Analysis of Brownfields Cleanup Alternatives – Preliminary Evaluation
The Former Virden Lighting Co. Redevelopment Project
2162, 2175-2187 Ashland Road and 0 Longfellow Ave, Cleveland, Ohio
January 11, 2026

Prepared for Cuyahoga County Land Reutilization Corporation

*** Note that this draft Analysis of Brownfields Cleanup Alternatives (ABCA), submitted as part of the USEPA grant application, is intended as a preliminary document only.*

I. Introduction & Background

This Analysis of Brownfields Cleanup Alternatives (ABCA) was conducted to evaluate remedial alternatives, including effectiveness, implementability, and cost to assist in selecting recommended cleanup alternatives.

a. Site Location

The 4.5-acre property, referred to as the Former Virden Lighting Co., is comprised of three parcels and located at 2162; 2175-2187 Ashland Road and 0 Longfellow Avenue in Cleveland, Cuyahoga County, Ohio, USA (herein referred to as "the Site"). The Site is divided by Ashland Road. Parcels west of Ashland are referred to as the 2162 Ashland portion and parcels east of Ashland are referred to as the 2175-2187 portion.

b. Previous Site Use(s) and any previous cleanup/remediation

The 1.7-acre 2162 Ashland Road and 0 Longfellow Ave portion of the Site (PPN 118-17-001 and 118-19-002, respectively) consists of former industrial and residential land located to the west of Ashland Road (between Cedar Avenue and Longfellow Avenue) and south of Longfellow Avenue (between Longfellow Avenue and Tivoli Court). Currently, the parcel north of Longfellow Avenue is developed with a multi-story former manufacturing building with an approximately 8,500 ft^2 footprint, and grass covered lawn; the parcel south of Longfellow Avenue consists of vacant land.

The 2175-2187 Ashland Road portion of the Site (PPN 118-21-001), located east of Ashland Road and bordered by Cedar Avenue to the north and Norfolk Southern railroad tracks to the east, is comprised of 2.8 acres of light manufacturing land. Currently, the parcel consists of two buildings in poor condition with a demolished former building between them. The north building (Building A) is a four-story primarily brick and concrete building with a basement and an approximately 42,500 ft^2 footprint. The south building (Building B) is a five-story primarily brick and concrete building with an approximately 20,000 ft^2 footprint.

The Site was originally developed for residential use in the late 1800s but quickly transitioned to industrial activities and a long and varied manufacturing history. By the early 1900s, the Cleveland Railway Company constructed battery houses along the northern portion of the 2162 Ashland parcels and manufactured electrical components on the 2175-2187 Ashland portion of the Site. By 1913, the Virden Manufacturing Company (Virden) had begun manufacturing electrical components in a large building in the central portion of the 2162 Ashland property. Meanwhile, the 2175-2187 Ashland property cycled through a series of industrial occupants, notably East Cleveland Railroad Company Power Station (1887-1932), Westinghouse Electric & Manufacturing Company (1929-1932), and multiple divisions of the Thompson Aircraft Products Company (1938-1955). During the post-WWII economic boom of the1950s, Virden expanded their operations at 2162 Ashland to include plating and lacquer spray booth operations while continuing their other manufacturing activities. By the mid-1960s, the Cleveland Railway Company had ceased operations at 2162 Ashland, and the building was repurposed by the Warner & Swasey Company to manufacture machinery. 2175-2187 Ashland, vacant since 1955, was used by Thompson Ramo Woodridge Inc./TRW Inc. (1963-1977), and Virden Lighting (1977-1981). By 1970, the residential dwellings located along Longfellow Avenue were razed. By 1982, Virden had ceased site operations and razed the manufacturing building located in the central portion of 2162 Ashland.

The Site has remained vacant since 1982. Multiple environmental site assessments have been conducted at both portions of the Site (see Site Assessment Findings) but to date, no remedial activities have been conducted. The remaining three buildings are in poor, deteriorating condition, posing environmental and safety risks to the surrounding community. Additional assessment and remedy actions are needed.

c. Site Assessment Findings

- In April 2020, The Mannik and Smith Group, Inc. (MSG) completed an ASTM E1527-21 Phase I Environmental Site Assessment (Phase I ESA) for the 2175-2187 Ashland Road portion of the Site. The Phase I ESA report identified three Recognized Environmental Concerns (RECs) for the Site:
    - REC-1/IA-1: The likely release of hazardous substances and/or petroleum products at the Site from long-term industrial uses; specific items of concern included the historical use of a rail spur, the presence of transformers throughout the Site and other industrial infrastructure such as above ground tanks (ASTs) and associated piping.
    - REC-2/IA-2: The likely release of hazardous substances and/or petroleum products from the west / southwest adjoining properties to due to their historical status as a Resource Conservation and Recovery Act (RCRA) large quantity generator (LQG) and associated operations.
    - REC-3/IA-3: The likely release of hazardous substances and/or petroleum products from the east adjoining property (former TRW manufacturing facility) due to its historical status as a RCRA LQG and associated operations.

Although, not considered a REC or IA, the April 2020 MSG Phase I ESA identified the following asbestos containing materials (ACM) in Building A:

- 680 square-feet (SF) of pipe insulation in piles scattered throughout the western portions of the basement floor;
- 50 linear feet (LF) of pipe insulation on ceiling pipe runs in the basement kitchen and restrooms;
- 25 LF of brown pipe insulation on ceiling pipe runs in the north portion of the basement;
- 125 SF of brown mastic under gray 12-foot by 12-foot ceiling tile in the basement kitchen area;
- 32,300 SF of black roofing tar from the roof;
- 185 windows (i.e., 475 SF) with white window glazing throughout the building;
- 1,200 SF of white/gray cement board around a vertical duct on the east side of the second floor; and
- 400 SF of white 12-inch by 12-inch floor tile over black mastic in the southwest corner of the first floor.

ACM was not found in samples collected from Building B.

- In January 2024, MSG completed an ASTM E1527-21 Phase I ESA for the 2162 Ashland Road portion of the Site. The Phase I ESA report identified two RECs for the Site:

  - REC-1/IA-1: The (site-wide) likely release of hazardous substances and/or petroleum products at the Site from long-term industrial uses, and
  - REC-2/IA-2 The likely release of hazardous substances and/or petroleum products from neighboring properties due to their equally long industrial use.

- In June 2024, MSG conducted a limited Phase II ESA for the entire Site. MSG advanced thirteen soil borings (SB-1 through SB-13) using direct push sampling techniques to depths ranging from 2.5 to 25 feet below ground surface (bgs) across the Site. Six of the soil borings were converted into permanent monitoring wells (MW-1, MW-3, MW-6, MW-8, MW-9, MW-13). MSG also installed and sampled seven soil vapor monitoring points (SG-01 through SG- 07) and five Cox-Colvin® sub-slab vapor pins (SS-01 through SS-05) through the concrete floor of Building A and Building B on the 2175-21865 Ashland portion of the Site. Soil samples were analyzed for site-specific chemicals of concern (COCs) - volatile organics (VOCs), polycyclic aromatic hydrocarbons (PAHs), metals, and total petroleum hydrocarbons (TPH).

  No COCs were detected above applicable VAP commercial / industrial standards in soil; however, multiple VOCs, including trichloroethene (TCE), were found in groundwater and soil gas above applicable VAP standards across both portions of the Site. The Site is located within an Urban Setting Designation (USD) and potable water at the Site and surrounding properties is provided by a metropolitan water source; private groundwater wells are prohibited by the USD and by City of Cleveland municipal code. Since no receptors within the USD can use the groundwater as a portable water source, this exposure pathway is considered incomplete under the VAP; however, not-potable groundwater exposure must be considered.

The MSG Phase II risk evaluation determined that the volatilization of multiple VOCs in groundwater to soil gas and ultimately indoor air through the vapor intrusion (VI) pathway exceeded acceptable risk values for both residential and commercial / industrial workers across both portions of the Site. Based on the findings of the June 2024 MSG Phase II ESA, additional delineation of affected media and cleanup of groundwater and soil gas are required.

- In October 2024, MSG completed an ACM survey at the former manufacturing building on the 2162 Ashland portion of the Site. Although none of the 23 bulk samples submitted for testing contained ACM, MSG indicated that the building roofing materials, which were not sampled due to access issues, should be presumed to contain ACM.

- In September 2025, MSG completed an Asbestos, Universal Waste, and Hazardous Materials Survey for the 2175-2187 Ashland portion of the Site. The survey identified universal waste (e.g., batteries, pesticides, mercury-containing material, and aerosol cans, and other miscellaneous materials that need to be removed from Building A and Building B prior to demolition. The survey also identified ACM (e.g., insulation, ceiling tiles, cement board, plaster, and roofing materials) in Building A that will need to be removed prior to demolition.

d. Project Goal

The planned reuse for the Site is commercial / industrial land use. The redevelopment plan includes pre-demolition asbestos and regulated materials abatement and demolition of all existing structures to create site ready land for redevelopment within the City of Cleveland. The targeted property end use is anticipated to include health technology office and/or light manufacturing.

e. Regional and Site Vulnerabilities to Extreme Weather

According to Federal Emergency Management Agency (FEMA) Flood Zone Map, the Site is **not** located within a 100-year flood zone; as such, increased precipitation that may affect flood waters and stormwater runoff, as well as rising sea levels, are not applicable to the Site. Based on the nature of the Site and its proposed reuse, changing temperature, changing dates of ground thaw/freezing, changing ecological zone, and changing groundwater table are not likely to significantly affect the Site. However, some of these factors, specifically increased precipitation that may affect stormwater runoff, are most applicable to the cleanup of the site. Therefore, proposed cleanup activities will incorporate stormwater erosion control measures, such as installation of geotextile fabric, erosion control blankets/matting, and stepped landscaping beds, among others, as applicable.

II. Applicable Regulations and Cleanup Standards

a. Cleanup Oversight Responsibility

The cleanup will be overseen by the Ohio Environmental Agency (Ohio EPA) and implemented under the Ohio EPA Voluntary Action Program (VAP) and with the supervision of a VAP Certified Professional.

Once cleanup activities are completed, the CP will prepare a VAP No Further Action (NFA) Letter for the Site for submittal to Ohio EPA with a request for a Covenant Not to Sue (CNS). When Ohio EPA is satisfied that all VAP requirements have been met and the Site meets applicable standards, they will issue a CNS.

b. Cleanup Standards for Major Contaminants

Asbestos: Ohio EPA regulations require the removal of ACM that will be disturbed by demolition activities. All identified interior and exterior ACM must be properly removed and transported for off-site disposal. ACM removal must be performed by a fully-trained and licensed asbestos abatement contractor, using approved methods in accordance with applicable regulations established by the U.S. EPA, OSHA, and the State of Ohio. If ACM cannot be removed prior to demolition due to safety concerns, the building must be demolished and disposed of as regulated ACM.

Universal Wastes: Used or non-functional universal waste is required to be segregated prior to demolition and disposed or recycled off-site in accordance with Ohio EPA Solid Waste regulations.

Soil/groundwater/soil gas: Project stakeholders anticipate that the Ohio VAP generic standards for commercial / industrial land use will be used as the cleanup standards. COCs will also undergo a multiple chemical adjustment (MCA) evaluation to account for the cumulative risk posed by exposure to multiple chemicals. Site-specific risk-based cleanup standards may be generated for compounds of concern, if warranted, in accordance with the Ohio VAP requirements found in Ohio Administrative Code (OAC) 3745-300-09.

c. 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, Ohio VAP requirements in OAC 2545-300, and City of Cleveland by-laws. Federal, state, and local laws regarding procurement of contractors to conduct the cleanup will be followed.

In addition, all appropriate permits and notifications (*e.g.*, Ohio Utilities Protection Service OHIO811 call before you dig) will be completed prior to the work commencing.

III. Evaluation of Cleanup Alternatives

a. Cleanup Alternatives Considered

i. Cleanup Alternatives – ACM & Universal Waste

Based on the previous ACM and universal waste surveys, ACM and universal wastes are present in Building A and B on the 2175-2187 Ashland portion of the Site. The roof of 2162 Ashland is presumed asbestos-containing. Three alternatives were evaluated to address ACM and universal waste:

- ACM and Universal Waste Alternative 1 – No Action;
- ACM and Universal Waste Alternative 2 – Targeted ACM and Universal Waste Abatement; and
- ACM and Universal Waste Alternative 3 –ACM and Universal Waste Demolition & Disposal.

ii. Cleanup Alternatives - Soil Contamination

Low levels of VOCs, PAHs, and metals were found in surface and subsurface soils across the Site. COC concentrations in soil meet applicable VAP direct contact standards for commercial / industrial land use; however, VAP soil standards for residential land use were exceeded at two locations. Three alternatives were evaluated to address soil contamination at the Site:

- Soil Alternative 1 – No Action; and
- Soil Alternative 2 – Institutional Controls and Activity Use Limitations (AULs): Specifically, an Environmental Covenant (EC) that restricts property use to commercial / industrial land use.
- Soil Alternative 3 – Excavation and Disposal

iii. Cleanup Alternatives - Groundwater Contamination

Previous Phase II activities documented the presence of metals (arsenic, cobalt, and lead) and multiple VOCs including trichloroethene (TCE) above VAP groundwater standards and/or above risk thresholds for groundwater to volatilize to indoor through the VI pathway. The Site is located within a USD, which addresses the potable use pathway by confirming all receptors within the USD use a municipal water source; however, the not-potable contact with contaminated groundwater pathway remains complete. The need for groundwater cleanup activities is driven by the VI pathway at on-site and downgradient off-site properties. To address groundwater contamination at the Site, four different alternatives were considered:

- Groundwater Alternative 1: No Action;

- Groundwater Alternative 2: Institutional Controls and AULs - specifically, an EC that prohibits the extraction of ground water at the Site, except for monitoring, remediation, or in conjunction with construction or excavation activities or maintenance of subsurface utilities.
- Groundwater Alternative 3: Groundwater Pump and Treat (P&T) and;
- Groundwater Alternative 4: In-situ Carbon Trap and Treat application.

iv. Cleanup Alternatives considered for Soil Gas Contamination

To address soil gas contamination and the VI pathway at the Site, three different alternatives were considered, including

- Soil Gas Alternative 1: No Action.
- Soil Gas Alternative 2: Institutional Controls and AULs. Specifically, a building Occupancy Limitation (BOL) memorialized through the EC that will ensure that if buildings at the Site are to be used, or new buildings constructed, then further evaluation of the vapor intrusion pathway within the new building footprint must be performed and approved by the Ohio EPA prior to occupancy, or a vapor barrier or vapor mitigation system must be installed within the new building footprint.
- Soil Gas Alternative 3: Building Vapor Barrier.

b. Effectiveness and Extreme Weather Resiliency, Implementability, & Cost of Cleanup Alternatives

To satisfy USEPA requirements, the effectiveness, implementability, impact of extreme weather, and cost of each alternative must be considered prior to selecting a recommended cleanup alternative.

<u>Effectiveness and Extreme Weather Resiliency of ACM and Universal Waste Cleanup Alternatives</u>

ACM and Universal Waste Alternative 1 – No Action: The No Action alternative would not mitigate the potential threats to human health and the environment from ACM and universal wastes in Buildings A and B. In addition, the No Action alternative would not facilitate demolition or beneficial reuse of these buildings.

ACM and Universal Waste Alternative 2 – Targeted ACM and Universal Waste Abatement: This alternative includes the removal and off-site disposal of all ACM and regulated materials identified within structurally sound onsite buildings by a licensed contractor prior to demolition of the buildings. This alternative would not be effective in buildings that are not structurally sound and require demolition, this alternative would not effectively address potential threats and regulatory requirements required for asbestos and universal wastes in unsafe/unstable buildings prior to demolition.

ACM and Universal Waste Alternative 3 - Demolition & Disposal ACM and Universal Waste: This alternative includes demolition and off-site disposal of all ACM and regulated materials identified within onsite buildings by a licensed contractor prior to demolition of the buildings. This alternative would effectively address potential threats and regulatory requirements required for asbestos and universal wastes prior to demolition.

Resiliency: ACM and Universal Waste Alternative 1 does not improve the resilience of the Site to extreme weather; by not eliminating ACM and universal wastes, these materials can leave the site through damage or dust due to increased rainfall and extreme weather events. Whereas, Alternatives 2 and 3 improve the resilience of the Site to extreme weather since these alternatives eliminate ACM and universal wastes, preventing these materials from leaving the site through damage or dust due to increased rainfall and extreme weather events.

Effectiveness and Extreme Weather Resiliency of Soil Cleanup Alternatives

Soil Alternative 1 – No Action: The No Action alternative would not mitigate the potential threats to human health and the environment from exposure to contaminated surface and subsurface soil to residential receptors.

Soil Alternative 2 – Institutional Controls and Activity Use Limitations (AULs): Specifically, an EC that restricts property use to commercial / industrial land use.

Soil Alternative 3 – Excavation and Disposal: This alternative includes the removal and offsite disposal of contaminated soil. Sitewide, surface soils meet VAP generic commercial / industrial direct contact standards and subsurface soils meet VAP construction / excavation standards; therefore, excavation would target soil that exceeds residential land use standards. Although this alternative would effectively remove contamination at the site, it's an inefficient approach that would also include the excavation and disposal of thousands of tons of clean overlying soil.

Resiliency: Soil Alternative 1 does not improve the resilience of the Site to extreme weather; by not eliminating or restricting site use, soil contamination can migrate off-site as dust or in runoff due to increased rainfall and extreme weather events. Soil Alternative 3 does not improve Site resilience, since additional soil would need to be excavated to access contamination at depth, exposing soil contamination to rain and runoff, where it can be carried off-site. Alternatives 2 provides the most improvement related to the resilience of the Site as it reduces exposure to contamination by limiting land and/or resource use and guiding human behavior.

Effectiveness and Extreme Weather Resiliency of Groundwater Cleanup Alternatives

Groundwater Alternative 1 - No Action: although potable groundwater use is addressed through the existing USD, the No Action alternative would not control or prevent exposure of on-site and off-site receptors to VOC volatilization from groundwater to soil gas and indoor air.

Groundwater Alternative 2 - Institutional Controls and AULs: Specifically, an EC that prohibits the extraction of ground water at the Site, except for monitoring, remediation, or in conjunction with construction or excavation activities or maintenance of subsurface utilities would further protect site receptors from contact with contaminated groundwater.

Groundwater Alternative 3 - Groundwater P&T: P&T is an effective and common method for cleaning up VOC-contaminated groundwater. Groundwater is pumped from wells or trenches to an aboveground treatment system that removes the contaminants. P&T systems also help prevent the contaminant plume from spreading by pumping contaminated water toward the on-site recovery wells. While effective at preventing offsite groundwater migration, P&T systems are largely inefficient in treating source areas and need to operate over long time (e.g., 30 years or more) to achieve remedial objectives.

Groundwater Alternative 4 - In-situ Carbon Trap and Treat Injections: Injections such as Remediation Products, Inc (RPI) product CAT 100, effectively treats groundwater by injecting a slurry of granulated activated carbon impregnated with zero valent iron (ZVI) and biotechnology. The carbon “traps” the VOCs in place while the ZVI (abiotic mechanism) and biotechnology (biotic mechanism) degrade VOCs in groundwater. The treatment material can be installed in groundwater source areas as a grid of injections using a Geoprobe drill rig, or as a permeable reactive barrier (PRB) on a property boundary to treat contaminated groundwater migrating off-site. The carbon materials will quickly sorb VOCs in groundwater, preventing further migration, while the ZVI and biotic components break down the VOC contamination to less toxic substances. VOC concentrations in groundwater are expected to drop dramatically and quickly.

Resiliency: Groundwater Alternative 1 does not improve the resilience of the Site to extreme weather. Alternatives 2 improves the resilience of the Site as it reduces exposure to contamination by limiting land and/or resource use and guiding human behavior. Alternative 3 does not improve resiliency due to the length of treatment time. Alternative 4 improves resiliency by reducing off-site contaminant migration and buffering seasonal changes in rainfall patterns predicted by climate change models.

Effectiveness and Extreme Weather Resiliency of Groundwater Soil Gas Alternatives

Soil Gas Alternative 1 - No Action: The No Action alternative would not mitigate the potential threats to human health and the environment from VOCs in soil gas to on-site or off-site receptors.

Soil Gas Alternative 2 - Institutional Controls and AUL: A building Occupancy Limitation (BOL) memorialized through the EC would effectively mitigate the potential threats to human health and the environment from VOCs in soil gas by requiring the evaluation of the VI pathway for any new buildings constructed on-site prior to receptor occupancy. If unsafe levels of VOCs are found in the new building indoor air, the BOL would require vapor mitigation measures, such as a sub-slab depressurization system or vapor barrier, be implemented to mitigate exposure.

Soil Gas Alternative 3 - Building Vapor Barrier: A building vapor barrier engineering control would effectively mitigate the potential threats to human health and the environment from VOCs in soil gas by serving as a barrier to soil gas and preventing VOCs from infiltrating the air inside the building. The required VAP Operation and Maintenance Agreement for this engineering control provides certainty that the building vapor barrier will be maintained and remain effective while the building is in use.

Resiliency: Soil Gas Alternative 1 does not improve the resilience of the Site to extreme weather. Alternatives 2 improves the resilience of the Site as it reduces exposure to contamination by limiting land and/or resource use and guiding human behavior. Alternative 3 improves resiliency due to its continued ability to function during extreme weather events, including increased precipitation.

Implementability of ACM and Universal Waste Cleanup Alternatives

ACM and Universal Waste Alternative 1 - No Action: There are no barriers to implementing the No Option alternative; however, the ACM present in onsite buildings would continue to present a risk to potential building occupants and remain an impairment to site redevelopment.

ACM and Universal Waste Alternative 2 – Targeted ACM and Universal Waste Abatement: This alternative can be readily implemented in accordance with the requirements of 29 CFR 1926.1101 (Asbestos Construction

Standard), Ohio EPA OAC) 3745-20, and 40 CFR Part 61, Subpart M, which provide detailed requirements for ACM abatement and offsite disposal, and Ohio EPA Solid Waste regulations that direct management of universal wastes. This alternative presents a feasible implementation for buildings in which ACM and universal wastes can safely be abated prior to demolition.

ACM and Universal Waste Alternative 3 - Demolition & Disposal ACM and Universal Waste: This alternative can be readily implemented in accordance with the requirements of 29 CFR 1926.1101 (Asbestos Construction Standard), Ohio EPA OAC) 3745-20, and 40 CFR Part 61, Subpart M, which provide detailed requirements for ACM abatement/demolition and offsite disposal, and Ohio EPA Solid Waste regulations that direct management of universal wastes. As onsite buildings are slated for demolition, this alternative would be the most appropriate implementation for buildings that are structurally unsafe for ACM/universal waste abatement prior to demolition.

<u>Implementability of Soil Cleanup Alternatives</u>

Soil Alternative 1 - No Action: There are no barriers to implementing the No Option alternative; however, the shallow soil contamination at and around SB-2 and SB-3 at 2162 Ashland would continue to present a risk to potential residential receptors and remain an impairment to site redevelopment.

Soil Alternative 2 - Institutional Controls and AULs: Institutional controls and AULs can be readily implemented through their inclusion in an EC that will be recorded with the property deed and restrict property use in perpetuity. Ohio EPA provides mechanisms for transferring responsibility for maintaining these controls to new ownership if the Site is sold or transferred.

Soil Alternative 3 – Excavation and Disposal: Although this alternative would effectively remove contamination at the Site, it poses implementation challenges, including the need to excavate and dispose of thousands of tons of clean soil and challenges posed by excavating under existing buildings.

<u>Implementability of Groundwater Cleanup Alternatives</u>

Groundwater Alternative 1 - No Action: There are no barriers to implementing the No Option alternative; however, the groundwater contamination would continue to present a risk to potential residential receptors through the VI pathway and remain an impairment to site redevelopment.

Groundwater Alternative 2 - Institutional Controls and AULs: Institutional controls and AULs can be readily implemented through their inclusion in an

EC. The EC will be recorded with the property deed and restrict property use in perpetuity. Ohio EPA also provides mechanisms for transferring responsibility for maintaining these controls to new ownership if the Site is sold or transferred.

Groundwater Alternative 3 - Groundwater P&T: A Groundwater P&T system could readily be implemented at the Site. There is sufficient open space to construct a treatment system building, install recovery wells, and install the piping to convey groundwater from the wells to the treatment system building. Treated groundwater can be discharged to a sanitary sewer or through a National Pollutant Discharge Elimination System (NPDES) permit. Groundwater P&T requires intensive long-term maintenance to remain effective. The long (30+ years) treatment times associated with P&T systems can also pose implementation challenges as well as challenges to Site development activities.

Groundwater Alternative 4 - In-situ Carbon Trap and Treat application: The Carbon Trap and Treat can be readily installed across the Site. Treatment application will require a permit exemption confirmation from Ohio EPA's Underground Injection Control (UIC). The treatment materials are injected into the subsurface using a Geoprobe drill rig. The small footprint of the drill rig facilitates installation in most areas. Building access limitations and limited access to building basements and subbasements may hinder implementation and building demolition or alteration may be needed to access all areas of the Site. Operation and maintenance requirements for Carbon Trap and Treat applications are light and typically include monitoring groundwater for indicator parameters such as sulfate as well as COCs; there are no mechanical systems to maintain. Because this alternative works quickly, post-closure groundwater monitoring can be completed in as little as two years.

Implementability of Soil Gas Cleanup Alternatives

Soil Gas Alternative 1 - No Action: There are no barriers to implementing the No Option alternative; however, the VOC contamination in soil gas would continue to present a risk to potential site receptors through vapor intrusion and remain an impairment to site redevelopment.

Soil Gas Alternative 2 - Institutional Controls and AULs: A BOL can be readily implemented through their inclusion in an EC that will be recorded with the property deed and "run with the land". Ohio EPA provides mechanisms for transferring responsibility for maintaining these controls to new ownership if the Site is sold or transferred.

Soil Gas Alternative 3 - Building Vapor Barrier: Groundwater cleanup alternatives such as the Carbon Trap and Treat application will significantly address VOCs in soil gas and the VI pathway; however, it may not be practicable to implement a groundwater remedy at all areas of the Site, and an additional control may be needed to fully address the VI pathway. A spray-applied building vapor barrier system serves as a physical barrier that prevents the intrusion of subsurface soil gas into buildings. It is installed under the slab and behind vertical walls to create a seamless, chemically resistant membrane that seals off pathways for gases like VOCs methane, and radon. The system can be readily applied to a prepared surface, quickly cures into a flexible, rubberized asphalt-based membrane, and offers a reliable, more cost-effective alternative to traditional vapor barriers. Building vapor barriers are easily implemented in new building construction but implementation at existing building will face implementation challenges.

Cost of ACM and Universal Waste Cleanup Alternatives

ACM and Universal Waste Alternative 1 – No Action: There are no costs associated with Alternative 1: No Action; however, this alternative would not mitigate the potential threats to human health and the environment posed by these materials. In addition, the No Action alternative would not facilitate demolition or beneficial reuse of the building.

ACM and Universal Waste Alternative 2 – Targeted ACM and Universal Waste Abatement: Costs associated with this alternative include targeted abatement of ACM, and universal wastes at an approximate cost of $230,000.

ACM and Universal Waste Alternative 3 - Demolition & Disposal ACM and Universal Waste: Costs associated with this alternative include complete abatement of ACM and universal wastes prior to demolition at an approximate cost of $1MM.

Cost of Soil Cleanup Alternatives

Soil Alternative 1 - No Action: There are no costs associated with Alternative 1: No Action; however, this alternative would not mitigate the potential threats to human health and the environment from contaminated surface and subsurface soil to residential receptors.

Soil Alternative 2 - Institutional Controls and AULs: Institutional Controls and AULs: The costs of preparing and recording an EC for the Site that includes institutional controls, AULs, and or a BOL is approximately $60,000. This cost estimate is inclusive of all institutional controls for soil, groundwater, and soil gas discussed in this ABCA.

Soil Alternative 3 –Excavation and Disposal: The cost for excavating and disposing contaminated soils across the Site is estimated to exceed $7,000,000. Contributing to this cost is the excavation and disposal of clean soil overlying the contaminated soil.

Cost of Groundwater Cleanup Alternatives

Alternative 1 - No Action: There are no costs associated with Alternative 1: No Action; however, this alternative the No Action alternative would not control or prevent exposure of on-Site and off-Site receptors to groundwater contamination volatilizing to indoor air.

Groundwater Alternative 2 - Institutional Controls and AULs: The costs of preparing and recording an EC for the Site that includes institutional controls, AULs, and a BOL is approximately $62,000. This cost estimate is inclusive of all institutional controls for soil, groundwater, and soil gas discussed in this ABCA.

Groundwater Alternative 3 - Groundwater P&T: The estimated capital costs for implementing Groundwater P&T are estimated at approximately $1,000,000. Annual operation, maintenance, and groundwater monitoring costs are estimated at $75,000 - 100,000 per year for approximately 30 years.

Groundwater Alternative 4 - In-situ Carbon Trap and Treat application: The cost for implementing Carbon Trap and Treat at 2162 Ashland as a combination of source area treatment grids and PRBs is approximately $1,020,000; costs for installing a PRB (or series of PRBs) along the west and north property boundary of 2175 – 2187 Ashland is estimated to cost approximately $800,000. Operation and maintenance requirements are light and typically include monitoring groundwater for indicator parameters such as sulfate as well as COCs; there are no mechanical systems to maintain. Because this alternative works quickly, post-closure groundwater monitoring can be completed in as little as two years. Post-closure monitoring costs are included in the above cost estimates.

Cost of Soil Gas Cleanup Alternatives

Soil Gas Alternative 1 - No Action: There are no costs associated with Alternative 1: No Action; however, this alternative would not mitigate the potential threats to human health and the environment from VOCs in soil gas to on-site or off-site receptors.

Soil Gas Alternative 2 - Institutional Controls and AULs: The costs of preparing and recording an EC for the Site that includes institutional controls, AULs, and a BOL is approximately $62,000. This cost estimate is inclusive of institutional controls for soil, groundwater, and soil gas discussed in this ABCA, the preparation of ancillary documents such as a VAP Operation and Maintenance Agreement, Operation and Maintenance Plan, and includes the $23,600 fee for submitting a VAP NFA Letter with an EC to Ohio EPA with a request for a CNS.

Soil Gas Alternative 3 - Building Vapor Barrier: Installation of a vapor barrier, such as Liquid Boot, at a new building is approximately $1.65 per SF; installation of this barrier at a new 500,0000 SF building would cost approximately $825,000

c. Recommended Cleanup Alternative

The following cleanup alternatives are recommended to address the presence of ACM in onsite buildings and contamination in site soil, groundwater, and soil gas at the Site:

- ACM and Universal Waste Alternative 2 – Targeted ACM and Universal Waste Abatement

- ACM and Universal Waste Alternative 3 – Demolition & Disposal ACM and Universal Waste

- Soil Alternative 2 – Institutional Controls AULs; specifically, an EC that restricts property use to commercial / industrial land use..

- Groundwater Alternative 2 - Institutional Controls and AULs; specifically, an EC that prohibits the extraction of ground water at the Site, except for monitoring, remediation, or in conjunction with construction or excavation activities or maintenance of subsurface utilities.

- Groundwater Alternative 4 - In-situ Carbon Trap and Treat injections, such as Remediation Products, Inc (RPI) CAT 100.

- Soil Gas Alternative 2 - Institutional Controls and AUL; specifically, a BOL memorialized through the EC.

The various Alternative 1 - No Action alternatives cannot be recommended since they do not address site risks.

ACM/universal waste and soil contamination concerns can be addressed through a single remedy alternative but complimentary remedies (e.g., institutional controls plus an active remedy or engineering control) are recommended to address groundwater contamination and soil gas contamination. Since surface and subsurface soils meet applicable VAP direct contact standards, soil issues are most readily remedied with institutional controls. Groundwater Alternative 3 – Groundwater P&T is less effective, more difficult to implement, and more expensive than a combination of the Groundwater Alternatives 2 (institutional controls) 4 (Carbon Trap and Treat).

d. Green and Sustainable Remediation Measures for Selected Alternative

To make the selected alternative greener, or more sustainable, several techniques are planned. The most recent Best Management Practices (BMPs) issued under ASTM Standard E-2893: Standard Guide for Greener Cleanups will be used as a reference in this effort. CCLRC will require contractors to follow an idle-reduction policy and use heavy equipment with advanced emissions controls operated on ultra-low sulfur diesel. The number of mobilizations to the Site would be minimized and erosion control measures would be used to minimize runoff into environmentally sensitive areas. In addition, CCLRC plans to ask bidding cleanup contractors to propose additional green remediation techniques in their response to the Request for Proposals for the cleanup contract.