way, riverwalk/green space, multi-family residential townhomes, and commercial space.

2.2 ENVIRONMENTAL SITE INVESTIGATIONS

Stantec (2019) Phase I ESA. As summarized in the Stantec (2019) Phase I ESA, Stantec identified the following recognized environmental conditions (RECs) associated with the River Point District:

- REC 1: Prior Railroad Use
- REC 2: Prior Industrial Use

- REC 3: Residual Impacts to Soil and Groundwater
- REC 4: Apparent Anthropogenic Fill
- REC 5: Storage/Dumping by Adjacent Property Owners
- REC 6: Residual Impacts to Soil and Groundwater from Nearby Properties

In addition to railroad use during the 20th Century, prior leases correspond to a multitude of prior industrial occupants/uses, including bulk coal transloading/storage, petroleum storage, ship building, grain storage/elevator, and transloading of stone. Historic features of specific environmental interest for the Phase 2 Redevelopment Area are illustrated on **Figure 5** through **Figure 7**.

Phase II ESAs, Construction Documentation Reports and Site Investigations. Stantec (2020a through 2023a) completed multiple phases of investigation including Phase II ESAs, Construction Documentation Reports, and Site Investigations at the River Point District using funds from brownfield assessment grants awarded to the City by the USEPA in 2018 under Cooperative Agreement Number BF 00E02377 and in 2022 under Cooperative Agreement number BF 00E03040. Additional work was completed using funds from three Site Assessment Grants awarded to the City and CDA by the Wisconsin Economic Development Corporation in 2020 and 2021. Soil and groundwater sample locations completed in the Phase 2 Redevelopment Area are illustrated on **Figure 8**.

Soil. Site investigation work confirmed the presence of a contiguous sitewide black granular fill unit extending from the ground surface downward up to seven feet in depth. Concentrations of PAHs and heavy metals in the fill are consistently greater than one or more health-based RCL; however, impacts associated with the fill unit in the Phase 2 Redevelopment Area have not migrated downward to underlying native soils The vertical and horizontal extents of the fill unit area are illustrated on **Figure 9**. A spatial model of **Figure 9** estimates there are 40,690 cubic yards of granular fill in the Phase 2 Redevelopment Area.

As illustrated on **Figure 10**, a variety of hazardous substances and petroleum constituents, presumably associated with liquid spills, were detected in soil/fill at concentrations greater than one or more health-based RCLs. Petroleum volatile organic compound (VOC) impacts to surficial fill and underlying native soils, though delineated, are identifiable in the Phase 2 Redevelopment Area (e.g., SB-157, SB-160) and are likely associated with previous bulk petroleum storage/handling at the Property. Chlorinated solvents were initially detected by Stantec (2020a) in soil; however, solvents were not confirmed in soil during subsequent sampling events.

As described in the Stantec (2020b) Construction Documentation Report for Demolition and Removal of Structural Impediments, fill material with Prussian blue coloration consistent with ferrocyanide salts in oxide box waste was encountered at approximately 2.5 feet below ground surface. Shallow groundwater was encountered approximately three feet below ground surface in the test pit and had a similar blue color. Additional soil borings, monitoring wells, and test pits were installed by Stantec (2023a) to further delineate the extents of the apparent oxide box waste and confirm residual subsurface impacts. The apparent extents of the oxide box waste are illustrated on **Figure 13**.

Groundwater. The potentiometric surface of shallow groundwater grades downward in a radial manner towards the Manitowoc River, which serves as a constant head boundary for groundwater. Groundwater sampling confirmed the presence of arsenic in groundwater, which is considered representative of background concentrations and not indicative of a release to groundwater. The concentration of 1,1,2,2-Tetrachloroethane in groundwater at MW-157 was greater than the ch. NR 140 WAC Enforcement Standard and the concentration of benzene in groundwater at MW-157 was slightly greater than the ch. NR 140 WAC Preventive Action Limit. MW-157 is located adjacent to a former oil house and bulk petroleum storage facility, which is the most likely source of residual groundwater impacts. The extent of groundwater impacts at the Property are illustrated on **Figure 12**.

Vapor Intrusion. The Property is currently vacant. Therefore, the vapor intrusion pathway cannot be quantitatively evaluated at this point. Although vapor intrusion is not a focus of this ABCA, soil and/or groundwater with residual VOC impacts may extend beneath the proposed multi-family residential townhomes and commercial redevelopments. If soil and/or groundwater impacts are not fully addressed as part of future cleanup activities, a SSDS may be warranted in new building construction.

3.0 REMEDIAL ACTION OPTIONS EVALUATION

3.1 PROPOSED PROPERTY REDEVELOPMENT – RIVER POINT DISTRICT TARGET AREA

The redevelopment of the River Point District has been part of the vision for the City for well over 20 years. More recently, the 2009 Comprehensive Plan targets redevelopment of the Target Area from Industrial to Planned Mixed Use. Also in 2009, the City adopted the Port of Manitowoc, Downtown & River Corridor Master Plan. Within that plan, the Property was shown as a redevelopment site. A third plan related to the path extension was adopted in 2009, Manitowoc Riverwalk Master Plan and Design Guidelines. The importance of the peninsula portion of the river walk was covered extensively in the document as was the overall site. In 2019, the City adopted a Downtown Master Plan with the peninsula redevelopment identified as one of four catalyst sites for redevelopment. The North Central River District Redevelopment Plan is substantially complete and focuses specifically on redevelopment of the Property. The City Council approved moving forward with design and construction documents for the necessary infrastructure to redevelop the peninsula, and the first phase of redevelopment began in Spring 2021.

Future public infrastructure investments at the River Point District will include streets, trails, utilities, lighting, and streetscape of over $15M. It is estimated that the installation of the public improvements will lead to a mix of private investments ranging from residential condos and apartments to commercial and mixed-use buildings with a value of up to $180M. With over 3,500 feet of river frontage, redevelopment of the River Point District also nearly doubles public pedestrian access to the Manitowoc River through trails and key nodes intended to serve as overlooks, trailheads and river access points to enhance connection to the river and the natural environment. The overall Property redevelopment also offers the unique distinction of being located immediately adjacent to the existing downtown core furthering the potential economic impact of the project. City support for the project includes acquisition of the property in 2019, infrastructure design and construction that are currently underway, brownfield assessment and cleanup, establishment of a new Tax Incremental Financing District and site preparation.

3.2 PROPOSED PROPERTY REDEVELOPMENT – PHASE 2 REDEVELOPMENT AREA

As previously stated, the 8.33-acre Phase 2 Redevelopment Area is part of the larger 20.1-acre River Point District Redevelopment Project. Conceptual redevelopment plans for the Phase 2 Redevelopment Area are illustrated on **Figure 3**, and include the following:

- 1.4 acres targeted for multi-family residential reuse (town homes);
- 4.0 acres targeted for commercial reuse;
- 0.9 acres targeted for park/greenspace with 550 linear feet of new multi-modal trail; and
- 1,600 linear feet of new ROW (i.e., roadway, sidewalk, landscaping) with new utilities/infrastructure installed beneath the driving surfaces.

3.3 CLEANUP STANDARDS AND APPLICABLE LAWS

Although the City has an LGU exemption granted under ch. 292.11(9) WAC, remedial activities proposed under this 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 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 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. The portion of project adjacent to the Manitowoc River will be permitted under ch. 30 Wis. Stats.

3.4 REMEDIAL ACTION OPTIONS EVALUATION

Based on impacts identified to date, 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 ABCA included the following:

1. Natural Attenuation (no action).
2. Excavate all impacted soils and transport offsite for disposal at a licensed solid waste landfill; backfill with clean fill materials to final grade; and establish an institutional control to manage residual groundwater impacts.
3. Limited excavation and offsite disposal of impacted fill; constructing an engineered barrier to minimize direct contact with impacted soil/fill and reduce potential for leaching of residual impacts to groundwater; and establishing institutional controls/continuing obligations and maintenance plans to provide for long-term control of residual soil and groundwater impacts (future).

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 $3.7MM). Further, Alternative 2 will require hauling a considerable volume of soil for disposal in a landfill (estimated 40,690 cubic yards) 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. Under Remedial Alternative 3, approximately 140-200 cubic yards of apparent oxide box waste fill materials will be excavated as source removal and transported offsite for disposal at a licensed solid waste landfill. A further 200-300 cubic yards of impacted fill/underlying soil disturbed during utility installation in the Buffalo Street ROW will be transported offsite and disposed of at a licensed solid waste landfill. The excavations will be backfilled to current grade with imported clean fill materials. Approximately 21,250 cubic yards of fill will be imported/placed at the Property to create a soil engineered barrier during construction of the River Point Drive ROW.

To reduce the footprint of Alternative 3, petroleum-impacted soil may be placed on the biopile at the solid waste landfill and later reused by the landfill. 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. Pending the results of sampling and WDNR concurrence, clean fill could be sourced from nearby municipal road projects and/or local construction projects which would lessen the carbon footprint of the project and reuse unwanted fill.

In the future, completion of the hardscape engineered barriers/caps outside of the scope of this ABCA will include Property amenities (e.g., roadways, buildings, parking lots, sidewalks, trail, etc.), as illustrated on **Figure 3.**

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 is comprised of three distinct activities. Each remedial action includes up to four elements and is described individually below.

EXCAVATION AND DISPOSAL OF APPARENT OXIDE BOX WASTE FILL MATERIALS

Excavation and Disposal of Apparent Oxide Box Waste Fill. Apparent oxide box waste fill material (estimated 140-200 cubic yards) will be excavated and transported to a solid waste landfill for disposal as source control to remove the most probable source of cyanide impacts to groundwater. The apparent extents of the oxide box waste are illustrated on **Figure 11.** Soil samples may be collected from the sidewall and bottom of the excavations to confirm removal efficiency. As described in the Stantec (2023b) RAP, the excavations will be backfilled to match the surrounding grade with clean imported granular fill and completed in turf to stabilize the excavation. If necessary, the adjacent concrete slab remnant may require demolition and removal to facilitate complete removal of the apparent waste fill.

Construction Documentation Report. A construction documentation report will be prepared following completion of the described remedial action.

Establish Institutional Controls. Once a developer for the commercial area is identified, a future RAP and Material Management Plan will be prepared and submitted to WDNR describing the final engineered barriers and continuing obligations necessary to facilitate non-industrial redevelopment. The commercial redevelopment will be listed on the WDNR Geographic Information System (GIS) Registry. The listing will serve as a continuing obligation/institutional control to restrict groundwater. The GIS Registry will provide for notification of residual impacts to soil and groundwater and will include an annual engineered barrier maintenance plan.

Engineering, Permitting, Program Management, and Community Outreach. Engineering and design services, procurement of necessary permits to complete the proposed cleanup activities, onsite oversight of contractor work, and community outreach activities will be performed.

OFFSITE DISPOSAL OF IMPACTED MATERIAL DISTURBED DURING UTILITY INSTALLATION IN THE BUFFALO STREET ROW

Transportation and Offsite Disposal of Impacted Material Disturbed During Utility Installation in the Buffalo Street ROW. Impacted fill (estimated 200-300 cubic yards) could be disturbed during utility installation beneath the western portion of the Buffalo Street ROW. If disturbed, the material will be transported offsite for disposal at a solid waste landfill. Given the nature of this work, soil samples will not be taken of the sidewall and bottom of the utility trench. The grading plan for the ROW is illustrated on **Figure 14.** As described in the Stantec (2023d) RAP/MMP, the utility trench will be backfilled to match the surrounding grade with clean imported granular fill and the ROW surface finished as illustrated on **Figure 3.**

Construction Documentation Report. A construction documentation report will be prepared following the complete construction of the Buffalo Street ROW.

Establish Institutional Controls. Following construction of the engineered barrier illustrated on **Figure 3**, the ROW will be listed on the WDNR Geographic Information System (GIS) Registry. The listing will serve as a continuing obligation/institutional control to restrict groundwater consumption and restrict disturbance of the engineered barrier. The GIS Registry will provide for notification of residual impacts to soil and groundwater and will include an annual engineered barrier maintenance plan.

Engineering, Permitting, Program Management, and Community Outreach. Engineering and design services, procurement of necessary permits to complete the proposed cleanup activities, onsite oversight of contractor work, and community outreach activities will be performed.

CONSTRUCTION OF A SOIL ENGINEERED BARRIER IN THE RIVER POINT DRIVE ROW

Construction of a Soil Engineered Barrier in the River Point Drive ROW. As described in the Stantec (2023b) RAP/MMP, approximately 21,250 cubic yards of fill will be imported/placed at the Property to create a

soil engineered barrier during construction of the River Point Drive ROW. Imported fill will consist of granular fill imported from a commercial quarry and/or soil generated during municipal construction projects (soils generated as part of municipal construction projects would be properly characterized and the results submitted to WDNR for approval prior to import to the Property). The grading plan for River Point Drive is adapted on **Figure 15** and illustrates the thickness/extent of the proposed soil engineered barrier.

In the event that impacted fill/soils at the Property are disturbed during construction of the soil engineered barrier, impacted media will be transported offsite for disposal in a solid waste landfill.

Construction Documentation Report. A construction documentation report will be prepared following the complete construction of the River Point Drive ROW.

Establish Institutional Controls. Following construction of the engineered barrier illustrated on **Figure 3**, the ROW will be listed on the WDNR Geographic Information System (GIS) Registry. The listing will serve as a continuing obligation/institutional control to restrict groundwater consumption and restrict disturbance of the engineered barrier. The GIS Registry will provide for notification of residual impacts to soil and groundwater and will include an annual engineered barrier maintenance plan.

Engineering, Permitting, Program Management, and Community Outreach. Engineering and design services, procurement of necessary permits to complete the proposed cleanup activities, onsite 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	Excavation and Offsite Disposal of Apparent Oxide Box Waste Fill (140 cubic yards)	1 Week, to be completed in August 2023.
2	Offsite Disposal of Impacted Material Disturbed during Utility Installation in the Buffalo Street ROW	1 Week, to be completed during the installation of utilities in August 2023.
3	Construction of a Soil Engineered Barrier in the River Point ROW	1-2 Months, pending availability of a suitable quantity of fill. Expected to be completed in October 2023.
4	Construction Documentation Reports	Up to 4 weeks following completion of Task 1, Task 2, and Task 3
5	Engineering, Permitting and Program Management, and Community Outreach	Duration of Remedial Alternative 3 (Anticipated to be up to 6 months)

4.3 ESTIMATED COST

A preliminary estimate of the total cost for implementation of Remedial Alternative 3 is presented on the table below. The work will be completed under a 2023 USEPA Brownfield Cleanup Grant (Cooperative Agreement Pending)

Cost Estimate for Remedial Alternative 3

Task #	Item	Potential Cost
1	Excavation and Offsite Disposal of Apparent Oxide Box Waste Fill (140-200 cubic yards)	$12,000
2	Offsite Disposal of Impacted Material Disturbed during Utility Installation in the Buffalo Street ROW (200-300 cubic yards)	$18,000
3	Construction of a Soil Engineered Barrier in the River Point ROW (21,250 cubic yards)	$383,000

Task #	Item	Potential Cost
4	Construction Documentation Reports	$45,000
5	Engineering, Permitting and Program Management, and Community Outreach	$10,700
Total Remedial Cost		**$468,700**

4.4 RESTORATION TIME FRAME

As described in Section 4.2, implementation of Remedial Alternative 3 is anticipated to be complete within 3 months, as clean fill becomes available at the River Point District. The final engineered barriers in the Buffalo Street ROW will be completed in Fall 2024. The final engineered barriers in the River Point Drive ROW will be completed in Spring 2024.

4.5 PERFORMANCE MEASURES

During excavation of the apparent oxide box waste, confirmation soil samples will be collected along the sidewalls of the excavation to document removal. Other performance measures (i.e., post-remediation soil or groundwater sampling) are not anticipated as part of the proposed work at this time, but could be conducted if requested by WDNR following agency review of the Stantec (2023b-2023d) RAPs.

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 offsite disposal of material not suitable for reuse at the Property. The direct contact exposure pathway will be further mitigated through the use of sitewide engineered barriers consisting of multiple completed surfaces. This approach minimizes transporting of soil for offsite disposal in a landfill. Petroleum soils that are removed from the Property may be added to a biopile at the solid waste landfill to facilitate natural attenuation of residual impacts. Low sulfur diesel can be used, and a no-idle policy will reduce the carbon footprint.

4.8 ADDITIONAL REMEDIAL ACTIONS

This ABCA evaluated a set of remedial actions to address residual soil and groundwater impacts within the Phase 2 Redevelopment Area. Additional remedial actions to be discussed in a future RAP not described in this ABCA could, if required by WDNR, include:

Additional future remedial activities to facilitate non-industrial redevelopment are likely to include:

- Construction of sitewide engineered barriers on parcels to be sold to private developers for non-industrial redevelopment to mitigate the potential for direct contact with residual soil impacts and reduce the risk for mobilization of soil impacts to groundwater;
- Construction of an engineered soil barrier along the Manitowoc River to mitigate the risk for direct contact with impacted soil/fill, reduce the risk of mobilization of soil/fill impacts to the river through stormwater runoff, and reduce the potential for leaching of residual impacts to groundwater;
- Potential transport and offsite disposal of impacted fill disturbed during future construction;
- Construction of sub-slab depressurization systems beneath newly constructed buildings to mitigate the risk for vapor intrusion; and
- Establishing institutional controls/continuing obligations and maintenance plans to provide for long-term control of residual soil and groundwater impacts.

5.0 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. This report relates solely to the specific project for which Stantec was retained and the stated purpose for which the report was prepared. This 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 and the CDA and third parties in the preparation of this 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 and the CDA in accordance with Stantec's contract with the City and the CDA. While this report may be provided to applicable authorities having jurisdiction and others for whom the City and the CDA is responsible, Stantec does not warrant the services to any third party. This 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.

6.0 REFERENCES

Stantec, 2019, 10th Street Railroad Property, Manitowoc, Wisconsin, Phase I Environmental Site Assessment, March 21, 2019.

Stantec, 2020a, Phase II Environmental Site Assessment, Riverpoint District; Manitowoc, Wisconsin, March 23, 2020.

Stantec, 2020b, Construction Documentation Report for Demolition and Removal of Structural Impediments, River Point District – Site 3, December 11, 2020.

Stantec, 2020c, Phase II Environmental Site Assessment, River Point District; Manitowoc, Wisconsin, Site 3, December 18, 2020.

Stantec, 2021a, Fire Department Response During Explosive Demolition of a Former Grain Elevator, 1101 Buffalo Street, River Point District – Phase I Construction Area; Manitowoc, Wisconsin, September 7, 2021.

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Stantec, 2022a, Site Investigation Workplan, River Point District Phase 2 Construction Area, Manitowoc, Wisconsin, February 17, 2022.

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Stantec, 2023a, Site Investigation Report, River Point District Phase 2 Redevelopment Area, Manitowoc, Wisconsin, June 2, 2023.

Stantec, 2023b, Remedial Action Plan & Materials Management Plan, River Point Drive Extension, Phase 2 Redevelopment Area of the River Point District; Manitowoc, Wisconsin, June 2, 2023.

Stantec, 2023c, Remedial Action Plan for Removal of Apparent Oxide Box Waste Fill Materials, Phase 2 Redevelopment Area of the River Point District; Manitowoc, Wisconsin, June 2, 2023.

Stantec, 2023d, Remedial Action Plan & Materials Management Plan, Buffalo Street Rights of Way, Phase 2 Redevelopment Area of the River Point District; Manitowoc, Wisconsin, in press.

FIGURES

Figure No.
1

Title
Phase 2 Redevelopment Area
and Regional Topography

Client/Project
Phase 2 Redevelopment Area Site Investigation
River Point District
City of Manitowoc

0 265 530 Feet

193708490
Prepared by HLB on 6/2/2023

N

Legend

- River Point District
- Phase 2 Redevelopment Area

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

Stantec

Figure No.
2

Title
Phase 2 Redevelopment Area
and Property Identification Numbers

Client/Project
Phase 2 Redevelopment Area Site Investigation
River Point District
City of Manitowoc

0 130 260 Feet

193708490
Prepared by HLB on 1/24/2022

N

Legend

- River Point District
- Phase 2 Redevelopment Area
- Parcel Identification Numbers

000173001
000173170
000173010
000173002
000173020
000173023
000173022
000173030
000173110
000173040
000173060
000173070
000173150
000173000
000173080
000173130
000173170
000173090
000173140
000173003
000173100
000173160
000173160

Chicago St
N 11th St
N 10th St
Buffalo St
York St
Maritime Dr
10th St
Wollmer St
S 14th St
Clark St
S Water St

Notes
1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Orthophotograph: Manitowoc County, 2020

Stantec

Figure No.
3

Title
Proposed Reuse and Proposed Engineered Barriers/Caps

Client/Project
Phase 2 Redevelopment Area Site Investigation
River Point District
City of Manitowoc

0 130 260 Feet

Prepared by HLB on 5/8/2023

N

Legend

- River Point District
- Phase 2 Redevelopment

Proposed Redevelopments

- Town Homes (2025-2026)
- Town Homes (2024-2025)
- Commercial (Finished)
- Multi-Family (Finishing 2022)
- Roadway (2021-2024)
- Landscaping (2023-2025)
- Floating Dock and Pier (2023)
- Multi-Family Residential (2023-2024)
- Sidewalk (2024-2025)
- River Walk / Park (2023-2024)
- Proposed Commercial (2025-2026)
- Future Commercial (2024-2025)

Notes
1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Orthophotograph: Manitowoc County, 2020

Stantec

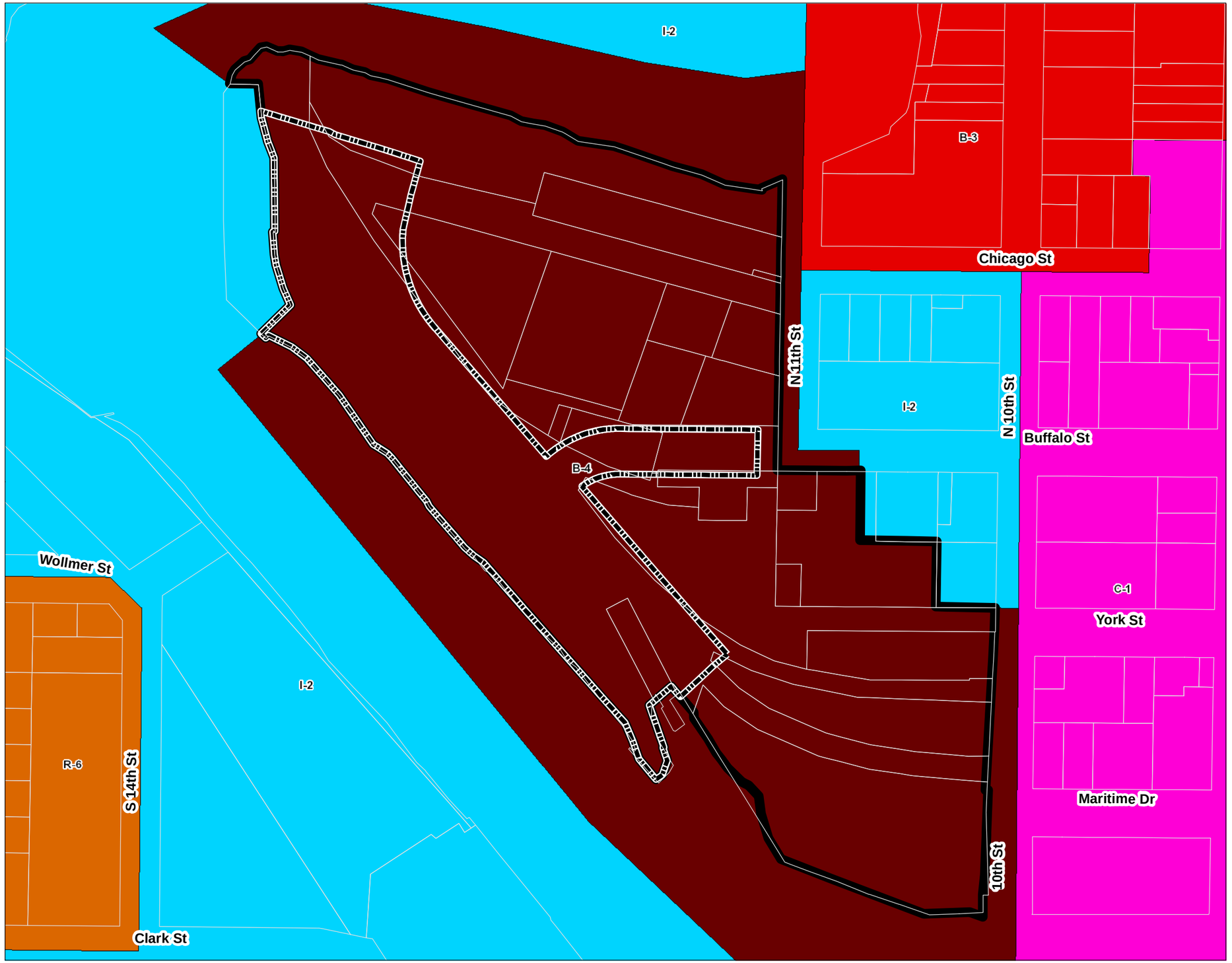


Figure No.
4

Title
Phase 2 Redevelopment Area
and Zoning

Client/Project
Phase 2 Redevelopment Area
River Point District
City of Manitowoc

Prepared by HLB on 10/15/2022

0 130 260
Feet

Legend

N

Parcels

Phase 2 Redevelopment Area

River Point District

Zoning

B-1 Office - Residential B-2 Neighborhood

B-3 General

B-4 Central

C-1 Commercial

I-1 Light Industrial

I-2 Heavy Industrial

P-1 Conservancy

R-1 Residential - Agricultural

R-2 Single Family

R-3 Single Family

R-4 Single and Two Family

R-5 Low Density Multiple Family

R-6 Multiple Family

R-7 Central

Notes
1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Orthophotograph: Manitowoc County, 2020

Stantec

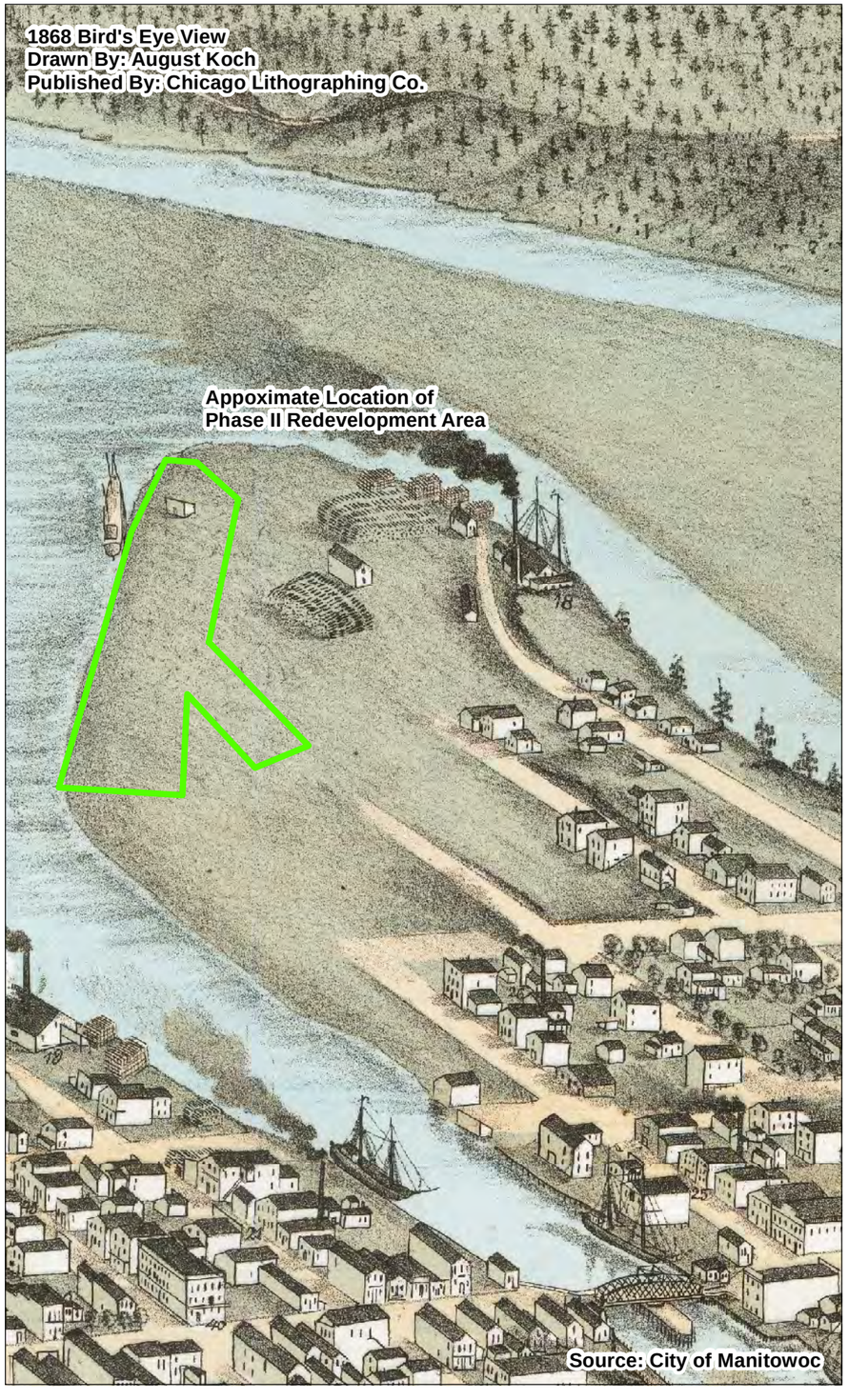


Figure No.

5

Title

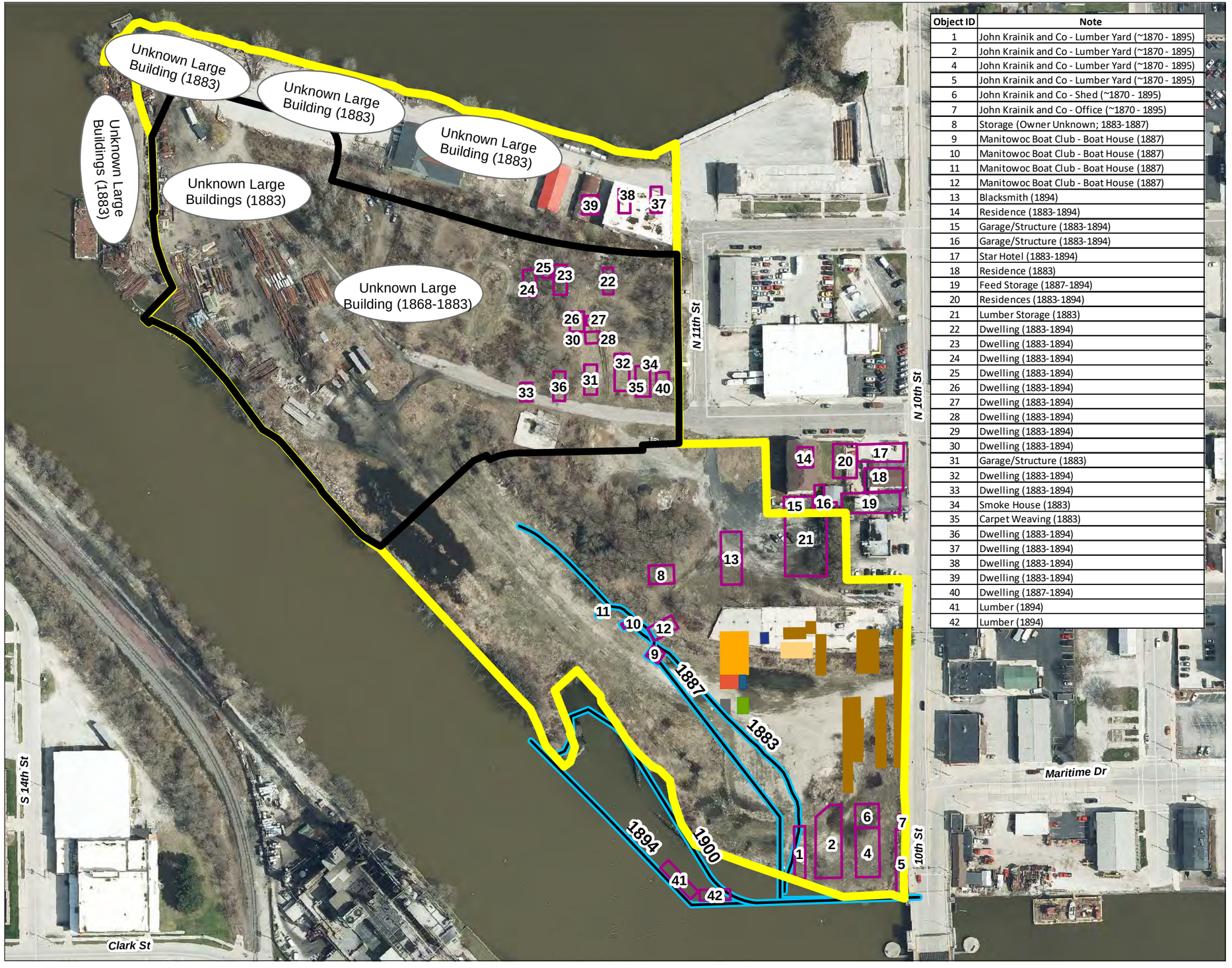
Phase 2 Redevelopment Area Panoramic Illustration

Client/Project

Phase II Redevelopment Area
River Point District
City of Manitowoc

Prepared by HLB on 10/15/2022

Stantec



Object ID	Note
1	John Krainik and Co - Lumber Yard (~1870 - 1895)
2	John Krainik and Co - Lumber Yard (~1870 - 1895)
4	John Krainik and Co - Lumber Yard (~1870 - 1895)
5	John Krainik and Co - Lumber Yard (~1870 - 1895)
6	John Krainik and Co - Shed (~1870 - 1895)
7	John Krainik and Co - Office (~1870 - 1895)
8	Storage (Owner Unknown; 1883-1887)
9	Manitowoc Boat Club - Boat House (1887)
10	Manitowoc Boat Club - Boat House (1887)
11	Manitowoc Boat Club - Boat House (1887)
12	Manitowoc Boat Club - Boat House (1887)
13	Blacksmith (1894)
14	Residence (1883-1894)
15	Garage/Structure (1883-1894)
16	Garage/Structure (1883-1894)
17	Star Hotel (1883-1894)
18	Residence (1883)
19	Feed Storage (1887-1894)
20	Residences (1883-1894)
21	Lumber Storage (1883)
22	Dwelling (1883-1894)
23	Dwelling (1883-1894)
24	Dwelling (1883-1894)
25	Dwelling (1883-1894)
26	Dwelling (1883-1894)
27	Dwelling (1883-1894)
28	Dwelling (1883-1894)
29	Dwelling (1883-1894)
30	Dwelling (1883-1894)
31	Garage/Structure (1883)
32	Dwelling (1883-1894)
33	Dwelling (1883-1894)
34	Smoke House (1883)
35	Carpet Weaving (1883)
36	Dwelling (1883-1894)
37	Dwelling (1883-1894)
38	Dwelling (1883-1894)
39	Dwelling (1883-1894)
40	Dwelling (1887-1894)
41	Lumber (1894)
42	Lumber (1894)

Figure No.

6

Title

Phase 2 Redevelopment Area and 19th Century Historic Site Features

Client/Project

Phase 2 Redevelopment Area Site Investigation
River Point District
City of Manitowoc

0 125 250 Feet

Prepared by HLB on 4/15/2021

N

Legend

- Phase 2 Redevelopment
- River Point District
- Additional Site Features (see table)
- Bank of the Manitowoc River

Carl Zander Planing Mill and Factory (~1870s-1895)

Site Feature

- Drying House
- Engine Room
- Lumber
- Planing Mill
- Warehouse
- Shavings
- Shed
- Steam Boxes

Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Historic Site features illustrated on this figure were digitized from multiple historic maps/sources, including City Assessor files, WDNR files, and Sanborn (R) Fire Insurance Maps. These features are provided for illustration purposes only; Stantec makes no warranty as to the accuracy of these features.
3. Orthophotograph: Manitowoc County, 2020

Stantec

Figure No.
7

Title
20th Century Historic Site Features

Client/Project
Phase 2 Redevelopment Area Site Investigation
River Point District
City of Manitowoc

0 70 140
Feet

Legend

- Phase 2 Redevelopment
- River Point District
- Historic Site Features (see table for details)

Prior Site Features (City Records)

- Oil House (4)
- Oil Tank (AST) (34)
- Pump House (5)
- UST (2)
- Railroad Spurs

Additional Site Features (WDNR Files)

- Former UST (10)
- Product Piping (2)
- Pump House (2)
- Soil Excavation (3)

Key	Notes
4	Cinder Pit
7	Coal Shed
8	Coal Storage
17	Unk
24	Storage
25	Unknown
21	Garage
26	Residential Dwelling
28	Unknown Bldg
6	Railroad Turntable
5	Railroad Roundhouse
29	Unk (possible AST?)
30	Unk (possible AST?)
31	Unk (possible AST?)
32	Shreaded Metal
33	Shreaded Metal
35	Warehouse

Notes
1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Historic Site features illustrated on this figure were digitized from multiple historic maps/sources, including City Assessor files, WDNR files, and Sanborn (R) Fire Insurance Maps. These features are provided for illustration purposes only; Stantec makes no warranty as to the accuracy of these features.
3. Orthophotograph: Manitowoc County, 2017

Stantec

Figure No.
8

Title
Stantec Sample Locations

Client/Project
Phase 2 Redevelopment Area Site Investigation
River Point District
City of Manitowoc

0 65 130 Feet

Prepared by HLB on 5/8/2023

N

Legend

- River Point District
- Phase 2 Redevelopment
- Soil Boring / Monitoring Well
- Soil Boring
- Soil Boring / Temp Well

Proposed Redevelopments

- Town Homes (2025-2026)
- Town Homes (2024-2025)
- Commercial (Finished)
- Roadway (2021-2024)
- Landscaping (2023-2025)
- Multi-Family Residential (2023-2024)
- Sidewalk (2024-2025)
- River Walk / Park (2023-2024)
- Proposed Commercial (2025-2026)

Notes
1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Orthophotograph: Manitowoc County, 2020

Stantec

Figure No.
9

Title
Extent and Thickness of Granular Fill Unit

Client/Project
Phase 2 Redevelopment Area Site Investigation
River Point District
City of Manitowoc

0 130 260 Feet

193708490
Prepared by HLB on 1/27/2022

Legend

N

River Point District

Phase 2 Redevelopment Area

Thickness of Granular Fill

(Feet)

- 7 - 8
- 6 - 7
- 5 - 6
- 4 - 5
- 3 - 4
- 2 - 3
- 1 - 2
- 0 - 1

Notes
1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Orthophotograph: Manitowoc County, 2020

Stantec

Figure No.
10

Title

Extents of Soil Impacts

Client/Project
Phase 2 Redevelopment Area Site Investigation
River Point District
City of Manitowoc

0 65 130 Feet

Prepared by HLB on 5/8/2023

Legend

N

River Point District

Phase 2 Redevelopment

Sample Locations

Soil Boring / Monitoring Well

Soil Boring

Soil Boring / Temp Well

Soil Impacts

Petroleum PAH > IDC

Petroleum PAH > NIDC

PVOC > IDC

PVOC > NIDC

PCB > NIDC

PVOC > GW Pathway

CVOCs > GW Pathway

Notes

1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Orthophotograph: Manitowoc County, 2020
3. PAH = polycyclic aromatic hydrocarbon; PVOC = petroleum volatile organic compound; CVOC = chlorinated volatile organic compound; SVOC = semi-volatile organic compound; IDC = industrial direct contact residual contaminant level; NIDC = non-industrial direct contact residual contaminant level; GW = groundwater.
4. Soil impacts illustrated on this drawing are in addition to the sitewide metals and PAH impacts associated with historic granular fill materials.

Stantec

Figure No.
11

Title
Extents of Groundwater Impacts

Client/Project
Phase 2 Redevelopment Area Site Investigation
River Point District
City of Manitowoc

0 65 130 Feet

Prepared by HLB on 5/8/2023

N

Legend

- River Point District
- Phase 2 Redevelopment

Sample Locations

- Soil Boring / Monitoring Well
- Soil Boring / Temp Well

Groundwater Impacts

- Cyanide > PAL
- CVOC > ES
- CVOC > PAL
- PAH > PAL
- PVOC > ES
- PVOC > PAL
- Vinyl Chloride > PAL

Notes

1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Orthophotograph: Manitowoc County, 2020
3. PVOC = petroleum volatile organic compound; PAH = polycyclic aromatic hydrocarbon; CVOC = chlorinated volatile organic compound; PAL = Preventive Action Limit; ES = Enforcement Standard

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PFAS (ng/L)	MW-1
	4-Feb-19
PFOA	71
PFOS	30
6 PFAS	101

PFAS (ng/L)	MW-2
	8-Apr-19
PFOA	22
PFOS	15
6 PFAS	37

PFAS (ng/L)	MW-3
	8-Apr-19
PFOA	70
PFOS	57
6 PFAS	127

PFAS (ng/L)	MW-4
	8-Apr-19
PFOA	24
PFOS	8.1
6 PFAS	32.1

PFAS (ng/L)	MW-5
	8-Apr-19
PFOA	120
PFOS	380
6 PFAS	500

PFAS (ng/L)	MW-6
	8-Apr-19
PFOA	110
PFOS	230
6 PFAS	340

PFAS (ng/L)	TW-26
	28-Nov-18
PFOA	38
PFOS	1.9 J
6 PFAS	39.9

PFAS (ng/L)	TW-38
	8-Apr-19
PFOA	35
PFOS	1.5
6 PFAS	36.5

PFAS (ng/L)	MW-47
	4-Mar-21
PFOA	71
PFOS	1.1 J I
6 PFAS	72.1

Notes
Perfluoro-n-Octanoic Acid (PFOA)
Perfluorooctane Sulfonate (PFOS)
Perfluorooctanesulfonamide (PFOSA)
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)
N-ethyl perfluorooctane sulfonamide (NEtFOSA)
6 PFAS are NEtFOSE+NEtFOSA+NEtFOSAA+PFOSA+PFOA+PFOS

	Concentration greater than the Maximum Contaminant Level of 70 nanograms per liter (ng/L); https://dnr.wisconsin.gov/topic/DrinkingWater/NR809.html
	Combined concentration greater than the recommended groundwater standard of 20 ng/L; https://www.dhs.wisconsin.gov/water/gws-cycle11.htm

Figure No.
12
Title
PFAS Concentrations in Groundwater

Client/Project
Phase 2 Redevelopment Area Site Investigation
River Point District
City of Manitowoc

0 65 130 Feet

Prepared by HLB on 5/8/2023

Legend

N

River Point District

Phase 2 Redevelopment

Sample Locations

Soil Boring / Monitoring Well

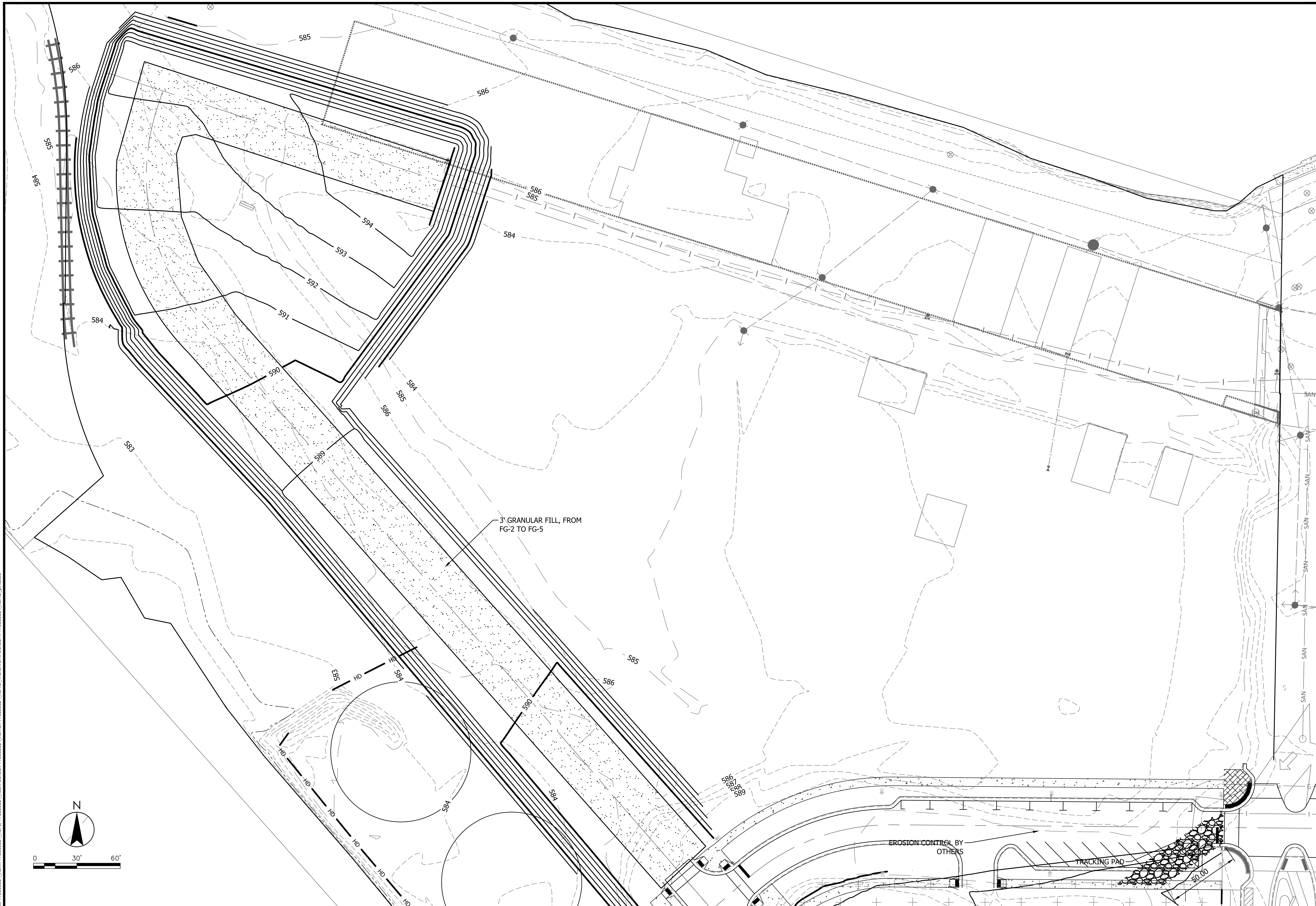
Soil Boring

Soil Boring / Temp Well

Notes

1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet
2. Orthophotograph: Manitowoc County, 2020

Stantec



Proposed Engineered Barrier and Grading Plan

RIVER POINT Drive ROW
CITY OF MANITOWOC
MANITOWOC COUNTY, WISCONSIN

Stantec
12075 N. Corporate Parkway, Suite 200
Mequon, WI 53092
www.stantec.com

PROFESSIONAL ENGINEER
WISCONSIN

DATE OF ISSUANCE
May 30, 2023

NO	REVISION	DATE

SURVEY	########
DRAWN	
DESIGNED	
CHECKED	
APPROVED	###
PROJ. NO.	193709261

SHEET NUMBER
Figure 13

Plot Date: 05/30/2023 - 5:35pm
Drawing name: C:\pw_stn_bh_infra01\dms74518\2023_fill1.dwg
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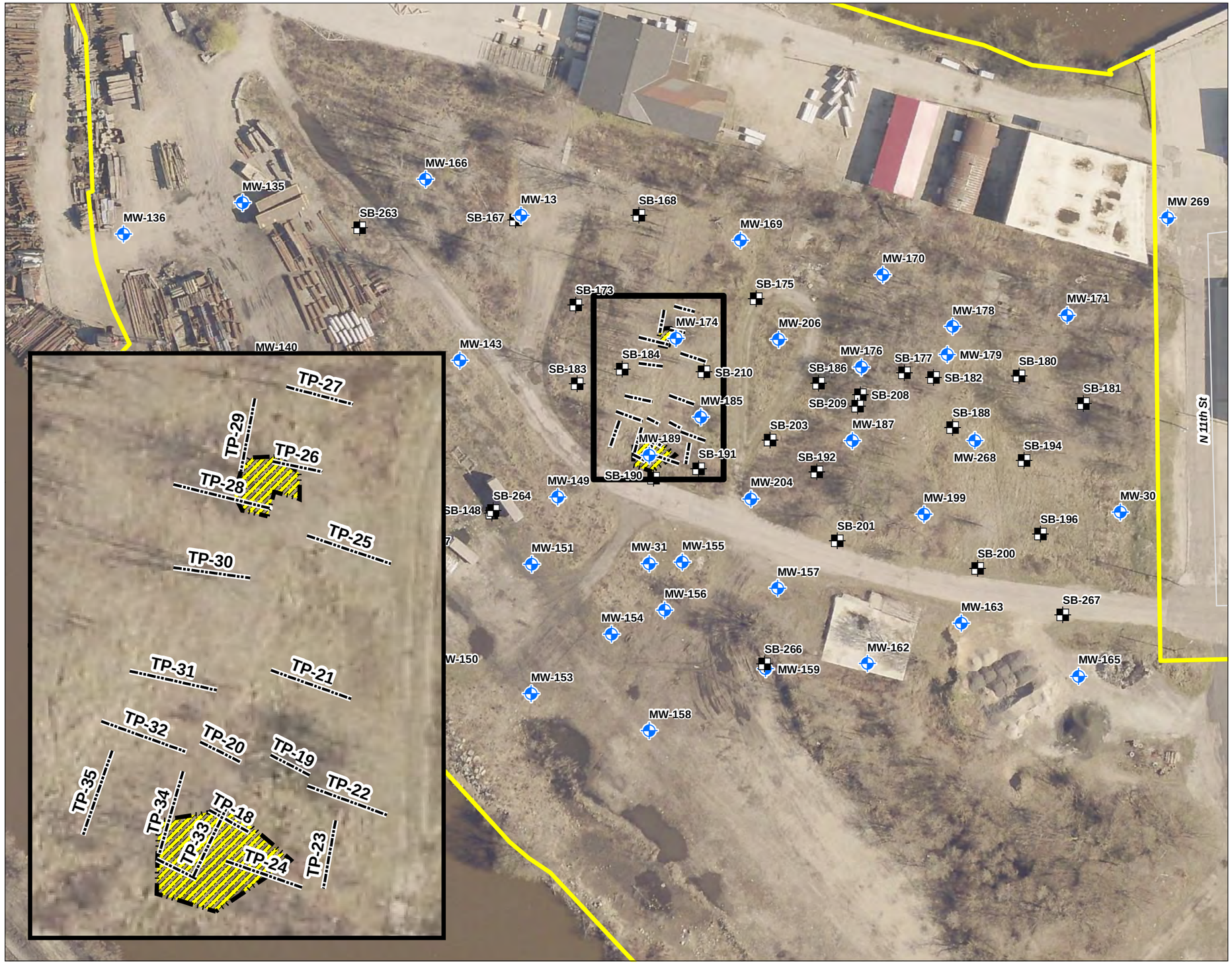


Figure No.
14

Title
Extent of Apparent Oxide Box Waste

Client/Project
Phase 2 Redevelopment Area Site Investigation
River Point District
City of Manitowoc

0 62.5 125 Feet

193709092
Prepared by SC on 03/09/2023

N

Legend

- Test Pits (TP)
- River Point District
- Apparent Oxide Box Waste

January 18, 2023 Sample Locations

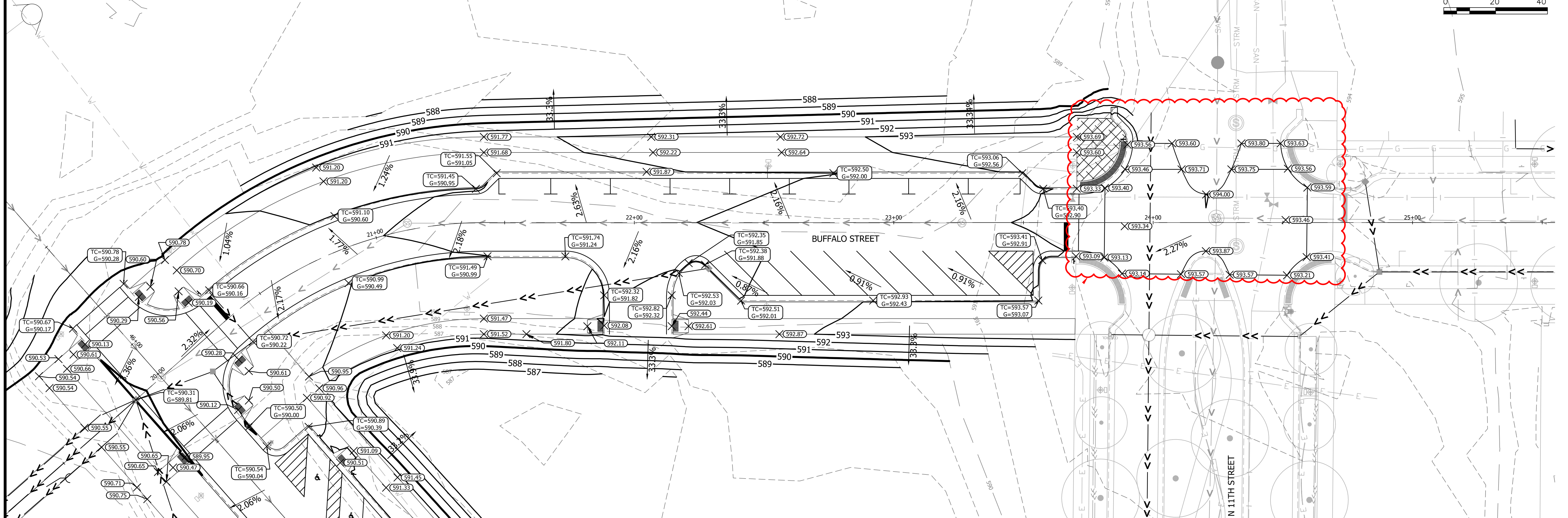
- Monitoring Well
- Soil Boring

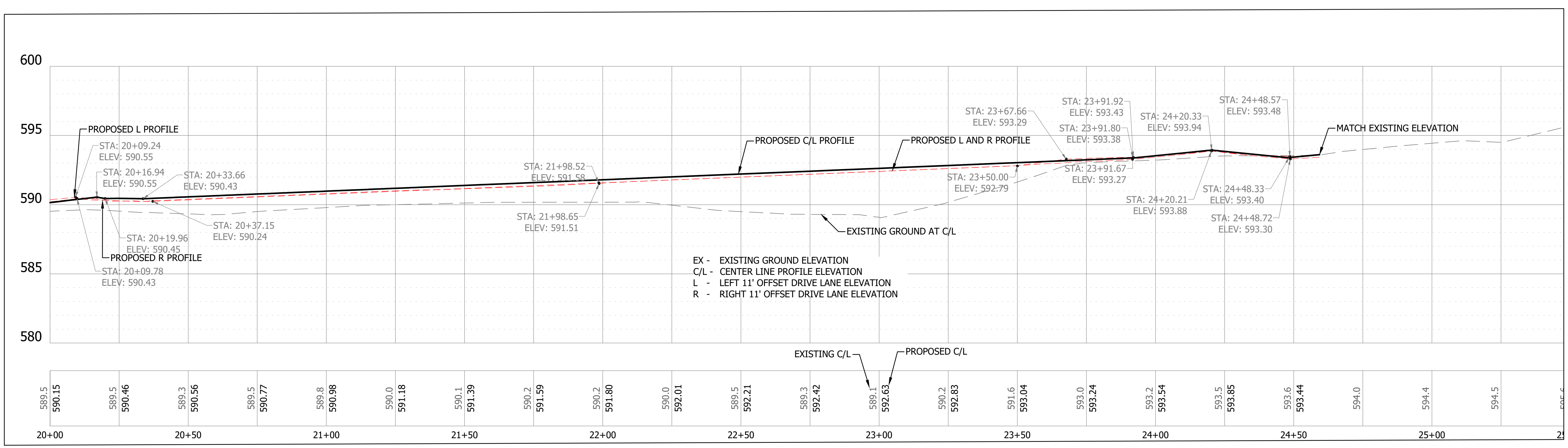
Notes
1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Historic Site features illustrated on this figure were digitized from multiple historic maps/sources, including City Assessor files, WDNR files, and Sanborn (R) Fire Insurance Maps. These features are provided for illustration purposes only; Stantec makes no warranty as to the accuracy of these features.
3. Orthophotograph: Manitowoc County, 2017

Stantec

NOTE

COMPACTION REQUIREMENTS OUTSIDE OF PAVING IS TO MEET LANDSCAPE COMPACTION REQUIREMENTS





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Bid Set

GRADING PLAN

RIVER POINT PHASE 2
CITY OF MANITOWOC
MANITOWOC, WISCONSIN

DATE OF ISSUANCE		
01/17/2023		
NO	REVISION	DATE

SURVEY	CENTERPOINT
DRAWN	JAW
DESIGNED	JAW
CHECKED	JCB
APPROVED	SMM
PROJ. NO.	193805824

SHEET NUMBER
Figure 15

Plot Date: 02/02/2023 - 6:14pm
Drawing name: C:\pw_tsh_infra01\d0102238\193805824C300.dwg
Xrefs: 193805824_XSNO_Border, 193805824_XSNO_waterfront, 193805824_XSNE_waterfront, 193805824_XSXT

TABLE

Table 1
Analysis of Brownfields Cleanup Alternatives
Phase 2 Redevelopment Area, River Point District
Manitowoc, Wisconsin

Remedial Action Area Description:	The target remedial area consists of vacant land formerly developed as a railroad/industrial peninsula, which included former bulk petroleum storage. Residual heavy metal, petroleum, and/or solvent impacts are present in soil/fill across the Property 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, residual volatile organic compound (VOC) impacts to groundwater remain 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 impacts in soil are considered recalcitrant to natural attenuation. Therefore natural attenuation would not reduce the overall heavy metal 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 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 the 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 (34,100 cubic yards @ $90 per yard =$3,069,000). 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 - Limited excavation and offsite disposal of soil with elevated impacts; constructing a sitewide engineered barrier to minimize sitewide direct contact with impacted soil/fill and reduce potential for leaching of residual impacts to groundwater; and establishing institutional controls/continuing obligations and maintenance plans to provide for long-term control of residual soil and groundwater impacts.	Excavation and removal of soil with elevated impacts is effective in both the short and long-term time frames. 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.		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.	Soils with elevated heavy metal and VOC constituents disturbed during utility installation in the Buffalo Street rights of way are proposed to be excavated as source control (estimated 200 cubic yards @ $90 per yard = $18,000). Petroleum impacted soils may be managed in a biopile at the solid waste landfill at a reduced fee, though hauling will still be needed. Clean fill will be imported to backfill the utility trench. Cyanide impacted soils will be excavated as source control (estimated 140 cubic yards @ $90 per yard = $12,600), hauled to the solid waste landfill, and backfilled with clean imported fill. 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 proposed along the river front (1.76 acres, estimated cost of $102,600) and future residential and restaurant areas (2.06 acres, estimated cost $120,600). Establishing the institutional control to control groundwater consumption will occur with final closure. Engineering support is estimated to be $54,000.	Petroleum-impacted soil may be placed on the biopile at the solid waste landfill and later reused by the landfill. 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.

Note: Additional remedial actions to be discussed in a future RAP not described in the table above are summarized in Section 4.8 of the Stantec (2023) ABCA.