Prepared for:

City of Chicago
Dept of Fleet and Facility Management
Chicago, Illinois

Prepared by:

AECOM
Chicago, Illinois
60585513
January 2019

Draft Analysis of Brownfield Cleanup Alternatives

1807-1815 North Kimball Avenue
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1.0 Introduction

This Analysis of Brownfield Cleanup and Alternatives (ABCA) report has been prepared for the City of Chicago Department of Fleet and Facility Management (2FM) regarding the 1807-1815 North Kimball Avenue Site located in Chicago, Illinois (herein referred to as "the Site"). The proposed cleanup under the Brownfield Cleanup Grant will include the reduction of trichloroethylene (TCE) concentrations to below the soil saturation concentration (C_{sat}) limit. Later remedial actions to eliminate the soil ingestion and soil inhalation exposure pathways for areas where soil exceeds the Tiered Approach to Corrective Action Objectives (TACO) Tier 1 Soil Remediation Objectives (SROs) will be completed under separate funding prior to or concurrent with redevelopment.

This ABCA report includes the following:

- A summary of the Site background and the future use of the Property;
- A description of the previous environmental investigations and their findings, including the Phase I and Phase II Environmental Site Assessments (ESAs) and the Comprehensive Site Investigation Report (CSIR);
- Analysis of potential remediation alternatives for cleanup of the 1807-1815 North Kimball Avenue Site; and
- Selection of the most appropriate alternative.

2.0 Background

2.1 Site Location and Description

The Site occupies three parcels (PINs 13-35-409-037, 13-35-409-039, 13-35-409-042) in the northwestern portion of Chicago, Illinois, and is located adjacent to residential properties to the north and to the east, Kimball Avenue to the west and The Bloomingdale Trail to the south. The Bloomingdale Trail is an elevated greenway constructed on a former railroad running east-west on the northwest side of Chicago that forms the main line a park and trail network called The 606. The location of the subject property is depicted on **Figure 2-1**.

The Site encompasses approximately 0.4 acres and is mostly vacant with some portions covered in concrete and some portions covered in grass/soil. The Site's topography is generally flat on the northern and eastern portions, with a sloped embankment connecting the Site to the Bloomingdale Trail (approximately 15 to 16 feet above the Site grade). The elevation of the flat portion of the Site is between 600 and 605 ft above mean sea level (amsl).

The closest surface water body is a small pond in Humboldt Park approximately 0.75 miles southeast of the Site. The north branch of the Chicago River is approximately 2.8 miles east of the Site. The North Branch of the Chicago River flows south into the Chicago Sanitary and Ship Canal, away from Lake Michigan. Lake Michigan is approximately 4.5 miles east of the Site. Lake Michigan is the sole source of the City of Chicago's drinking water.

2.2 Previous Site Uses and Site History

The City of Chicago acquired the Site in 2005 through foreclosure. Prior to the City of Chicago's ownership, land use at the site was primarily industrial. The known historic uses of the Site based on historic fire insurance maps are provided below:

- In 1896, the Site was utilized as a lumberyard for the Elsmere Lumber Company (ELC) and contained a single-family dwelling on the northern portion.
- By 1921, the Site was vacant, and a concrete retaining wall existed along the southern Site boundary. Railroad spurs from the Chicago, Milwaukee, and St. Paul railroad were present to the south.
- By 1950, American Laundry Machinery Company (ALMC), which had occupied the eastern adjacent property, expanded to occupy the Site. Historical operations at ALMC included woodworking, testing, painting, crating, shipping, lumber storage, casting storage, and machine shop operations.
- By 1975, the Compco Corporation (Compco) was present in place of ALMC in the vicinity of the Site and the eastern adjacent site. Compco is described on the 1975 Sanborn Map as "Manufacturers of Fluorescent Fixtures."
- By 2003, the Site was vacant. Two small structures were demolished by the City of Chicago, one in 2001, and one in 2002/2003.

The Site was occupied for nearly a century by industrial and manufacturing operations associated with ELC, ALMC, Compco and others that occurred on the Site and the adjoining east and south properties. The property to the west (across North Kimball Avenue) was historically industrial until recent development as a multi-family apartment complex. The properties to the north have historically been single-family residential.

2.3 Site Assessment Findings

The following previous environmental investigations have been completed for this Site and its adjacent properties:

- Clean World Engineering, Ltd. (CWE), 2010, Phase I ESA Report, 1807-1815 North Kimball Avenue, Chicago, Illinois, April 2010
- Brecheisen Engineering, Inc. (Brecheisen), 2010, Phase II ESA, 1807-1815 North Kimball Avenue, Chicago, Illinois, September 2010
- Weston Solutions, Inc. (Weston), 2012, Comprehensive Site Investigations Report (CSIR), 1807-1815 North Kimball Avenue, Chicago, Illinois, July 2012
- Terracon Consultants, Inc. (Terracon), 2012, Phase I Environmental Site Assessment (ESA), 1809-1815 North Kimball Avenue, Chicago, Illinois, August 2012
- Terracon, 2013, Phase II Site Investigation Summary, 1809 North Kimball Avenue, Chicago, Illinois, January 2013
- AECOM, 2018, Additional Investigation, 1807-1815 N Kimball Ave, Chicago, Illinois, October 2018

These previous environmental investigations are further described in the following sections.

2.3.1 Phase I ESAs

The following recognized environmental conditions (RECs) were identified based on the Phase I ESA Reports, prepared by Northern (2003), CWE (2010), and Terracon (2012):

- Long term historical Site uses that included metals, painting, automobile or other warehousing, lumber storage and warehousing, storage operations and other industrial uses assumed to be associated with historic and adjoining Site operations by ELC, ALMC, Compco and others.
- Records for two heating oil underground storage tanks (USTs) (23,000-gallon and 25,000-gallon) installed on the eastern adjacent property in 1952 were identified, with no documentation on the disposition
- Listings of the eastern adjacent property a Resource Conservation and Recovery Act (RCRA) Small Quantity Generator (SQG) of hazardous waste and a RCRA non-generator
- Light industrial facility (manufactured fluorescent light bulbs and fixtures) adjoining to the east is listed as a former small quantity RCRA generator facility,
- History of long term uses that include lumber storage and warehousing and storage operations,
- Documented soil and groundwater contamination onsite, documented onsite fill material, and
- Potential for USTs located southeast of the site.

Based on the historical Site use and RECs, the primary sources of contamination are likely derived from paint, lumber, and automobile warehouse operations at the Site, urban fill, potential petroleum releases from two heating oil USTs (23,000-gallon and 25,000-gallon) installed on the eastern adjacent Site in 1952, and potential historical releases from the Site and adjacent property formerly occupied by ELC, ALMC, Compco and others.

2.3.2 Phase II ESAs, CSIR and Additional

Subsurface environmental investigations, including the Phase II ESAs and sampling associated with the CSIR and recent, additional investigations were completed for this site and its adjacent properties between November 2002 and October 2018. The 2012 CSIR, completed by Weston, was funded under a Targeted Brownfields Assessments (TBA) Grant and the 2013 Terracon Phase I and Phase II ESAs were funded under the City's 2008 Hazardous and Petroleum Area Wide Assessment Grant.

The scope of work and results of each of these investigations are summarized below:

Investigation	Scope of Work	Results
Brecheisen 2010, *Phase II ESA, 1807-1815 N Kimball Ave*	Advancement of eight soil borings to depths of 6- to 24-feet Collection of soil samples Installation of three monitoring wells Collection of groundwater samples	Soil analytical results exceed applicable Illinois TACO SROs for SVOCs and Metals Groundwater analytical exceed applicable Class II Groundwater Remediation Objectives (GROs) for VOCs and metals
Weston, 2012, *CSIR, 1807-1815 N Kimball Ave*	Advancement of ten soil borings to a maximum depth of 20-feet Collection of soil samples including fraction organic carbon analyses Collection of groundwater samples, field parameters and hydraulic conductivity	Soil analytical results exceed applicable Illinois TACO SROs for volatile organic compounds (VOCs) and SVOCs Groundwater analytical exceed applicable Class II GROs for VOCs
Terracon, 2013, *Phase II Site Investigation Summary, 1809 N Kimball Ave*	Advancement of five soil borings to depths of 15 to 30 feet Collection of soil samples Collection of six soil gas samples Installation of four monitoring wells Collection of groundwater samples	Soil analytical results exceed applicable Illinois TACO SROs for VOCs and SVOCs Soil gas analytical results exceed Tier 1 Remedial Objectives (ROs) for Residential Indoor Inhalation for VOCs Groundwater analytical exceed applicable Class II GROs for VOCs
AECOM, 2018 *Additional Investigation, 1807-1815 N Kimball Ave*	Advancement of 22 soil borings to a maximum depth of 30 feet Collection of soil samples Collection of four soil gas samples Collection of four groundwater samples Collection of a Total Oxidant Demand sample	Results are preliminary at present, and in draft form. When finalized, they will better define the extent of TCE above the soil saturation limit, better delineate the extent of soil vapor impacts, and inform soil remediation design.

The investigations listed above found that concentrations of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and inorganics in soil at the site exceeded applicable Illinois TACO SROs, and that TCE concentrations in some soil on the eastern portion of the Site exceed the C_{sat} limit. Groundwater results from the site investigations exceeded the applicable Class II Groundwater Remediation Objectives (GROs). Soil gas samples at two locations exceeded Tier 1 Remediation Objectives (ROs) for Indoor Inhalation for residential properties for TCE, and at one location also for Vinyl Chloride.

A summary of the analytical results from prior Site investigations, including the Phase II ESAs, the CSIR sampling event, and the 2018 additional investigation are provided in **Appendix A.** A sample location and C_{sat} exceedance map is provided as **Figure 2-2.**

2.4 Project Goal

The TCE C_{sat} cleanup activities to be performed under this grant are critical steps in advancing the Site cleanup for reuse. The ultimate goal is to redevelop the Site as a public park that will be connected to the adjacent elevated Bloomingdale Trail, allowing it to serve as an access point to the trail and park network (The 606).

3.0 Cleanup Goals and Objectives

3.1 Cleanup Oversight Responsibility

The Site will be enrolled in the voluntary Illinois Site Remediation Program (SRP), which is overseen by the Illinois EPA. The steps in the regulatory process for the Site will be to update and submit the CSIR, prepare a Remediation Objectives Report (ROR) and Remedial Action Plan (RAP), implement remediation, and submit a Remedial Action Completion Report (RACR) to document the cleanup actions. The SRP will provide technical support and review of these reports, and will approve or deny reports based on fulfilment of the requirements of the SRP and the Illinois Tiered Approach to Remedial Action Objectives (TACO) regulations that govern environmental cleanups and risk assessment in the state. Successful remediation will result in receipt of a Comprehensive No Further Remediation (NFR) letter from the Illinois EPA in accordance with 35 IAC Part 740 (the SRP). The proposed cleanup under the Brownfield Cleanup Grant includes the reduction of TCE concentrations to below the C_{sat} limit, which is a critical step to fulfill the SRP requirements and receive an NFR letter.

The City of Chicago will contract with a professional environmental consultant to provide technical assistance, design, report preparation, and oversight services during the remediation process. The consultant will provide the services of professional scientists and engineers licensed in Illinois to prepare, review, and certify technical reports for submittal to the Illinois EPA.

3.2 Cleanup Standards for Major Contaminants

Sites enrolled in the Illinois SRP must evaluate and address exposure pathways for contaminants that exceed applicable cleanup standards in accordance with the rules and regulation found in 35 IAC Parts 740 and 742 (The SRP and TACO). The City anticipates that the TACO ROs for residential use and Class II groundwater will be used as the first-tier cleanup standards. The City also anticipates the development of site-specific, risk-based ROs for specific contaminants of concern in accordance with the SRP and TACO regulations.

3.3 Laws & Regulations Applicable to the Cleanup

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 local regulations. 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.

4.0 Alternatives Considered

4.1 Cleanup Alternatives Considered

The proposed Cleanup under the Brownfield Cleanup Grant will include implementation of a remedial technology to reduce TCE concentrations identified in the eastern portion of the site to below the C_{sat} limit.

Additional actions to fulfill the SRP requirements and receive an NFR letter may include the installation of an engineered barrier to eliminate soil ingestion and soil inhalation exposure pathways of soil with concentrations of VOCs, SVOCs and inorganics that exceed the applicable TACO Tier 1 SROs. As part of the NFR letter, institutional controls (ICs) will be implemented in the form of a deed restriction or environmental restrictive covenant to ensure the long-term effectiveness of the soil remedy by protecting the engineered barrier and ensuring health and safety of future construction workers. The ICs would require appropriate health and safety precautions (e.g. site-specific Health and Safety Plan (HASP) and a construction worker caution zone) prior to any future remediation / construction activities. These additional actions will be completed under separate funding prior to or concurrent with redevelopment.

Remediation of groundwater and soil vapor is not anticipated. No direct groundwater remedy other than remediation of source soils to below C_{sat} concentrations is anticipated. The exposure path of groundwater that exceeds TACO GROs will be addressed by the City of Chicago Municipal Code 11-8-390 which prohibits the installation of new potable water supply wells. Onsite indoor air vapor intrusion is not considered a risk based on the future use of the site as a greenspace park. Potential offsite impacts will continue to be evaluated and, if needed, will be addressed under separate funding.

A preliminary evaluation of remedial alternatives that were considered is provided in **Table 4-1**. Alternatives that were determined to have low effectiveness, low implementability or prohibitive costs were not evaluated further. The following alternatives warranted further consideration and have been evaluated in subsequent sections:

Alternative #1 – No Action

Alternative #2 – Excavation and Landfill Disposal of Soil exceeding TCE C_{sat} Limit

Alternative #3 – In Situ Chemical Oxidation Treatment (Soil Mixing) of Soil exceeding TCE C_{sat} Limit

4.2 Cleanup Alternative Evaluation

Cleanup technologies proposed to address the soil contamination to be remediated under the Brownfield Cleanup Grant were evaluated based on established criteria including the following: effectiveness (protection of human health and the environment, proven long- and short-term effectiveness of the remedy, regulatory compliance, reduction in toxicity/mobility/volume), implementability (probability of success, feasibility and schedule) and cost. Costs for the additional actions to fulfill the SRP requirements and receive an NFR letter were not included in this evaluation.

4.2.1 Effectiveness

Alternative #1: The Alternative #1 No Action is not considered effective. No Action would leave the Site in its current state and would not address the soil exceeding TCE C_{sat} Limit. This alternative would leave soil with TCE concentrations that exceed the C_{sat} limit (considered "source material") in place. The Site would not meet IEPA TACO regulations and would not be eligible to receive an NFR letter.

Alternative #2: The effectiveness of Alternative #2 Excavation of Soil exceeding TCE C_{sat} Limit is high. Soil Excavation would remove soil containing TCE concentrations that exceed the C_{sat} limit and transport material offsite for disposal at an appropriate facility. Soil samples collected from the base and walls of the excavation area would confirm soil exceeding the TCE C_{sat} Limit was fully removed.

Additional actions may be implemented to fulfill the SRP requirements including the installation of an engineered barrier (either a 3-foot geological barrier or 18-inch equivalent geotextile and soil barrier) across the full site. This is an effective way to eliminate the soil ingestion exposure route, with an enhanced (10' clean soil or clean fill plus vapor barrier) soil inhalation barrier where needed. The engineered barrier would effectively protect human health and the environment by preventing contact with contaminated soil as long as the barrier is maintained. An institutional control would need to be instituted to protect the engineered barrier and to ensure health and safety of future construction workers. An Operation and Maintenance Plan (O&M Plan) and regular maintenance would be recommended to monitor and protect the engineered barrier.

Alternative #3: The effectiveness of Alternative #3 – In Situ Chemical Oxidation Treatment (Soil Mixing) of Soil exceeding TCE C_{sat} Limit is high. ISCO has been proven to be effective at reducing TCE concentrations that exceed the C_{sat} limit to below the C_{sat} limit when reactants can reach contaminants. Soil mixing is the preferable reactant delivery method in low-permeability soils like those found at the Site. Soil samples will be collected from a variety of depths and locations within the treated mass to confirm the remaining levels of TCE in soil are below the C_{sat} limit. This delivery method allows some opportunity to add reagent and re-treat an area that fails confirmation sampling without requiring a later remobilization.

Additional actions may be implemented to fulfill the SRP requirements including the installation of an engineered barrier (either a 3-foot geological barrier or 18-inch equivalent geotextile and soil barrier) across the full site. This is an effective way to eliminate the soil ingestion exposure route, with an enhanced (10' clean soil or clean fill plus vapor barrier) soil inhalation barrier where needed. The engineered barrier would effectively protect human health and the environment by preventing contact with contaminated soil as long as the barrier is maintained. An institutional control would need to be instituted to protect the engineered barrier and to ensure health and safety of future construction workers. An O&M Plan and regular maintenance would be recommended to monitor and protect the engineered barrier.

4.2.2 Implementability

Alternative #1: Implementing Alternative #1 No Action is simple/effortless. No actions are required to be completed.

Alternative #2: The ease of implementing Alternative #2 Excavation of Soil exceeding TCE C_{sat} Limit is moderate. The zone of soil exceeding TCE C_{sat} Limit is 8 feet to 20 feet below grade. Implementation would include removal and onsite stockpiling of the top 8 feet of soil, potential dewatering, design and installation of an excavation support system, excavation and offsite disposal

of Soil exceeding the TCE C_{sat} Limit, and backfilling the excavation using unimpacted spoils from onsite and/or imported clean fill.

Installation of the engineered barrier would include the removal of surface soil across the site, offsite disposal or reuse of this material as backfill in the TCE C_{sat} excavation area, importing of clean soil and (if needed) geotextile/vapor barrier, and placement of imported material across the site. Regular maintenance in accordance with the O&M Plan would be recommended.

Community air monitoring and dust/odor suppression may be needed during cleanup activities. If dewatering is required, water will need to be treated and discharged either to the local POTW via a permit or disposed of at an offsite facility. Short-term disturbance to the community (e.g., trucks transporting contaminated soils and backfill) are anticipated.

Alternative #3: The ease of implementing Alternative #3 – In Situ Chemical Oxidation Treatment (Soil Mixing) of Soil exceeding TCE C_{sat} Limit is moderate. The zone of soil exceeding the TCE C_{sat} Limit is 8 feet to 20 feet below grade. Implementation would include removal and onsite stockpiling of the top 8 feet of soil, potential dewatering, design and installation of an excavation support system, treatment of soil exceeding the TCE C_{sat} Limit using ISCO applied by soil mixing. Limited, additional treatment can be applied during the initial mobilization to address areas that fail confirmation sampling.

Installation of the engineered barrier would include the removal and disposal of surface soil across the site, importing of clean soil and (if needed) geotextile/vapor barrier, and placement of imported material across the site. Regular maintenance in accordance with the O&M Plan would be recommended.

Community air monitoring and dust/odor suppression may be needed during cleanup activities. If dewatering is required, water will need to be treated and discharged either to the local POTW (assuming they accept the water) via an NPDES permit or disposed of at an offsite facility.

4.2.3 Cost

Alternative #1: The costs to implement No Action would be minimal.

Alternative #2: The estimated rough order of magnitude costs to implement Excavation of Soil exceeding TCE C_{sat} Limit would be approximately $1,157,000.

Alternative #3: The estimated rough order of magnitude costs to implement In Situ Chemical Oxidation Treatment (Soil Mixing) of Soil exceeding TCE C_{sat} Limit would be approximately $720,000.

5.0 Selected Alternative and Proposed Cleanup Plan

The recommended cleanup alternative is Alternative #3 – In Situ Chemical Oxidation Treatment (Soil Mixing) of Soil exceeding TCE C_{sat} Limit and Engineered Barrier. Alternative #1: No Action cannot be recommended since it does not address site risks to human health and the environment. Both Alternative #2 and Alternative #3 are effective remedial options that use confirmation sampling to verify the reduction of TCE in soil to below the C_{sat} Limit. Both Alternative #2 and Alternative #3 include similar implementation challenges and long-term maintenance, but are considered moderately simple to implement. Alternative #2 may cause slightly more short-term disturbance to the community (e.g., trucks transporting contaminated soils and backfill) than Alternative #3. The estimated remediation cost of Alternative #3 (approximately $720,000) is approximately 38% less than the estimated cost of Alternative #2 (approximately $1,157,000).