

Analysis of Brownfield Cleanup Alternatives

CSB Shirland Avenue Property
126 Shirland Avenue
South Beloit, Illinois

Project Number: 23-1845

June 13, 2024

Brownfields Cleanup Grant
CA# BF-00E03563

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1.0 INTRODUCTION

This Analysis of Brownfields Cleanup Alternatives (ABCA) has been prepared on behalf of the City of South Beloit for the CSB Shirland Avenue Property site, located at 126 Shirland Avenue in South Beloit, Illinois (the Site). A Site Vicinity 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 petroleum contamination on the Site.

The CSB Shirland Avenue Property site is located along the Illinois-Wisconsin state line in South Beloit and is bounded by the Rock River to the west, Turtle Creek to the south, railroad and industrial operations to the east, and a newly constructed minor league baseball stadium (2021) to the north. The Site consists of three (3) parcels of land which are transected by a utility corridor/former railroad right-of-way and encompass approximately 11.36 acres. The Site was developed with a large manufacturing facility from 1918 until 2007, with historical operations including refrigeration equipment manufacturing, steel products manufacturing, automotive body shop, and food distribution warehousing. The buildings were demolished in 2007 and the Site has been vacant since that time. A Site Plan depicting the approximate Site boundary is included as Figure 2.

Phase I Environmental Site Assessments completed at the Site (2009, 2017, 2020) identified recognized environmental conditions associated with historical industrial, manufacturing, and railroad operations. Soil and groundwater investigations completed in 2009, 2010, 2020 and 2021 identified various constituents of concern (COC) in soil above the Illinois Environmental Protection Agency (Illinois EPA) Tiered Approach to Corrective Action Objectives (TACO) Tier 1 soil remediation objectives (SROs), including total petroleum hydrocarbons (TPH), benzene, trichloroethylene, polynuclear aromatic hydrocarbons (PNAs), and metals. However, only TPH is considered in this ABCA since the Site is only eligible for petroleum grant funding.

Redevelopment of the Site is planned to include parking lots for the adjoining baseball stadium and mixed-use commercial and public-use space. Based on the findings of the environmental investigations, redevelopment of the Site will include mitigation of subsurface petroleum contamination 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 11.36 acres of land formerly occupied by a manufacturing and warehousing facility. The historical buildings were demolished in 2007 and the Site has been vacant since that time, consisting of a grassy field with trees and shrubbery along the banks of the Rock River and Turtle Creek.

The areas surrounding the Site include the Rock River to the west, Turtle Creek to the south, a railroad followed by industrial properties to the east, and parking lots and a baseball stadium to the north. The Site is identified by parcel index numbers 04-05-152-001, 04-05-151-001 and 04-06-277-001 and is transected by a utility corridor/former railroad right-of-way which runs approximately parallel to the Rock River. The common address of the Site is 126 Shirland Avenue, South Beloit, Illinois 61080.

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

2.2 Site History

The Site was developed in 1918 with a manufacturing facility used to produce special cooling equipment for railroad refrigerator cars (Lipman Refrigerator Car and Manufacturing Company; later Lipman Refrigeration Corporation). The original facility included a foundry and car shop. After the conclusion of World War I, the demand for refrigerated rail cars decreased and the facility shifted operations to the production of various smaller refrigeration machines. The car shop was converted to assembly and testing, and the facility was expanded to include a cooling coil manufacturing shop, machine shop, and office. The name of the facility changed to General Refrigeration Corporation in 1930. Historical Sanborn Fire Insurance Maps between 1926 and 1950 depict a machine shop, a coil shop, storage areas, woodworking, painting, oil house, railroad spurs, and an earthen-floor foundry. Refrigeration equipment manufacturing operations continued until at least 1958.

Subsequent operations at the Site included Beloit Bridge & Iron Steel Fabrication / Beloit Corporation Integrated Products Division between at least 1961 and 1972, which included steel storage, welding, a machine shop, and railroad spurs. The Site was briefly occupied by an automotive body shop (Herf's Auto Body) in the early 1980s and was used for food distribution warehousing (Beatrice Foods Warehouse, Kerry Ingredients Certified Parts Corp Warehouse, Equipment Exchange) from 1987 to 2007. The Site has been undeveloped since the manufacturing/warehousing facility was demolished in 2007.

2.3 Environmental Assessments

Several environmental assessments have been completed at the Site, including Phase I and Phase II ESAs and enrollment in the Illinois EPA SRP. Initial assessments in 2009 and 2010 identified benzene, PNAs, metals, and TPH in soil exceeding the TACO Tier 1 remediation objectives. The Site was enrolled in the Illinois EPA SRP in 2010 with a proposed remediation strategy consisting of targeted excavations for TPH, sitewide engineered barriers, construction worker notification, and a groundwater use restriction. However, the City of South Beloit determined that implementation of the planned remedial strategy was impractical at that time due to floodway considerations and the absence of a funding source. The Site was removed from the SRP in 2016 without closure.

Additional Site investigations were completed in 2020 and 2021 to evaluate current Site conditions in renewed effort towards redevelopment. The investigations confirmed the presence of COCs identified during historical investigations and loosely delineated the area of TPH impacts. The Site was re-enrolled in the SRP in 2022 to address the identified contamination in pursuit of a comprehensive No Further Remediation (NFR) determination. The investigation activities and findings were described in a *Comprehensive Site Investigation Report, Remedial Objectives Report, and Remedial Action Plan (CSIR-ROR-RAP)* (Fehr Graham, January 20, 2022). The Illinois EPA denied the CSIR-ROR-RAP in a letter dated April 25, 2022, and provided comments requiring additional Tier 2 model calculations for the soil and groundwater components of the groundwater ingestion exposure route. The additional modeling is currently being completed and will be submitted for Illinois EPA review by December 31, 2022.

2.4 Regional and Site Vulnerabilities

In line with the directives outlined by the US Global Change Research Program (USGCRP), the Midwest region of the United States is poised to undergo significant climatic shifts, including heightened temperatures, intensified heavy rainfall occurrences, increased precipitation, and a surge in flooding incidents. Among these, the escalation in heavy rainfall, precipitation, and a surge in flooding poses the

most substantial threat to the Site due to its urban composition, exacerbating the already prevalent issue of urban flooding brought about by inadequate infrastructure, and proximity to the Rock River.

The Site is located in what FEMA Flood map considers a special flood hazard area and is surrounded by areas that will have a 1% percent annual chance flood hazard. Also based on recent assessments that unveiled a startling reality: 90% of urban flood damage claims extend beyond the mapped floodplain. Compounding this risk is the composition of the Site's adjoining properties, partially consisting of paved parking lots and commercial/industrial buildings, further intensifying the volume of stormwater discharge moving onto the Site.

The Site's current utilization is a vacant field with vegetation. Proposed redevelopment plans including mixed use commercial/residential and public-use green space should decrease the effects of some of the precipitation from urban flooding however it will not stop the flooding caused by the Rock River or 100-year flood cycles. The flooding events threaten to instigate erosion of the green space, thus increasing stormwater discharge from the site to the surrounding environments. Site stormwater controls and proposed infrastructure will help to mitigate urban flooding on the Site. Outside of these environmental changes, other anticipated environmental changes in temperature, groundwater thaw/freeze dynamics, ecological zones, and groundwater table levels are not likely to dynamically impact the Site's operations.

3.0 CONTAMINANTS AND EXPOSURE ROUTES

Subsurface conditions were identified through environmental investigation activities completed between 2009 and 2021, as described in *Section 2.3*. The analytical results for soil samples collected from the Site indicate the following constituents are present in soil exceeding Tier 1 SROs:

VOCs

- Benzene
- Trichloroethylene

SVOCs

- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Carbazole
- Dibenzo(a,h)anthracene
- Indeno(1,2,3-cd)pyrene
- N-Nitrosodi-n-propylamine

Metals

- Arsenic
- Antimony
- Chromium
- Lead
- Manganese
- Mercury
- Nickel

TPH

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 (construction worker), and soil component to groundwater ingestion. However, only TPH will be considered for this ABCA since the Site is only eligible for petroleum grant funding. Total petroleum hydrocarbons were identified in soil at concentrations exceeding the applicable default or Site-specific soil attenuation capacity, which is a threshold criterion for cleanup according to TACO. Therefore, remediation will be required to mitigate risk to human health and the environment from petroleum-contaminated soil at the Site.

4.0 CLEANUP OBJECTIVES

The City of South Beloit intends to pursue redevelopment of the Site in an effort to revitalize the riverfront and expand on the neighboring stadium development. Cleanup of the identified subsurface contamination is a critical component to facilitate redevelopment. The objective of cleanup actions is to protect human health and the environment at the Site considering potential future mixed-use commercial and/or recreational end use.

4.1 Cleanup Oversight Responsibility

Cleanup activities will be overseen by Fehr Graham in partnership with the City of South Beloit. All documents prepared for the Site will be submitted to U.S. EPA Region 5. Cleanup documents specific to the pursuit of a No Further Remediation determination will be submitted to the Illinois EPA Site Remediation Program.

4.2 Cleanup Standards for Major Contaminants

The City of South Beloit has enrolled the Site into the Illinois EPA Site Remediation Program in pursuit of a comprehensive NFR letter. The objective of cleanup actions is to protect human health and the environment at the Site considering potential future mixed-use commercial and/or recreational end use. Accordingly, the numerical cleanup objectives for subsurface contamination are the TACO remediation objectives for residential, industrial/commercial, and construction worker receptors. Along with TACO standards, state standards pertaining to commercial and recreational use will be followed to ensure that an NFR letter is achieved for the site after the cleanup process of the Site.

4.3 Laws and Regulations

Laws and regulations that are applicable to this cleanup include the Federal Small Business Liability Relief and Brownfields Revitalization Act, the Federal Davis-Bacon Act, state environmental law, and town by-laws. Federal, state, and local laws regarding procurement of contractors to conduct the cleanup will be followed. In addition, all appropriate permits (e.g., notify before you dig, soil transport/disposal manifests) will be obtained prior to the work commencing.

5.0 CLEANUP ALTERNATIVES ANALYSIS

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

5.1 Alternative 1 – No Action

The City does not address the TPH 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 TPH exceeding the attenuation capacity, 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

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. If free product or contaminated groundwater is observed in the open excavation, remove it using vacuum truck and/or absorbent materials. 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.
2. Implementability – TPH impacts in soil extend to depths of at least 6 feet below ground surface, but deeper samples were not collected for vertical delineation due to the shallow water table. Soil excavation at these depths is anticipated to require dewatering and implementation of shoring, benching, sloping or alternative stability method. It is anticipated that contaminated groundwater and/or free product may be encountered in the excavation and will require proper handling and disposal. Traffic considerations and/or street sweeping may be required due to truck traffic entering and leaving the Site for contaminated soil transportation. Sampling will be completed in a confirmation sampling grid of sufficient density for Illinois EPA approval. Confirmation sample results exhibiting concentrations of TPH above objectives will require further excavation and additional confirmation sampling.
3. Cost – The cost to excavate and dispose of TPH-impacted soils is estimated as follows:

• Excavation & Disposal - TPH Soils	\$ 150,000.00
• Groundwater/Free Product Removal & Disposal	\$ 30,000.00
• Clean Backfill	\$ 21,000.00
• Professional/Technical Services	\$ 30,000.00
• Sampling	\$ 10,500.00

TOTAL	\$ 241,500.00

5.3 Alternative 3 – In Situ Chemical Oxidation

Conduct pre-remedial design confirmation sampling to verify the horizontal and vertical extent of TPH in soil exceeding the soil attenuation capacity. Conduct bench scale testing of materials to maximize the effect of remediation implement application. Based on the results, conduct in situ chemical oxidation via blending of a reagent to rapidly oxidize petroleum hydrocarbons and induce conditions favorable for long-term biodegradation of residual contamination. Following soil blending activities, complete confirmation soil sampling to verify TPH concentrations are below the soil attenuation capacity.

1. Effectiveness – This alternative is anticipated to be effective at reducing TPH concentrations and overtime.
2. Implementability – Specialized soil blending equipment and/or expertise will be required. Soil will be treated in “lifts” and may require excavation stability methods to achieve required treatment depths. Avoids waste generation and groundwater management required by excavation methods. Effectiveness must be demonstrated by confirmation sampling results and may require multiple treatment events. Soil blending may alter the geotechnical properties of the soil, which should be evaluated prior to construction over the treated area.
3. Cost – The cost to conduct in situ petroleum oxidation is estimated as follows:

• In Situ Blending	\$ 209,000.00
• Professional/Technical Services	\$ 72,210.00
• Sampling	\$ 15,500.00

TOTAL	\$ 296,710.00

6.0 RECOMMENDATION

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

Subsurface TPH Contamination:

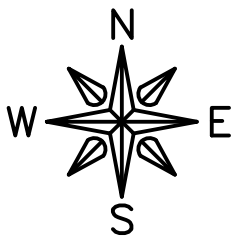
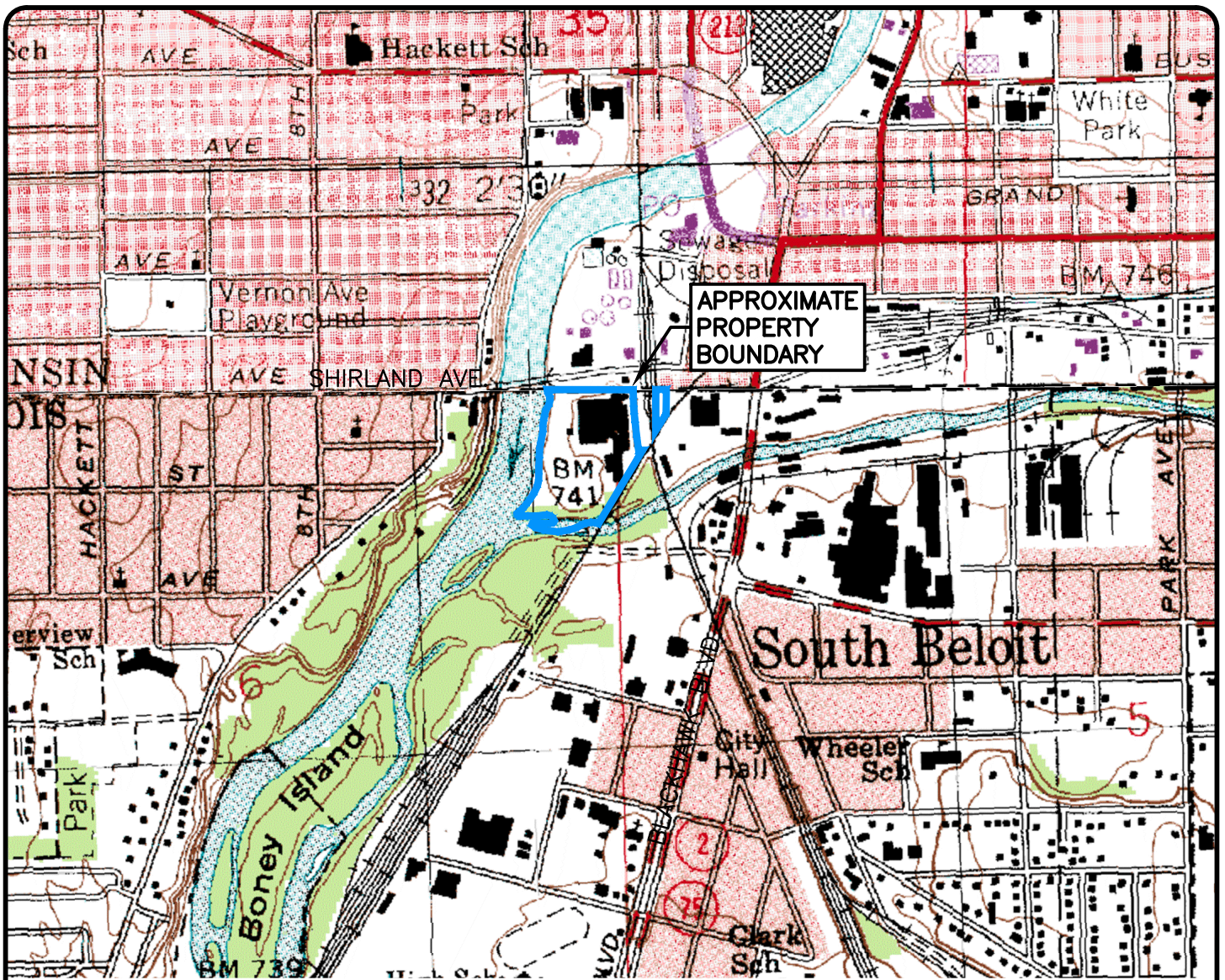
Alternative 3 - In Situ Chemical Oxidation

This cleanup alternative is anticipated to cause minimal disturbance to the land, river, and surrounding area since treatment will occur in situ and will avoid truck traffic for soil transportation. Compared to excavation and disposal methods, in situ chemical oxidation will generate less contaminated waste to manage in landfills or treatment facilities. This cleanup alternative is compatible with the intended land use and will meet the cleanup objectives for the Site in accordance with TACO.

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Figures

Figure 1
Site Vicinity Map



1000 0 1000 FEET
GRAPHIC SCALE IN FEET

FIGURE 1

SITE VICINITY MAP

CITY OF SOUTH BELOIT

126 SHIRLAND AVE.

SOUTH BELOIT, IL 61080

8/11/21

FEHR GRAHAM
ENGINEERING & ENVIRONMENTAL

ILLINOIS
IOWA
WISCONSIN

Figure 2
Site Plan

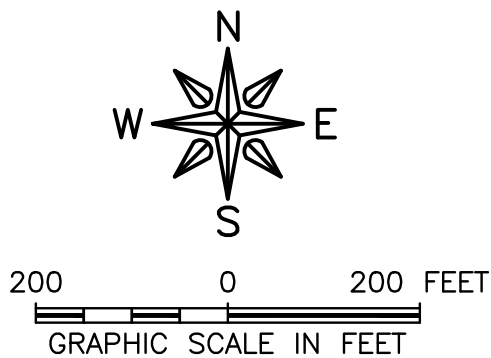


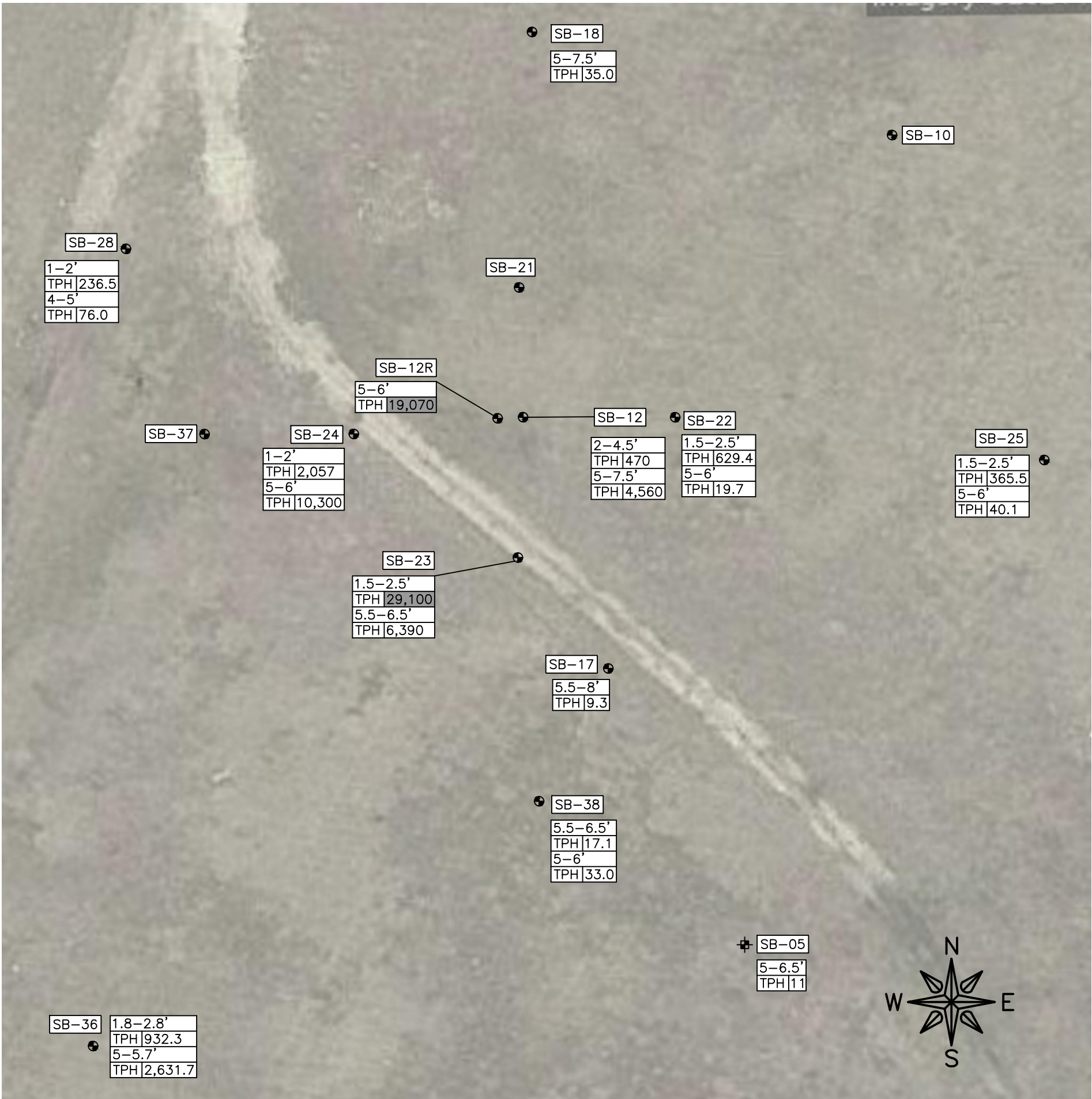
FIGURE 2
SITE PLAN
CITY OF SOUTH BELOIT
126 SHIRLAND AVE.
SOUTH BELOIT, IL 61080

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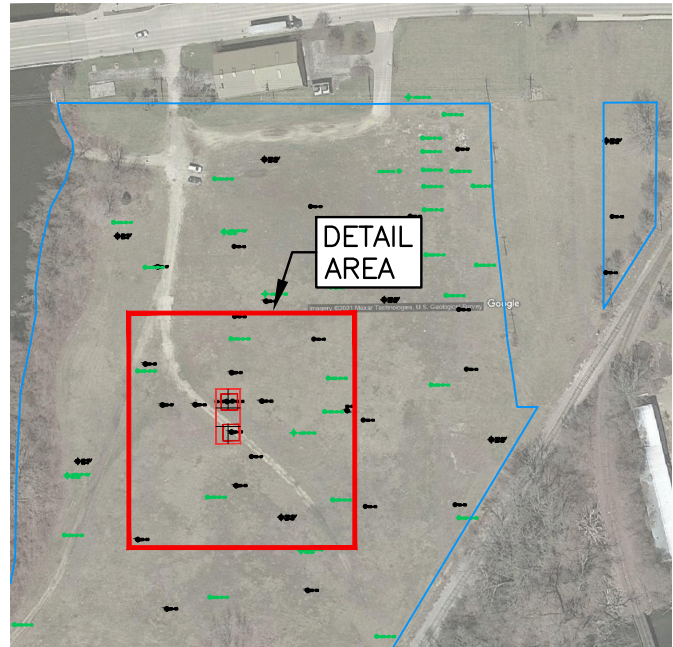
Figure 3
TPH Concentrations



SOIL ATTENUATION CAPACITY

CHEMICAL	SURFACE SOILS	SUBSURFACE SOILS
	UPPER 1 METER	BELOW 1 METER
TPH TOTAL PETROLEUM HYDROCARBONS	6,000	15,000

RESULTS REPORTED IN MILLIGRAMS PER KILOGRAM (mg/kg)



LEGEND

- SOIL BORING LOCATION
- TPH TOTAL PETROLEUM HYDROCARBONS (mg/kg)

FIGURE 3
TPH CONCENTRATIONS
CITY OF SOUTH BELOIT
126 SHIRLAND AVE.
SOUTH BELOIT, IL 61080

10/24/22

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