

DRAFT

Analysis of Brownfield Cleanup Alternatives

Former AAA Welding

1111-1125 N. 18th Street and 1726 Nicholas Street

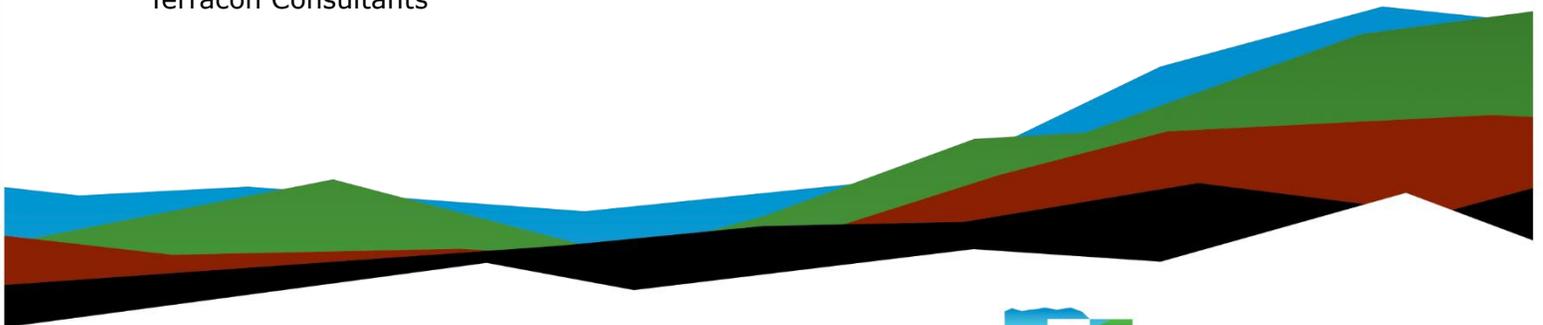
Omaha, Douglas County, Nebraska

Prepared for:

Siena Francis House

Prepared By:

Terracon Consultants



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- Facilities
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1.0 INTRODUCTION AND BACKGROUND

This Draft Analysis of Brownfield Cleanup Alternatives (ABCA) is in support of an application for United States Environmental Protection Agency (EPA) Brownfield Cleanup Grant funding to address hazardous substances at the Former AAA Welding site located in Omaha, Nebraska. The site fronts on two streets and has multiple addresses: 1111-1125 N. 18th Street and 1726 Nicholas Street. The site is currently vacant, and Siena Francis House intends to redevelop with residential buildings and a parking lot to support the existing emergency overnight homeless shelter, residential addiction recovery program, and medical respite services. Siena Francis House is a 501(c)(3) non-profit charitable organization for individuals experiencing homelessness to navigate their path to housing.

The EPA Brownfield Cleanup Grant application must include, as an attachment, an ABCA, which briefly summarizes information about the site and contamination issues, cleanup standards, applicable laws, cleanup alternatives considered, and the proposed cleanup. The ABCA should also include information on the effectiveness, the ability of the grantee to implement each alternative, the cost of each proposed cleanup alternative, an evaluation of how commonly accepted extreme weather event conditions might impact proposed cleanup alternatives, and an analysis of the reasonableness of the various cleanup alternatives considered, including the one chosen. The ABCA submitted as part of the proposal is intended as a brief preliminary document summarizing the larger and more detailed technical and financial evaluations performed in addressing each of these areas. The ABCA may be modified technically and financially or in more depth relative to each of these areas upon award of funding and in response to community interaction.

Cleanup alternatives were evaluated in accordance with EPA Region 7 protocols and general guidance required prior to implementation of a cleanup design using EPA Brownfields Grant funding. More specifically, this ABCA summarizes viable cleanup alternatives based on site-specific conditions, technical feasibility, resiliency to extreme weather event conditions, and preliminary cost/benefit analyses. EPA guidance requires a minimum of two different alternatives plus a “No Action” option be considered in this document. Specific cleanup alternatives and associated recommendations are presented in the applicable sections of this report.

1.1 Background

The rectangular-shaped, 0.89-acre site is adjoined by commercial buildings and is located along the southwestern corner of the existing Siena Francis House target area. This area of Omaha is in the midst of a multi-decade revitalization effort. An historic city dating back to when the first settlers arrived in the 1840s, the North Omaha neighborhood has great potential for mixed use redevelopment, including commercial, industrial, and expanding upon the current services offered to the homeless population of the City. The site is also located near the Creighton University campus. In addition to cleaning up a significantly contaminated site abutting residences, the Siena Francis House office building, and

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commercial properties, the additional residences and off-street parking that will be created is a much-needed part of the revitalization effort.

Portions of the Former AAA Welding site (1726 Nicholas Street and 1111 N. 18th Street) have been used for dwellings and stores including a bakery, drug store, tin shop, and tire service from approximately 1891 into the 1960s. Additionally, the properties at 1115, 1121, and 1125 N. 18th Street were developed as an auto repair shop from 1925 to 1941, a welding and radiator company from 1946 to 1961, and a welding company from 1962 to 2003. From 2003 to 2014, the site was occupied by the former welding company buildings and storage yard. By 2016, the site was vacant land and a storage yard. The business ceased operations in the early 2010s and the buildings, which were in a state of disrepair and neglect, were demolished between 2013 and 2016 due to safety concerns.

Significant research, assessment, and evaluation of site conditions then occurred utilizing a combination of State of Nebraska brownfield funding (Municipal Brownfields Redevelopment Grant Program, Voluntary Cleanup Program) and targeted brownfield assessments completed by the Nebraska Environmental Protection Agency (NEPA) and EPA Region 7. In addition to the welding operations, the assessments also evaluated potential contamination due to former oil tanks and nearby auto repair businesses. On-site lead concentrations were as high as 5,280 mg/kg in soil (DWEE VCP RGs remediation objective is 200 mg/kg). Other breakdown (“daughter”) chemicals, Benzo(a)anthracene, Benzo(a)pyrene, (TCE), are also present at levels exceeding the remediation objectives by orders of magnitude.

Previous investigations from 2014 to 2025 were completed with oversight by DWEE’s Voluntary Cleanup Program (VCP). The vertical and lateral extents of contamination were identified at that time and site-specific remediation objectives developed. The area of the site requiring physical remediation measures approximately 9,000 square feet to a depth of approximately 10 feet below ground surface (bgs). This area is located near the southern site boundary with a Siena Francis House building adjoining the site to the east. Soil at depth in this area exceeds the DWEE VCP RGs for the direct contact exposure pathway for soil at residential sites calculated during previous VCP investigations and approved by the DWEE.

A remedial action plan prepared in 2022 proposed excavation and disposal of contaminated soil and soil gas analysis to be conducted concurrent to soil excavation activities. In 2025, in anticipation of this application, Siena Francis House requested an investigation from the Nebraska DWEE’s targeted brownfield assessment team to confirm conditions had not changed significantly. In 2025, the DWEE, through additional investigation activities, concurred conditions had not changed significantly to alter the remedial approach.

1.2 Site Assessment Findings

Prior to 2014, the site was owned by Jackie D Krivanek, Ray Krivanek, and Marco Investments Ltd. Partnership. The City of Omaha acquired the site in 2014 and 2015. Prior

to its acquisition and to maintain bona fide prospective purchaser status, the City contracted with Thiele Geotech, Inc. and Tetra Tech to complete a Phase I Environmental Site Assessment (ESA) and a Phase II ESA of the site. Thiele's Phase I ESA report dated January 26, 2009, described the previous assessment work at the site as follows.

Thiele Geotech completed documentation of site conditions prior to demolition of the structures on site in 2008. During documentation of site conditions, Thiele identified the property was utilized for a variety of commercial and residential purposes. Several businesses formerly present at the assessment site were determined to be potential environmental threats to the assessment site due to types of activities associated with auto salvage, maintenance, fueling operations and manufacturing activities. Thiele Geotech completed a Phase I ESA dated January 26, 2008. The report identified RECs on-site (auto salvage, auto maintenance, Omaha Lead Superfund region, and disinfectant factory) and the adjoining/adjacent properties (historical autos, filling stations, chemical warehouse, petroleum underground storage tanks), which warranted additional site investigation.

In 2014, a subsurface site investigation indicated the presence of soil and groundwater contamination associated with historical auto salvage operations. Four soil borings were advanced (SB-1 through SB-4) and two temporary, groundwater monitoring wells (GW-1 and GW-2) were advanced for measurement of site-specific geologic and hydrogeologic parameters, and the collection of groundwater samples for chemical analyses. Additionally, three soil-gas samples were collected on the west side of the property and analyzed for volatile organic compounds (VOCs). Groundwater flow was identified to be towards the east-southeast and at a depth of 13 to 18 feet below ground surface. Semivolatile organic compounds (SVOCs) were detected at levels exceeding the DWEE Voluntary Cleanup Program (VCP) remediation goals (RG). Soil concentrations of benzo(a)anthracene, benzo(b)fluoranthene, and benzo(a)pyrene were above the DWEE VCP remediation goals. No VOCs or SVOCs were detected in the temporary groundwater well samples. No VOCs were detected in the three soil-gas samples at a level exceeding DWEE VCP Soil-gas Remediation Goal (SGRG) for soil gas in sandy residential soils.

Based on findings from the subsurface site investigation, a supplement investigation was performed by Tetra Tech in December 2014. Four surface soil borings were advanced (SB-4-1 through SB-4-4) for measurement of site-specific geologic parameters, and the collection of soil samples for chemical analyses. The purpose of the supplemental site investigation was to assess the vertical extent of impacted surface soil from zero to six inches deep around SB-4. The supplemental investigation activities identified the lateral extent of impact to the north, south, east, and west.

The results from the 2014 investigations indicated SVOCs detected in three soil samples: SB-4-1, SB-4-2, and SB-4-4. Benzo(b)fluoranthene was detected at levels

exceeding DWEE VCP RG for residential soil for samples collected at SB-4-2 and SB-4-4, although laboratory reporting limits for benzo(a)anthracene, benzo(b)fluoranthene, and benzo(a)pyrene exceeded the respective DWEE VCP RGs for residential soil. No analyte concentration exceeded DWEE VCP RG for industrial soil.

In 2016, a subsurface site investigation indicated the presence of soil and groundwater contamination associated with historical auto salvage operations. Three soil borings were advanced (EB-1 through EB-3) and one temporary, groundwater monitoring well was converted from soil boring EB-3. The borings were advanced for measurement of site-specific geologic and hydrogeologic parameters, and the collection of groundwater samples for chemical analyses. Groundwater depth was observed to be 19.9 feet below ground surface. Soil and groundwater samples from select locations were submitted to the laboratory for analysis of select contaminants of concern (COCs). These COCs included VOCs by EPA Method 8260, total petroleum hydrocarbons by Iowa Method OA-2, and 8 RCRA metals by EPA Methods 6010/7010/7471/7196. Ground water samples were analyzed for VOCs by EPA Method 8260, total petroleum hydrocarbons by Iowa Method OA-2.

The results from the 2016 investigations indicated arsenic was above the residential direct contact RG at sample locations EB-1 through EB-3. With regard to arsenic, Omaha has a higher background level of naturally occurring arsenic in soils. Therefore, the EPA has established 70 ppm as the action level for arsenic in soils within the Omaha Lead Superfund Site. Although the subject property does not lie within the Superfund Site, the action level is considered as a regulatory comparison for sites within the immediate area of the Superfund Site.

Lead was above residential and industrial remediation goals within soil sample EB-2, 1-2 ft. bgs. Because toxicity characteristic leaching procedure (TCLP) analysis was requested for sample EB-2. EB-2 contained significantly elevated arsenic and lead concentrations. Results of analysis indicated leachable metals concentrations were below TCLP limits and the material is not considered a "characteristic hazardous waste".

In 2020, a subsurface site investigation indicated the presence of soil and groundwater contamination associated with historical auto salvage operations. 17 soil borings were advanced (DEB-1 through DEB-17) and installation of temporary, groundwater monitoring well was converted from soil boring DEB-5 and DEB-11. The borings were advanced for measurement of site-specific geologic and hydrogeologic parameters, and the collection of groundwater samples for chemical analyses. Groundwater depth was observed to be 9.5-11.5 feet below ground surface. Soil and groundwater samples from select locations were submitted to the laboratory for analysis of select contaminants of concern (COCs). These COCs included VOCs by EPA Method 8260, SVOCs by EPA 8270 (including PAHs by EPA

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Method 8270 SIM), total petroleum hydrocarbon release constituents by Iowa Method OA-2, and RCRA metals by EPA Methods 6010/7010/7471. Ground water samples were analyzed for VOCs by EPA Method 8260 and common petroleum hydrocarbons by Iowa Method OA-2.

The results from the 2020 investigations indicated arsenic exceeded the VCP residential RG at sample locations DEB-6 (5-10'), DEB-7 (2-5', 5-10'), DEB-8 (1-2', 2-5', 5-10'), DEB-9 (1-2', 2-5'), DEB-10(1-2', 2-5', 5-10'), DEB-12 (0-1'), DEB-13 (0-1'), DEB-14 (1-2'), DEB-15 (0-1'), and DEB-16 (1-2'). Lead exceeded VCP residential RGs for DEB-10 (1-2', 2-5', 5-10') and DEB-16 (1-2'). Analytical results also indicated exceedances of VCP Residential RGs for Benzo(a)anthracene (DEB-6 [1-2']), Benzo(a)pyrene (DEB-3 [0-6'], DEB-4 [0-6'], DEB-6 [1-2'], DEB-12 [6-7'], and DEB-16 [0-1']), Benzo(b)fluoranthene (DEB-6 [1-2']), Dibenz(a,h)anthracene (DEB-6 [1-2']), Indeno(1,2,3-cd)pyrene (DEB-6 [1-2']). No concentrations of petroleum hydrocarbons or VOCs were found above laboratory detection limits within groundwater samples.

As part of the 2020 Phase II Environmental Site Assessment, Thiele Geotech recommended additional investigation be conducted to further delineate areas with metals and PAH constituent concentrations exceeding residential remediation goals. TCLP analysis may also be warranted for soils with significantly elevated concentrations of lead in order to determine if the soils are a characteristic hazardous waste for potential future remedial activities.

Thiele Geotech assisted the City of Omaha with the preparation of Remedial Action Plan (RAP). The RAP, dated December 3, 2021, proposed additional investigation of site conditions for the purpose of developing remediation objectives and determining the necessary actions required to obtain a Comprehensive NFR letter for the site. The RAP was approved by DWEE in January 2022, but to date, the fieldwork has not taken place.

The 2021 Remedial Action Plan proposed to excavate and dispose of contaminated soil. Soil will be removed from the site to a depth based on previously identified COCs found during environmental site assessments. At least 2-10 feet of vertical overexcavation and at least 1 foot of horizontal overexcavation will be completed. Following excavation activities, confirmation samples will be collected to ensure the complete removal of impacted soils. As a precautionary measure, additional soil gas analysis will be conducted concurrent with soil excavation activities to confirm that the 1,3-butadiene concentration has not increased over time.

Tetra Tech conducted another Phase I ESA in XXX 2025 in anticipation of a 99-year lease by Siena Francis House. The report identified the documented impact to on-site soil related to historic on-site auto maintenance, Omaha Lead Superfund region, and salvage yard as RECs.

2.0 PROJECT GOALS AND RE-USE PLAN

The northern core area of Omaha is in the midst of a multi-decade revitalization effort. An historic city dating back to when the first settlers arrived in the 1840s, the North Omaha neighborhood has great potential for mixed use redevelopment, including commercial, industrial, and expanding upon the current services offered to the homeless population of the City. The site is also located near the Creighton University campus. In addition to cleaning up a significantly contaminated site abutting residences, the Siena Francis House office building, and commercial properties, the additional residences and off-street parking that will be created is a much-needed part of the revitalization effort.

3.0 APPLICABLE REGULATIONS AND CLEANUP STANDARDS

3.1 Cleanup Responsibility

First promulgated in 1994, Nebraska Legislative Bill 1349 Chapter 81: Remedial Action Plan Monitoring Act, or RAPMA, establishes a framework for evaluating contaminated sites and determining the appropriate remediation goals (RGs) for protection of human health. The RAMPA regulation is a flexible, risk-based framework that allows property owners, consultants, and other parties to determine safe levels of contaminants at a site. The RAMPA regulation is used in Nebraska for both enforcement (e.g., the Leaking Underground Storage Tank, or LUST, Program) and voluntary (e.g., the Voluntary Cleanup Program, or VCP) programs.

Also adopted in 1995, Nebraska Legislative Bill 1349 Chapter 81: RAMPA established the VCP. The VCP facilitates the redevelopment of properties with environmental issues by providing applicants the ability to receive No Further Remediation (NFR) letters after the successful remediation of environmental contamination at a site.

The NFR letter must be filed with the Office of the Recorder or Registrar of Titles of the county in which the remediation site is located so that it forms a permanent part of the chain of title and thereby notifies future owners of the terms of the NFR letter. In some cases, the NFR letter may contain conditions that are necessary to ensure protection of human health and the environment (e.g. use of institutional controls or engineered barriers).

The EPA and the DWEE have entered into a Superfund Memorandum of Agreement through which the EPA concurs that further response actions will not be required by the EPA at sites that have received an NFR letter. In addition, the EPA will not plan or anticipate federal action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at an enrolled site, except in emergency situations.

The Remedial Action Plan Monitoring Act (RAPMA), initially created in 1995, established the Nebraska Voluntary Cleanup Program (VCP). The VCP provides property owners and parties responsible for contamination with a mechanism for developing voluntary environmental cleanup plans that are reviewed and approved by the Department.

The Facility Expansion at the Former AAA Welding site is enrolled in the VCP in pursuit of a Comprehensive NFR letter. The DWEE will provide regulatory oversight of the cleanup through the VCP.

3.2 Cleanup Standards

Any work to remediate a contaminated site can be called a corrective action. Remediation objectives are the goals of corrective action. The final goal of any cleanup action is to protect human health and the environment. Before VCP can be used, site owners must investigate the site to find out 1) what chemicals caused the contamination, and 2) where the contamination is located. After identifying the extent and concentrations of the chemicals through soil and groundwater sampling, site owners use this information to develop remediation objectives using RAMPA.

Baseline remediation objectives, also called VCP RGs, take into account the intended land use of the property, but do not consider other conditions specific to the site. Because of this, VCP RGs are calculated using the most conservative assumptions about the way the contamination might travel through the soil and groundwater and the amount of chemicals people might be exposed to.

Site owners can establish their own remediation objectives by conducting risk assessments. To accurately assess the health risk posed by the contamination, site owners must collect data and information on soil and groundwater conditions at the site and evaluate how long and how often people might be exposed to the chemicals. These site-specific remediation objectives, called Tier 2 and Tier 3, are usually less stringent than baseline remediation objectives but are just as protective of human health.

In deciding which remediation objectives to use, site owners consider the amount and extent of contamination, the future use of property, the cost of obtaining the information needed to develop Tier 2 and 3 objectives, and the cost of cleaning up to Tier 1 objectives. Once remediation objectives are established, the site owner may do one or a combination of the following.

- Reduce contaminant concentrations to meet the remediation objectives through removal or treatment of the chemicals
- Restrict exposure to contaminated soil or groundwater or both by using engineered barriers or institutional controls

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- Take no action, if contaminant concentrations present at the site do not exceed DWEE VCP remediation goals

Once a site owner satisfies the VCP and cleanup program requirements, the owner receives an NFR letter. The use of any institutional controls or engineered barriers at a site requires restrictions to be placed in the NFR letter. Common restrictions limit the land to industrial/commercial use or require the proper maintenance of an engineered barrier (e.g., asphalt pavement, concrete pavement, clean soil) to limit exposure to contamination. NFR letters are recorded with the County Recorder of Deeds so that future purchasers of the property will be aware of the terms and conditions of the NFR letter. If these conditions are violated, the NFR letter can be revoked.

The former AAA Welding site was evaluated using DWEE VCP RGs. The approved remedial action relies on excavating and disposing contaminated soil. Soil will be removed from the site to a depth based on previously identified contaminants of concern with at least 2-10 feet of vertical overexcavation and at least 1 foot of horizontal overexcavation to be completed. The remedial action also includes an additional soil gas analysis to be conducted concurrently with soil excavation activities to confirm that 1,3-butadiene concentration has not increased over time. Finally, soil concentrations of lead at depth (about 2-10 feet bgs) over a portion of the site exceed the DWEE VCP RGs of 200 milligrams per kilogram (mg/kg). Once concentrations in this area are achieved via remediation and the other controls/barriers are in place, Siena Francis House will be able to request its NFR letter from the DWEE.

3.3 Laws and Regulations Applicable to the Cleanup

Laws and regulations that are applicable to this cleanup may include the following.

- Federal Small Business Liability Relief and Brownfields Revitalization Act
- Federal Davis-Bacon Act
- Federal Underground Injection Control regulations
- Occupational Safety and Health Act
- Resource Conservation and Recovery Act
- RAMPA, Nebraska Legislative Bill 1349, Chapter 81
- VCP, Remedial Action Plan Monitoring Act (Section 1, Attachment 1-5 RAPMA Statute)
- CERCLA, 42 U.S.C. §§ 9601, et. seq.

All appropriate permits and notifications (e.g., underground injection control, soil disposal acceptance notification, soil transport/disposal manifests, etc.) will be obtained prior to the work commencing.

3.4 Extreme Weather Events Considerations

Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance, establishes an integrated strategy for sustainability within the Federal Government. Under the Executive Order, each agency is required to evaluate their Extreme Weather Events risks and vulnerabilities to manage the effects of Extreme Weather Events on the agency's mission and operations in both the short and long-term as part of the formal Strategic Sustainability Performance Planning process.

Effective with Fiscal Year 2026, EPA's Brownfields Program initiated a change to cooperative agreements for Cleanup and Revolving Loan Fund awards. It requires cooperative agreement recipients to evaluate the resilience of remedial options funded by the award in light of reasonably foreseeable changing climate conditions. As directed under EPA's Extreme Weather Events Adaptation Plan, the ABCA must include a discussion of observed and forecasted Extreme Weather Events conditions for the area of the project and the associated site-specific risk factors. Specifically, this is to be presented as part of the ABCA. As the possibility exists that Cleanup grant funds or Revolving Loan Fund grant funds may be utilized for cleanup actions at the site, Extreme Weather Events has been considered in this ABCA.

3.4.1 General Considerations

In considering remedy resiliency Terracon consulted the following resources as authoritative sources.

- Climate Resources on Data.gov
- U.S. Global Change Research Program (USGCRP)
- U.S. Climate Resilience Toolkit
- EPA Extreme Weather Events on EPA.gov
- USDA Climate Hub

3.4.2 Site-Specific Considerations

The site and Nebraska are in EPA's climate designation of Midwest. In this region, rising temperatures and extreme precipitation are the primary Extreme Weather Events conditions. These changing conditions have significant effects on the Midwest's most widespread economic contribution: agriculture. According to the USDA, this region of the country is one of the most intense areas of agricultural production in the world. However, the site is located in the heart of historical Omaha in an historically urbanized area and is

planned for redevelopment as residences and a parking lot serving the existing Siena Francis House homeless shelter. In such an urban environment, Extreme Weather Events concerns are related to human health, primarily due to dangerous temperature extremes, flash flooding, and air quality issues related to higher humidity, ground-level ozone, and pollen pollution.

These considerations do not identify property-specific risks in considering resiliency of remedy at this property as part of feasibility and implementability.

4.0 EVALUATION OF CLEANUP ALTERNATIVES

VOC-contaminated soil is considered a hazardous substance relative to cleanup grant funding. EPA proposal guidance requires the ABCA, at a minimum, to consider two different cleanup remedies and a “no action” alternative. The contaminated soil exceeds the DWEE VCP RGs concentration for arsenic, lead, and polycyclic aromatic hydrocarbon and is located at a depth of approximately 2 to 10 feet below ground surface (bgs) adjacent to the existing Siena Francis House campus.

A common and typical approach to remediating contaminated soil is to remove and properly dispose of the impacted material. Another option would be to mix a binding agent or amendment into lead-impacted soil to stabilize lead and reduce leaching potential from soil, remove, and properly dispose of the impacted material at a local landfill. When the oxidant contacts the contamination, a chemical reaction occurs, releasing heat and converting the contaminant to non-toxic compounds. The planned reuse of the site for a homeless shelter facility expansion, i.e. Residences and a parking lot, will provide an engineered barrier to cover remaining areas with contaminant concentrations reduced to below the DWEE VCP RGs. As required by EPA, the third alternative to be considered is “no action.” While all three alternatives include use of the existing City’s groundwater ordinance and could require installation of a building control technology to exclude vapors from the facility expansion if future investigations deem necessary, only the first two alternatives include construction of an engineered barrier (paved parking lot) over the marginally-contaminated soils (i.e., areas below VCP RGs) at the site.

To address hazardous substances at the site, three different alternatives were considered (minimum two different alternatives plus a “No Action” option). These alternatives are outlined in the sections that follow. Each subsection presents one of the following alternatives in greater detail, including estimated costs and potential contingency items.

Table 1: Summary of Cleanup Alternatives

Cleanup Alternative	Description
A	Excavation, Treatment, and Off-Site, Local Disposal of Impacted Soils (2-10 feet) Exceeding DWEE RG Value
B	Excavation and Off-Site Disposal of Impacted Soils (2-10 feet) Exceeding DWEE RG Value
C	No Action

4.1 Alternative A: Excavation, Treatment, and Off-Site Local Disposal of Impacted Soils (2-10 feet) Exceeding DWEE VCP RGs

Alternative A includes excavation, remediation, and removal of impacted soil (with contaminant concentrations above DWEE VCP RGs) from 2 to 10 feet bgs. The soils for excavation were estimated to be 9,000 square feet in extent. Soil confirmation samples will be collected from the sidewalls and bottom of the excavation area to ensure impacted soils have been removed.

Impacted soil from the 2 to 10-foot interval would be mixed with a binding agent or amendment into lead-impacted soil to stabilize lead and reduce leaching potential from the soil to pass Toxicity Characteristic Leaching Procedure – Lead test so the soil can be disposed locally as non-hazardous. Impacted soil will require permitting for off-site disposal. For this ABCA, the soil is assumed to be special waste (i.e., above hazardous waste criteria) given the high levels of lead in soil at DEB-10 and the unknown TCLP – Lead value in the soil on-site. If the soil cannot be treated and disposed as non-special waste and will require disposal as a characteristically hazardous waste, hauling and disposal costs will increase substantially.

As groundwater is typically encountered at depths of 9.5 to 19.5 feet bgs, groundwater could potentially be encountered during excavation. The open excavation will be dewatered for on-site disposal of impacted water. Due to the proximity of the Siena Francis House homeless shelter and to ensure worker safety, the excavation will require shoring or other means of stabilization to prevent its collapse.

The excavation will be backfilled with imported clean fill to two feet below ground surface and then filled in from two feet to grade with native soil. The area will be partially paved which will act as an engineered barrier and as planned by Siena Francis House for redevelopment. The RAP approved by the DWEE would need to be revised and approved by the DWEE before implementation of this alternative.

4.1.1 Effectiveness – Including Extreme Weather Events Considerations

Impacted soils are permanently removed. This approach is technically effective as a definitive and direct physical elimination of contaminants that produce unacceptable public

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risk. Furthermore, risk of inhalation of volatile emissions is reduced. Maintenance of a remediation system will not be required.

The site-specific Extreme Weather Events conditions identified include increased weather activity, which could impact excavation activities (stormwater contact with contaminated soils) and increase the volume of impacted water for removal and off-site disposal. Increased precipitation could also increase the likelihood of an excavation collapse, requiring more significant shoring/stabilization than would otherwise be required. Increased temperatures pose a risk to the workers conducting remediation if heat-illness safety precautions are not taken into account.

This remedy also requires extensive on-site activities by two excavators, several dump trucks, landfill spreaders/equipment, and vacuum trucks. Multiple trips to and from a local landfill and source for clean soil are required. The fossil fuel consumption and air pollution created by these activities exacerbate existing Extreme Weather Events issues and could pose acute health hazards for the local community associated with air pollution. This remedy also consumes finite landfill space.

For any development in the City, ordinance requires the City Engineer approve a stormwater management plan that evaluates the development's impact on sewer capacity and treatment demand. Design of the facility expansion would require elements to attenuate the acceleration of stormwater runoff.

4.1.2 Implementability

Excavation with off-site disposal is a mature remedy common in the remediation industry. The approach requires construction equipment readily available in the local construction and engineering markets. The materials for backfill and cover are readily available in the local area. A labor force readily exists in the area to accomplish the remedy. The implementation period is shorter-term, on the order to 1-3 months.

However, the following site-specific considerations at the former AAA Welding site complicate this remedy.

"Clean" Soil Removal (Surface to 2 feet bgs)

Soil above a depth of about 2 feet meets site-specific DWEE VCP RG remediation objectives. This "clean" soil does not require off-site disposal and can be replaced to its original location and depth after removing soil at depth that exceeds the DWEE VCP RGs. Removal would be accomplished with conventional excavation machinery. Terracon anticipates the "clean" soils would be temporarily stockpiled on-site and returned during the backfilling phase. The temporary off-site staging could require establishment of a Soil Management Zone.

Contaminated Soil Removal and Disposal (2 to 10 feet bgs)

Contaminated soil will be removed by placing an excavator down the access ramp into the excavation to be able to reach the 10-foot depth. This excavator will remove the soil and place it in the front bucket of a tracked loader, which will remove the soil up the ramp and

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stockpiled on the site. A binding agent or amendment would be mixed into the lead-impacted soil to stabilize the lead and reduce leaching potential from the soil to pass the TCLP test. Stockpiled soil would be in 300 to 500 cubic yard piles depending upon TCLP results with retreatment required for piles if TCLP fails. After soil is stabilized and meets the TCLP limit for classification, the soil would be loaded onto haul trucks which will carry the profiled and manifested load to the designated disposal facility (RCRA Subtitle D). This alternative could generate airborne contaminant emissions during the excavation work. Plans would be required to protect workers and the surrounding public.

Backfill

Due to the groundwater levels, Terracon anticipates filling the contaminated zone (2 to 10 feet bgs) with native soil from a local borrow pit. Above that level, the excavation will be backfilled with previously removed soils to an 80% compaction rate. The near-surface soils may need to be compacted to a higher rate (in accordance with recommendations from a geotechnical study) to accommodate the planned Siena Francis House facility expansion.

Groundwater Control and Disposal

Prior to excavation, a groundwater pump would be installed in one corner of the planned excavation with screening from about 8 to 10 feet bgs to dewater the excavation. The amount of water needed for removal is difficult to estimate without the results of pump tests, but Terracon assumed discharging the water to the City storm sewer. Terracon also estimated 120 hours of a vacuum pump truck on standby for water removal not accomplished with the pump. The potential for increased precipitation and water availability due to Extreme Weather Events makes this portion of the remedy especially sensitive to climate and weather variability.

4.1.3 Cost

Based upon Terracon's experience with similar projects, the estimated cost for revision of the existing RAP, excavation, remediation, and off-site disposal of contaminated soil, confirmation sampling, required reporting, and professional environmental consulting services at \$650,000. Should soil require Subtitle C hazardous disposal, costs would increase.

4.2 Alternative B: Excavation and Off-Site Local Disposal of Impacted Soils (2-10 feet) Exceeding DWEE VCP RGs

Alternative B includes excavation and removal of impacted soil (with contaminant concentrations above DWEE VCP RGs) from 2 to 10-foot bgs. The soils for excavation were estimated to be 9,000 square feet in extent. Soil confirmation samples will be collected from the sidewalls and bottom of the excavation area to ensure impacted soils have been removed.

Impacted soil from the 2 to 10-foot interval will require permitting for off-site disposal. For this ABCA, the soil is assumed to be special waste (i.e., above hazardous waste criteria)

given the 5,280 mg/kg of lead and unknown Toxicity Characteristic in soil. Since the soil cannot be permitted as non-special waste and will require disposal as a characteristically hazardous waste, hauling and disposal costs will increase substantially.

As with Alternative A, the area will be partially paved which will act as an engineered barrier and as planned by the Siena Francis House for redevelopment. Pavement is not required for site closure and will be paid for using non-grant funds.

4.2.1 Effectiveness – Including Extreme Weather Events Considerations

This approach is technically effective, and by virtue of its approval of the RAP, has been approved by the DWEE for this site. This alternative has the benefit of removing contaminated soils with concentrations above the site-specific DWEE VCP RGs.

As with Alternative A, increased temperatures pose a risk to the workers conducting remediation if heat-illness safety precautions are not taken into account.

Unlike Alternative A, while this remedy requires an increase of the number of vehicles and miles driven is significantly more. Therefore, the fossil fuel consumption and air pollution created by activities under this alternative are significantly greater than Alternative A. This remedy consumes finite landfill space.

Similar to Alternative A, this remedy requires a facility expansion design that includes elements to attenuate the acceleration of stormwater runoff.

4.2.2 Implementability

Similar to Alternative A, excavation with off-site disposal is a mature remedy common in the remediation industry. The approach requires construction equipment readily available in the local construction and engineering markets. The materials for backfill and cover are readily available in the local area. A labor force readily exists in the area to accomplish the remedy. The implementation period is shorter-term, on the order to 1-3 months.

However, the following site-specific considerations at the former AAA Welding site complicate this remedy.

“Clean” Soil Removal (Surface to 2 feet bgs)

Soil above a depth of about 2 feet meets site-specific DWEE VCP RG remediation objectives. This “clean” soil does not require off-site disposal and can be replaced to its original location and depth after removing soil at depth that exceeds the DWEE VCP RGs. Removal would be accomplished with conventional excavation machinery and include the excavation of an access ramp extending due east into the alley. This ramp would allow for safe entry of excavation equipment during the contaminated soil excavation.

Contaminated Soil Removal and Disposal (2 to 10 feet bgs)

Contaminated soil will be removed by conventional excavation. This excavator will remove the soil and place it into haul trucks which will carry the profiled and manifested load to the

designated disposal facility (RCRA Subtitle C). This alternative could generate airborne contaminant emissions during the excavation work. Plans would be required to protect workers and the surrounding public.

4.2.3 Cost

Based upon Terracon's experience with similar projects, the estimated cost for revision of the existing RAP, excavation, remediation, and off-site disposal of contaminated soil at a Subtitle C hazardous landfill of contaminated soil, confirmation sampling, required reporting, and professional environmental consulting services at \$1,250,000.

4.3 Alternative C: No Action

The "no action" scenario is required by the EPA ABCA process. No action would be taken to cleanup contaminated soils and the contamination in these areas would be allowed to naturally degrade over time. Contaminants would have the potential to migrate downgradient and off-site with the groundwater. The volatile contaminants would also disperse into the soil gas of the site, and potentially off site, including the homeless shelter.

4.3.1 Effectiveness

This alternative is deemed ineffective for brownfield redevelopment. Natural degradation of the contaminants would take decades. Socially, it does not allay stigma for future investments or disadvantaged community members. This alternative does not address potential current and future risks to human health and the environment. During site redevelopment, workers would face an increased risk of exposure to site contaminants.

4.3.2 Implementability

By its definition, taking no action precludes a discussion of implementation.

4.3.3 Cost

By its definition, taking no action precludes a discussion of cost to implement. This cleanup alternative would not include any specific efforts to remove or maintain contaminated soils in place. There would be no direct cleanup costs associated with this alternative. Further, this alternative may later result in redevelopment complications, delays and increased redevelopment costs due to contaminated soils and groundwater remaining onsite. There would be no additional direct costs associated with alternative. Indirect costs could include the continuing inability to utilize the property for public benefit as is currently planned.

4.4 Cost Comparison Alternatives

The table below presents a brief comparison of factors previously discussed for alternatives under consideration.

Table 2: Summary Comparison of Alternatives

Alternative	Effectiveness	Implementability	Estimated Cost
A – Excavation, Treatment, and Off-Site, Local Disposal of Impacted Soils (2-10 feet) Exceeding DWEE VCP RGs	This approach is technically effective as a definitive and direct physical elimination of the contaminants that produce unacceptable risk.	This alternative is technically achievable, and the resources to implement this alternative are readily available. Time to implement is relatively short (on the order of 1-3 months). The presence of nearby structures and potential for excessive dewatering due to Extreme Weather Events make the excavation more difficult and costly than traditional projects.	\$650,000
B – Excavation and Off-Site Disposal of Impacted Soils (2-10 feet) Exceeding DWEE VCP RGs	This approach is technically effective as a definitive and direct physical elimination of the contaminants that produce unacceptable risk.	This alternative is technically achievable, and the resources to implement this alternative are readily available. Time to implement is relatively short (on the order of 1-3 months). This alternative assumes the soil is hazardous waste for TCLP lead and will need disposed at a facility that accepts hazardous waste.	\$1,250,000
C – No Action	Does not address risks or regulatory requirements.	Not applicable	Negligible direct cost

5.0 RECOMMENDED CLEANUP ALTERNATIVE

The recommended cleanup approach is Alternative A: Excavation, Treatment, and Off-Site, Local Disposal of Impacted Soils (2-10 feet) Exceeding DWEE VCP RGs. This alternative would address human health risks using a proven approach consistent with recognized industry standards and has been approved for this site by the DWEE. This option remains comparably cost-effective under most remediation scenarios and site conditions and is more sustainable/resilient when considering Extreme Weather Events. Limitations to future land use remain, however, these limitations are consistent with the proposed site use. This alternative addresses liabilities, potential contaminant sources or potential limitations to future land use and brownfields redevelopment potential consistent with the Siena Francis House’s goals and re-use planning.