Analysis of Brownfield Cleanup Alternatives

Former Dixon Iron and Metal Company
78 Monroe Avenue
Dixon, Illinois

November 2021

Brownfields Cleanup Grant

Application

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1.0 INTRODUCTION

This Analysis of Brownfields Cleanup Alternatives (ABCA) has been prepared on behalf of the City of Dixon for the former Dixon Iron and Metal Company (DIMCO) site, located at 78 Monroe Avenue in Dixon, Illinois (the Site). A Site Location Map is included as Figure 1. This ABCA has been prepared in pursuit of a Brownfields Cleanup Grant to identify and evaluate cleanup alternatives to mitigate potential risks to human health and/or the environment resulting from subsurface contamination on the Site.

The former DIMCO site is located on the south side of the Rock River near downtown Dixon, Illinois, and has been vacant since scrap metal recycling operations were discontinued in 2017. The Site consists of two (2) parcels of land which are transected by a utility corridor/former right-of-way (River Street) and encompass approximately 3.13 acres. Former buildings have been demolished except for three (3) structures located on the southern parcel of the Site. A Site Layout Map depicting the approximate Site boundary is included as Figure 2.

Environmental assessment activities conducted on behalf of the City of Dixon were initiated with a Phase I Environmental Site Assessment (ESA) in April 2017, which was followed by Phase II investigations between April 2017 and August 2018. The Site investigations identified concentrations of total polychlorinated biphenyls (PCBs) and several volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals above the Illinois EPA Tiered Approach to Corrective Action Objectives (TACO) Tier 1 remediation objectives. Furthermore, the investigations revealed the presence of lead at concentrations exceeding the toxicity characteristic threshold for hazardous waste, PCBs in excess of 50 parts per million (ppm), and free product light non-aqueous phase liquid (LNAPL). The United States Environmental Protection Agency (US EPA) was notified of the PCB contamination on the Site and initiated a Time-Critical Removal Action to remediate conditions presenting an immediate threat to human health and the environment in 2019 and 2020. In addition, an asbestos inspection completed in March 2020 identified asbestos-containing building materials (ACBMs) in two (2) of the Site buildings.

The City of Dixon has identified the Site as a key component to the larger redevelopment area initative identified as Viaduct Point. The Viaduct Point redevelopment area includes parcels located north of West 1st Street, between Peoria Avenue and the railroad viaducts. Given the acreage and riverfront exposure, the former DIMCO site is a cornerstone parcel of Viaduct Point and will be a catalyst for future

redevelopment. In addition, the City has been awarded an Illinois Transporatation Enhancement Program (ITEP) grant to fund a recreational path extending from Peoria Avenue, across the DIMCO site and connecting via elevated boardwalk to the west adjacent viaducts, where the recreational path will extend south to West Seventh Street. The recreational path is scheduled to be constructed during Summer 2023. Based on the findings of the environmental investigations, redevelopment of the Site will include mitigation of subsurface contamination and ACBMs to protect human health and the environment. This ABCA is provided to outline the alternatives evaluated during the cleanup planning process for the Site.

2.0 BACKGROUND

2.1 Site Description

The Site is comprised of approximately 3.13 acres of land former occupied by a scrap metal recycling facility. The Site contains three (3) vacant buildings, including an office and two (2) industrial/storage buildings. Two (2) additional industrial buildings have already been demolished, with the concrete slabs remaining in place. The remainder of the Site consists of vacant land, but was formerly occupied by miscellaneous residual debris from historical scrap metal recycling operations and berms of soil/debris were built up along portions of the northern and eastern Site boundaries; however, junkyard debris and berms have been removed as part of remedial actions, as described in Section 2.4.

The Rock River bounds the Site to the north, Madison Street bounds the Site to the east, former railroad viaducts bound the Site to the west, and Monroe Avenue is situated to the west and south. The Site is associated with parcel index numbers 08-05-127-005 and 08-05-131-015 and is transected by a utility corridor/former right-of-way (River Street) which runs approximately parallel to the Rock River. The common address of the Site is 78 Monroe Avenue, Dixon, Illinois 61021.

A Site Location Map depicting the regional location of the Site is provided as Figure 1, and a Site Layout Map is included as Figure 2.

2.2 Site History

The Site was first developed for industrial purposes in the late 1890s, with historical uses including carpentry, lumber, coal, gravel, warehousing, and junkyard. At least a portion of the Site was operated as a junkyard/scrap metal recycling facility from approximately 1910 to 2017 and was most recently

identified as Dixon Iron and Metal Company. There have been no active operations on the Site since DIMCO operations were discontinued in 2017. A Site Layout Map is included as Figure 2.

2.3 Environmental Assessments

Due to the long-term history of scrap metal recycling and junk yard operations at the site, the City of Dixon initiated environmental assessment activities to determine the nature and extent of subsurface impacts, if present. Environmental investigations included a Phase I Environmental Site Assessment (April 2017), Phase II Environmental Site Assessment (June 2017), Focused Phase II Environmental Site Assessment (July-August 2018), Supplemental Site Investigation (April 2020), and an asbestos containing building materials inspection (March 5, 2020).

The Phase II investigations identified concentrations of several VOCs, SVOCs, metals, and PCBs exceeding TACO Tier 1 remediation objectives. The greatest distribution and highest-level impacts were identified for PCBs and select metals, primarily antimony, arsenic, lead, and mercury. Chemical concentrations identified at the Site exceed the soil ingestion and inhalation exposure route for residential and construction worker receptors, the indoor inhalation exposure route for residential receptors, and the soil and groundwater components to the groundwater ingestion exposure route. In addition, select soil samples contained TCLP lead exceeding the toxicity characteristic threshold and PCBs exceeding 50 ppm, and free phase LNAPL was observed in one (1) monitoring well location.

The City of Dixon enrolled the Site in the Illinois EPA Site Remediation Program (SRP) in November 2018 to address the identified contamination and to ultimately obtain a comprehensive No Further Remediation (NFR) determination. The Phase II investigation activities and findings were described in the *Comprehensive Site Investigation Report* (Fehr Graham, October 24, 2018). The Illinois EPA denied the *CSIR* in a letter dated January 4, 2019, and provided comments requiring additional investigation to delineate PCBs and TCLP lead in soil, evaluate groundwater on the southern parcel, and analyze total petroleum hydrocarbons (TPH) in select locations. Supplemental Site investigation activities were completed in April 2020, in accordance with the Illinois EPA-approved *Supplemental Site Investigation Work Plan* (Fehr Graham, January 21, 2020). The results of the additional investigation demonstrate that TCLP lead above the toxicity characteristic threshold of 5 mg/L and PCBs above the Tier 1 SRO of 1.0 mg/kg have been fully delineated in all accessible areas of the Site. Select samples analyzed for TPH

indicate the default attenuation capacity of soils has been exceeded in the northwest portion of the Site, consistent with the observations of LNAPL.

2.4 Emergency Response Actions

The US EPA completed a Time-Critical Removal Action at the Site in 2019 and 2020 to remediate conditions presenting an immediate threat to human health and the environment. US EPA removal actions included excavation of PCBs exceeding 50 ppm and widespread removal of debris and contaminated fill materials to two (2) feet below ground surface (bgs). In addition, soils containing TCLP lead concentrations exceeding the toxicity characteristic threshold were treated and removed, and an LNAPL interceptor trench was installed to prevent potential migration of LNAPL to the Rock River. Confirmation samples document the remaining concentrations of constituents of concern at the excavation floors and sidewalls. The US EPA installed a TSCA-approved cap in select areas where residual PCBs exceed 25 ppm, and a geotextile barrier in all other excavation areas before backfilling with at least two (2) feet of clean fill.

The purpose of future remediation would be to address areas and/or constituents of concern not included in US EPA removal actions.

3.0 CONTAMINANTS AND EXPOSURE ROUTES

3.1 Subsurface Contamination

Subsurface conditions were identified through environmental investigation and remediation activities completed between 2017 and 2020, as described in *Section 2.3* and *Section 2.4*. The analytical results for soil sample locations remaining on Site after US EPA removal actions indicate the following constituents are present in soil exceeding the one or more Tier 1 SRO:

VOCs

- Benzene
- trans-1,3-Dichloropropene
- Tetrachloroethylene
- 1,1,2-Trichloroethane
- Xylenes, total

SVOCs

- Pentachlorophenol

Metals

- Arsenic
- Antimony
- Copper
- Lead
- Mercury
- Selenium

PCBs (total)

The listed COCs were identified in soil exceeding one or more of the following State of Illinois exposure routes: soil ingestion (residential, construction worker), outdoor inhalation (residential, construction worker), and soil component to groundwater ingestion. In addition, manganese and PCBs were identified in groundwater exceeding the groundwater ingestion exposure route.

The barriers installed by US EPA cover the majority of the residual chemical impacts in soil, including the limited areas impacted by VOCs and SVOCs. However, areas not included in the US EPA removal action contain metals and PCBs exceeding State of Illinois Tier 1 ROs which have not been mitigated. In addition, total petroleum hydrocarbons were identified in soil at concentrations exceeding the default soil attenuation capacity and free phase LNAPL was observed in the northwest corner of the Site. Therefore, additional remediation will be required to mitigate risk to human health and the environment from contaminated soil and groundwater remaining at the Site.

3.2 Asbestos-Containing Building Materials

A licensed asbestos building inspector completed an inspection of the Site and identified ACBM in two (2) buildings, including transite asbestos cement wall and ceiling panels and asbestos roofing materials.

4.0 CLEANUP OBJECTIVES

The City of Dixon intends to pursue redevelopment of the Site in an effort to revitalize the City downtown and riverfront. Cleanup of the identified subsurface contamination and ACBM is a critical component to facilitate this redevelopment strategy. The objective of cleanup actions is to protect human health and the environment at the Site considering potential future mixed-use residential, commercial, and/or recreational end use.

The City of Dixon has enrolled the Site into the Illinois EPA voluntary SRP in pursuit of a comprehensive NFR letter. Accordingly, the numerical cleanup objectives for subsurface contamination are the TACO remediation objectives for residential, industrial/commercial, and construction worker receptors.

5.0 CLEANUP ALTERNATIVES ANALYSIS - TPH & FREE PRODUCT LNAPL

There are three (3) cleanup alternatives that could be used to address the free phase LNAPL and associated TPH in soil at the Site.

5.1 Alternative 1 – No Action

The City does not address the TPH and LNAPL contamination in any way at the Site.

1. Effectiveness – this alternative does not address the contamination in any manner and, therefore, is not effective.
2. Implementability – implementing this alternative takes no effort on the part of the City but considering that soils are impacted with cadmium exceeding the toxicity characteristic threshold, the Site could not achieve regulatory closure without further action.
3. Cost – there is no direct cost for inactivity.

5.2 Alternative 2 – Limited Soil Excavation and Free Product Removal

Conduct pre-remedial design confirmation sampling to verify the horizontal and vertical extent of TPH in soil exceeding the soil attenuation capacity. Based on the results, excavate soils impacted above the soil attenuation capacity and dispose off-site at a permitted landfill, treatment, or incineration facility, as appropriate based on waste profile analysis. Collect free product, if observed in the open excavation, using vacuum truck and/or absorbent materials. It is anticipated that TPH-impacted soils and recovered

LNAPL may require special handling and disposal under TSCA. Collect confirmation samples at the excavation sidewalls and floor to verify chemical impacts have been removed.

1. Effectiveness – This alternative can be immediately effective at removing soils containing TPH exceeding the soil attenuation capacity and the source of free product LNAPL.

2. Implementability – TPH impacts in soil extend to depths of at least 14 feet below ground surface. Therefore, soil excavation is anticipated to require implementation of shoring, benching, sloping or alternative stability method. Furthermore, sheet piling may be required due to the proximity of the excavation area to the Rock River. Excavation may result in damage or removal of the LNAPL interceptor trench and/or barriers and TSCA-approved caps installed by US EPA. Excavation and disposal is anticipated to include PCB-contaminated soils, which require special handling/disposal under TSCA. Sampling will include analysis of applicable COCs in a confirmation sampling grid of sufficient density for Illinois EPA approval. Confirmation sample results exhibiting concentrations of COCs above Tier 1 ROs will require further excavation and additional confirmation sampling.

3. Cost – The cost to excavate and dispose of TPH-impacted soils and recovered free product is estimated as follows:

Excavation & Disposal - TPH Soils	$ 630,000.00
Excavation & Disposal - TSCA Waste	$ 48,000.00
Free Product Removal & Disposal	$ 30,000.00
Professional/Technical Services	$ 70,000.00
Sampling	$ 40,000.00
TOTAL	**$ 818,000.00**

5.3 Alternative 3 – In Situ Chemical Oxidation and LNAPL Recovery

Conduct in situ chemical oxidation via injections of a liquid reagent to rapidly oxidize petroleum hydrocarbons and induce conditions favorable for long-term biodegradation of residual contamination. Following injection activities, complete confirmation soil sampling to verify TPH concentrations are below the soil attenuation capacity. Install monitoring well(s) for LNAPL monitoring and recovery. LNAPL recovery, if needed, may be accomplished using active skimmer pump systems, passive recovery canisters, or absorbent socks, depending on the thickness and recovery time of LNAPL in the well(s). Containerize recovered LNAPL in drums or totes and dispose off-site at a permitted treatment or

incineration facility. It is anticipated that recovered LNAPL may require special handling and disposal under TSCA.

1. Effectiveness – This alternative is anticipated to be effective at reducing TPH concentrations and LNAPL over time.

2. Implementability – Specialized injection equipment will be required. The radius of influence for each injection point may be dependent on subsurface materials and heterogeneity. However, injections cause the least disturbance at the surface and avoid waste generation and safety hazards of excavation methods. Effectiveness must be demonstrated by confirmation sampling results and may require multiple injection events. Proper handling and disposal of waste soils generated during installation of monitoring/recovery wells (two- or four-inch diameter) will be required. Operation of an active skimmer system, if selected for LNAPL recovery, may cease during winter months or require winterization.

3. Cost – The cost to conduct in situ petroleum oxidation and LNAPL recovery is estimated as follows:

In Situ Injections	$ 130,000.00
Professional/Technical Services	$ 50,000.00
Sampling	$ 35,000.00
LNAPL Recovery	$ 95,000.00
TOTAL	**$ 310,000.00**

6.0 CLEANUP ALTERNATIVES ANALYSIS - PCBs & METALS IN SOIL

There are three (3) cleanup alternatives that could be used to address the PCB and metals contamination in soil at the Site.

6.1 Alternative 1 – No Action

The City does not address the PCBs and metals contamination in any way at the Site.

4. Effectiveness – This alternative does not address the contamination in any manner and, therefore, is not effective.

5. Implementability – Implementing this alternative takes no effort on the part of the City but considering that soils are impacted with cadmium exceeding the toxicity characteristic threshold, the Site could not achieve regulatory closure without further action.

6. Cost – There is no direct cost for inactivity.

6.2 Alternative 2 – Engineered Barrier Placement

Install an engineered barrier in the portions of the Site not already covered in geotextile or PCB cap from the US EPA Time-Critical Removal Action. Rely on the existing building slabs as engineered barriers and add additional barriers in the remaining areas. Engineered barriers will consist of woven geotextile fabric overlain by at least two (2) feet of clean backfill and vegetation, consistent with the barriers installed by US EPA. Limited shallow excavation may be required to allow for placement of the barriers and proper Site grading. Dispose of any excavated soils off-site at a permitted landfill, treatment, or incineration facility, as appropriate based on waste profile analysis. Limited additional sampling may be required at the boundaries of the engineered barrier area. Install monitoring wells near the down-gradient Site boundary to complete further evaluation for potential groundwater and/or surface water impacts resulting from the contaminated soils left in place.

1. Effectiveness – This alternative effectively excludes soil ingestion and soil inhalation exposure routes.
2. Implementability – Complements the existing strategy of engineered barriers installed by US EPA and does not require significant additional intrusive work and/or waste generation.
3. Cost – The cost to install engineered barriers in the portions of the Site not already covered in the caps/barriers installed by US EPA is estimated to be:

Engineered Barrier	$ 120,000.00
Professional/Technical Services	$ 30,000.00
Sampling	$ 5,000.00
Down-Gradient Monitoring	$ 40,000.00
TOTAL	**$ 195,000.00**

6.3 Alternative 3 – Excavation and Disposal of Soils Exceeding Tier 1 ROs

Excavate soils outside the US EPA excavation boundary and dispose off-site at a permitted landfill, treatment, or incineration facility, as appropriate based on waste profile analysis. Remove remaining buildings and building slabs to complete the excavation, since sample results indicate chemical impacts extend beneath some of the buildings. Collect confirmation samples at the excavation sidewalls and floor to verify chemical impacts have been removed.

1. Effectiveness – Soil excavation is an effective corrective action used to remove soil contamination. This alternative is effective without relying on engineered barriers to exclude exposure routes.

2. Implementability –Soil impacts in select areas extend to depths of at least 19 feet below ground surface. Therefore, soil excavation is anticipated to require groundwater management and implementation of shoring, benching, sloping or alternative stability method. Excavation in the northwest portion of the Site may require installation of sheet piling due to the proximity of the Rock River and may result in damage or removal of the LNAPL interceptor trench and/or barriers installed by US EPA. Building and concrete slab demolition will be required. Excavation and disposal anticipated to include PCB-contaminated soils, which may require special handling/disposal under TSCA. Sampling will include analysis of all COCs in a confirmation sampling grid of sufficient density for Illinois EPA approval. Confirmation sample results exhibiting concentrations of COCs above Tier 1 ROs will require further excavation and additional confirmation sampling. May require excavation to Site boundaries if soil impacts exceeding Tier 1 ROs are not defined on the Site.

3. Cost – The cost to excavate and dispose of soils exceeding Tier 1 ROs is estimated as follows:

Building Demolition	$ 125,000.00
Excavation - PCB Waste	$ 75,000.00
Excavation - Non-PCB Waste	$ 1,200,000.00
Professional/Technical Services	$ 70,000.00
Sampling	$ 80,000.00
TOTAL	**$ 1,550,000.00**

7.0 CLEANUP ALTERNATIVES ANALYSIS - ASBESTOS

There are three (3) cleanup alternatives that could be used to address the asbestos-containing building materials at the Site.

7.1 Alternative 1 – No Action

The City does not address the ABCM in any way at the site.

1. Effectiveness – this alternative does not address the contamination in any manner and, therefore, is not effective.

2. Implementability – implementing this alternative takes no effort on the part of the City. However, the Site cannot be redeveloped without addressing the ACBM.

3. Cost – there is no direct cost for inactivity.

7.2 Alternative 2 - Asbestos Encapsulation

ACBM can be encapsulated and managed in the Sitebuilding, assuming that the ACBM are in good condition.

1. Effectiveness – this alternative can be very effective for ACBM that are in good condition. However, given the age of the structure and duration of vacancy, the interior is not in good condition. It is unlikely that the structures will remain as part of site redevelopment and demolition may disturb any encapsulated materials, rendering this alternative ineffective.

2. Implementability – the implementability of this alternative is limited because the ACBM is generally in poor condition and the building interior would need to be completely remodeled or demolished.

3. Cost – the cost to encapsulate the ACBM is projected to be **$5,000.**

7.3 Alternative 3 - Asbestos Abatement

ACBM can be abated by a licensed asbestos abatement contractor.

1. Effectiveness – this alternative removes ACBM from the structure and thereby eliminates potential exposure to asbestos. Abatement is the most effective method of addressing ACBM on the Site.

2. Implementability – abatement must follow National Emission Standards for Hazardous Air Pollution (NESHAP) and Illinois Department of Public Health (IDPH) requirements. The building is structurally sound, making asbestos abatement easily implemented.

3. Cost – the cost to abate the asbestos is projected to be **$16,000.**

8.0 RECOMMENDATION

Based on the analysis presented in the previous section, the following recommendations are provided relative to cleanup of subsurface contamination and ACBM at the Site:

Subsurface Contamination

TPH and Free Product LNAPL: Alternative 3 - In Situ Chemical Oxidation and LNAPL Recovery

This cleanup alternative is the most cost-effective approach for addressing the identified TPH and LNAPL impacts and is anticipated to cause minimal disturbance to the land, river, and surrounding area, including existing remedies installed through US EPA Time Critical Removal Action. Due to the vertical and horizontal distribution of constituents of concern in soil, excavation alternatives may be cost-prohibitive and include substantial safety considerations and waste generation. In situ injection and LNAPL recovery wells will generate minimal contaminated soil or groundwater waste in comparison to other alternatives. Furthermore, this alternative is consistent with the existing strategy of engineered barriers and caps covering the majority of the site, as installed by US EPA. In situ chemical oxidation and LNAPL monitoring/recovery is compatible with the intended land use and meet the cleanup objectives for the Site in accordance with TACO.

*PCBs and Metals in Soil***:** Alternative 2 - Engineered Barrier Placement

This cleanup alternative is the most cost-effective approach for addressing the identified residual PCBs and metal impacts and is anticipated to cause minimal disturbance to the land, river, and surrounding area, including existing remedies installed through US EPA Time Critical Removal Action. Due to the vertical and horizontal distribution of constituents of concern in soil, excavation alternatives may be cost-prohibitive and include substantial safety considerations and waste generation. The engineered barrier alternative will minimize contaminated soil and groundwater waste in comparison to other alternatives. Furthermore, this alternative is consistent with the existing strategy of engineered barriers and caps covering the majority of the site, as installed by US EPA. Engineered barriers are compatible with the intended land use

and meet the cleanup objectives for the Site in accordance with TACO, as the alternative barrier has already been approved by the Illinois EPA.

Asbestos Containing Building Materials

ACBM: Alternative 3 - Asbestos Abatement

Abatement of ACBM is the only effective and implementable option to prevent potential asbestos exposure during and after redevelopment of the Site due to the planned demolition of the structures on the Site.

The cleanup areas are depicted on Figure 3.

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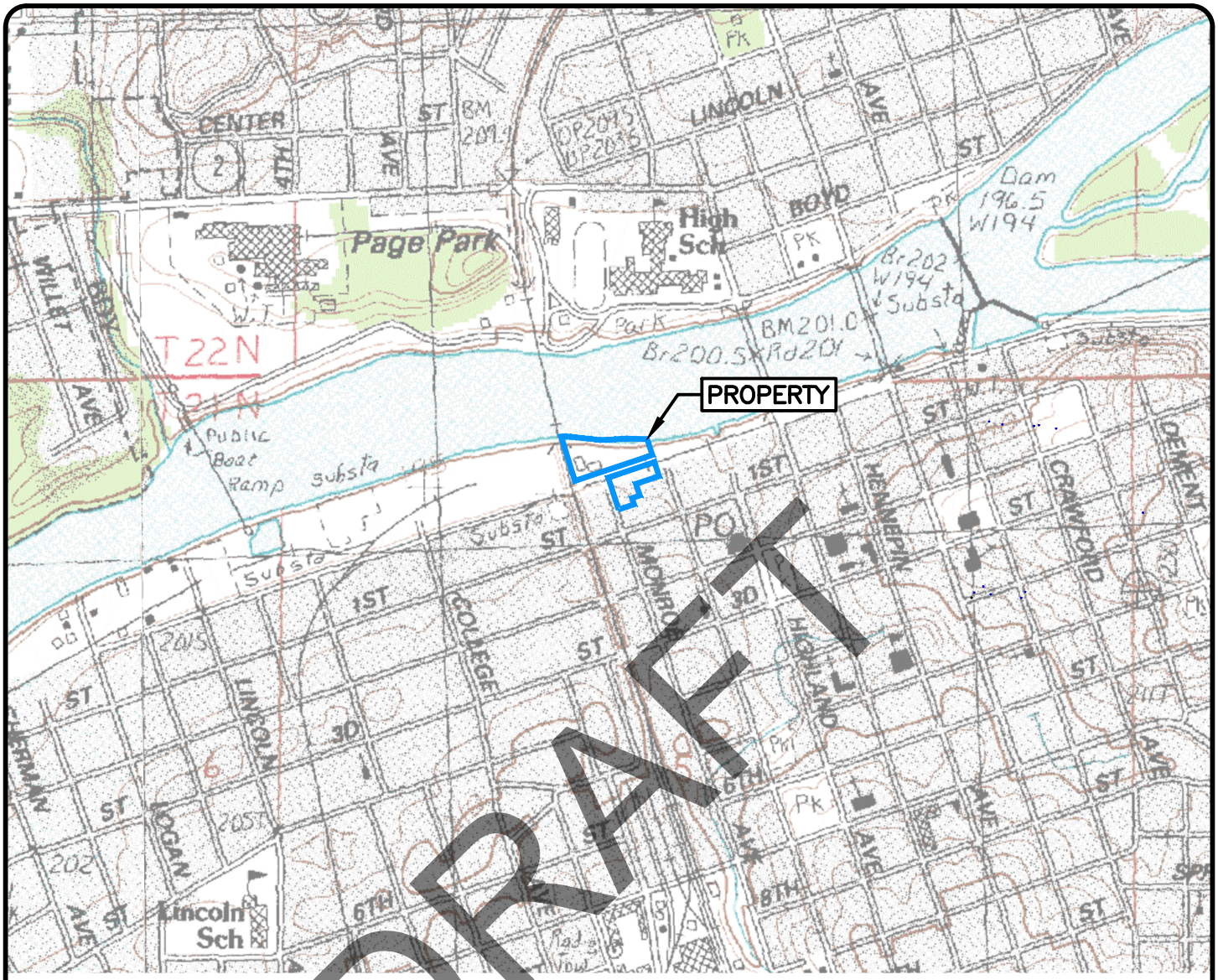
Figures

Figure1

Site Location Map



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GRAPHIC SCALE IN FEET

FIGURE 1

SITE LOCATION MAP
DIMCO
78 MONROE AVE.
DIXON, IL 61021

11/5/21

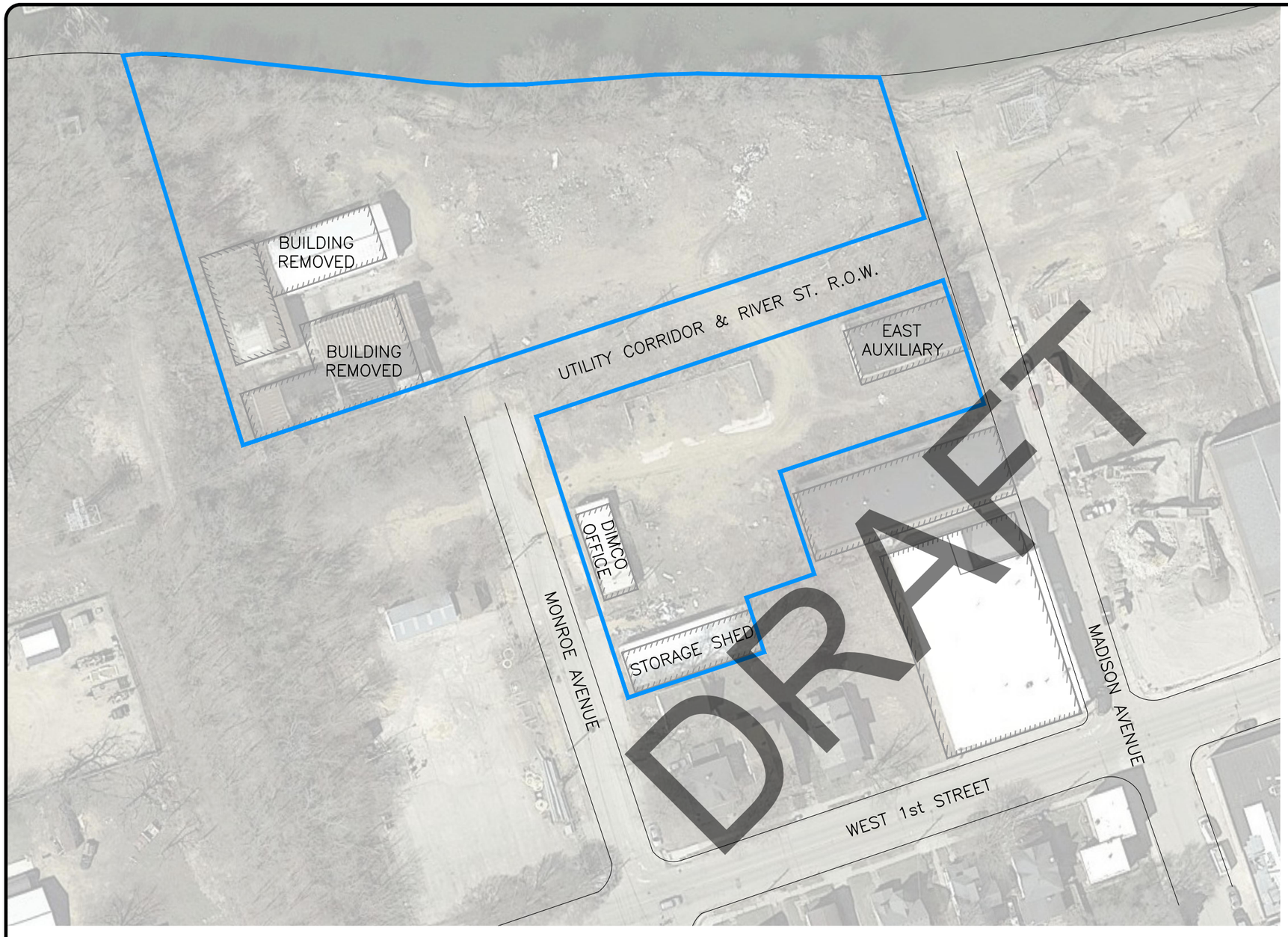
FEHR GRAHAM
ENGINEERING & ENVIRONMENTAL

ILLINOIS
IOWA
WISCONSIN

PLOT DATE: 11/5/21
G:\C3D\19\19-945\Exhibits\19-945_BASE MAP.dwg, Site Vicinity (CSIR)

Figure 2

Site Layout Map



LEGEND

- APPROXIMATE PROPERTY BOUNDARIES
- PROPERTY BUILDINGS
- REMEDIATION SITE BOUNDARY

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GRAPHIC SCALE IN FEET

FIGURE 2
SITE LAYOUT MAP
DIMCO
78 MONROE AVE.
DIXON, IL 61021

11/5/21

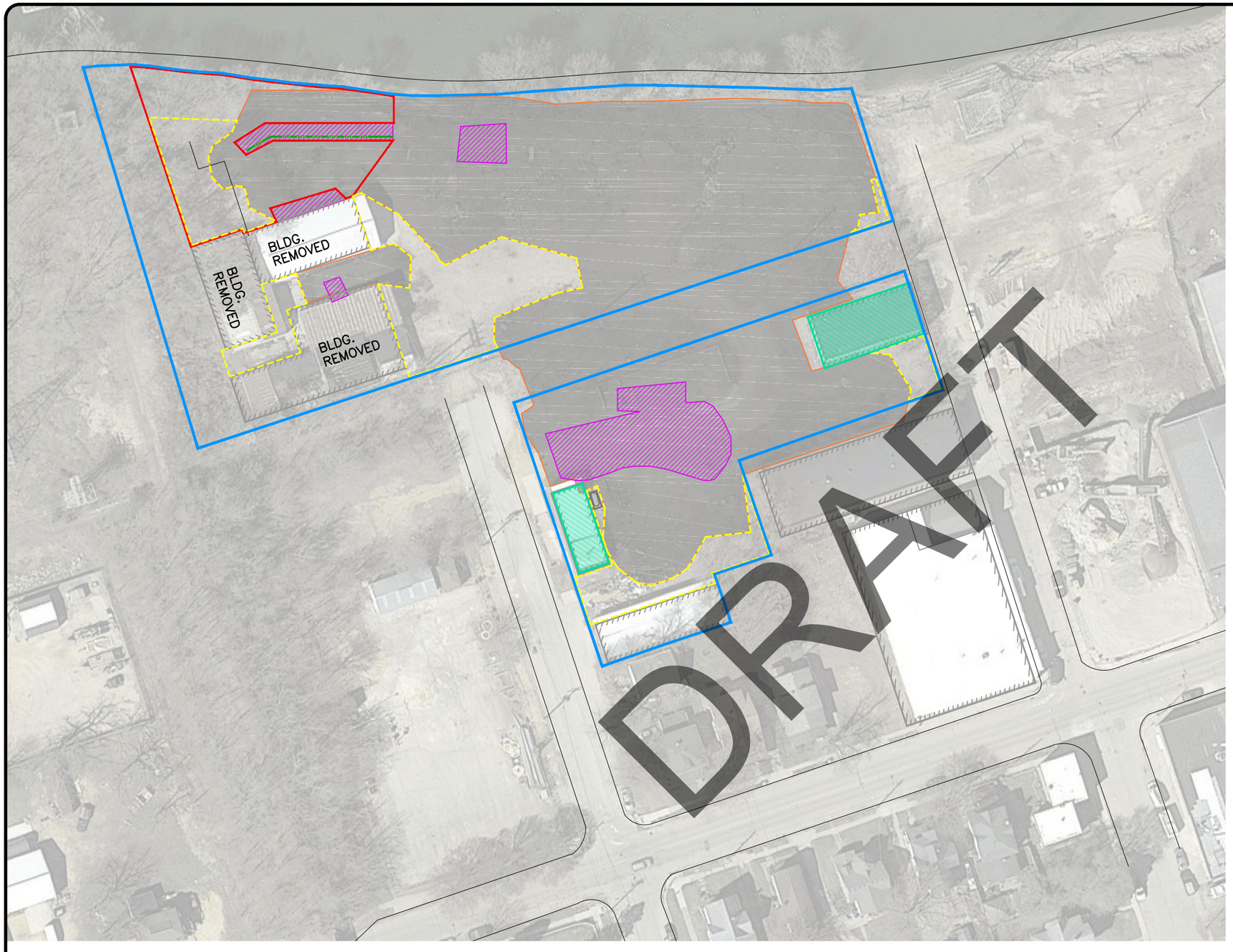
FEHR GRAHAM
ENGINEERING & ENVIRONMENTAL
ILLINOIS DESIGN FIRM NO. 194-003525

ILLINOIS
IOWA
WISCONSIN

G:\C3D\19\19-945\Exhibits\19-945_BASE MAP.dwg, Site Base Map (CSIR)
PLOT DATE: 11/5/21

Figure 3

Cleanup Areas Map



LEGEND

- APPROXIMATE PROPERTY BOUNDARIES
- PROPERTY BUILDINGS
- SITE BOUNDARY
- EXISTING GEOTEXTILE AREA (NO DIG)
- EXISTING PCB CAP AREA
- EXISTING INTERCEPTOR TRENCH
- TPH/LNAPL CLEANUP AREA
- PCB/METALS CLEANUP AREA
- ASBESTOS CLEANUP AREA

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GRAPHIC SCALE IN FEET

FIGURE 3
CLEANUP AREAS MAP
DIMCO
78 MONROE AVE.
DIXON, IL 61021

11/8/21

FEHR GRAHAM
ENGINEERING & ENVIRONMENTAL
ILLINOIS DESIGN FIRM NO. 194-003525

ILLINOIS
IOWA
WISCONSIN

G:\C3D\19\19-945\Exhibits\19-945_BASE MAP.dwg, CLEANUP AREA (2021 CSIR)
PLOT DATE: 11/8/21