

# PHASE III IDENTIFICATION, EVALUATION, AND SELECTION OF COMPREHENSIVE REMEDIAL ACTION ALTERNATIVES AND REMEDIAL ACTION PLAN

**FORMER NU-STYLE PROPERTY  
21 GROVE STREET  
FRANKLIN, MASSACHUSETTS  
MASSDEP RELEASE TRACKING NUMBER (RTN) 2-16694**

**May 2024**

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Ref: Z:\Project Files\EA-FZ\Franklin\17356 - Town Of Franklin-Nustyle Brownfields Ass\Working\Documents\Phase III Report\Phase III Remedial Action Plan.Docx

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## 1.0 INTRODUCTION

On behalf of the Town of Franklin, Massachusetts (the Town) Verdantas LLC (Verdantas) has prepared this Phase III Identification, Evaluation, and Selection of Comprehensive Remedial Action Alternatives and Remedial Action Plan (Phase III RAP) to address a release of chlorinated volatile organic compounds (CVOCs) to soil and groundwater at the former Nu-Style Property located at 21 Grove Street, Franklin, Massachusetts (the Site). The Site is identified by the Massachusetts Department of Environmental Protection (MassDEP) under Release Tracking Number (RTN) 2-16694. The Site is classified by MassDEP as "Tier II".

The Site is in an area of mixed residential, industrial, and commercial use. The Site consists of an approximately 0.83-acre parcel, identified as Lot 22. The Site is improved with an approximately 4,000-square-foot (SF) collapsing building constructed circa 1945, situated at the western portion of the Site. The remainder of the Site consists of landscaped areas. The Site is currently vacant. Access to the building is restricted by a fence. A former building at the eastern portion of the Site (formerly referenced as 87 Grove Street/Lot 27) was demolished in 2012. The Town acquired Lot 22 in 2002 and Lot 27 in 2005 as tax takings. The two lots were subsequently combined and are referred to as Lot 22. Mine Brook flows along the western and southern perimeter of the Site. The Site is abutted by a stone countertop commercial business to the north/northeast; a Massachusetts Bay Transportation Authority (MTBA) commuter rail line to the north; Grove Street to the east/southeast; and Old Forge Road to the west/southwest.

The Site was developed by at least the early 1890s and was occupied by the Unionville Woolen Mills. The existing Site building was constructed circa 1945 and the former Site building was constructed circa 1900. The Site and adjacent parcel south of Mine Brook was occupied by the Franklin Paint Company in the 1950s. The Site was purchased in 1969 by Carol and Richard Armstrong and was used for jewelry manufacturing until the late 1980s as the Nu-Style Jewelry Factory (Nu-Style). A 1975 plan for a proposed addition to the former Lot 27 building indicated that this building was a manufacturing plant, and the Lot 22 building was a garage. The Lot 22 building was used by a construction company for vehicular repair until it was vacated in 1989. Operations on both parcels ceased in late 1989.

The MassDEP assigned RTN 2-16694 to the Site in May 2007 following identification of a release of metals (beryllium, lead, and nickel), CVOCs (tetrachloroethylene [PCE] and trichloroethylene [TCE]), and polycyclic aromatic hydrocarbons (PAHs; benzo(a)pyrene and fluorene) to soil and release of lead and CVOCs (PCE and TCE) in groundwater at the Site. The Site is classified by MassDEP as "Tier II".

The following conclusions can be made based upon the results of the comprehensive site assessment activities completed at the Site:

1. Based upon the results of groundwater collected between 2006 and 2023, both overburden and bedrock groundwater are impacted by CVOCs, with PCE and

TCE detected at concentrations exceeding their applicable Massachusetts Contingency Plan (MCP) Method 1 Groundwater Standards:

- i. The vertical and horizontal extents of CVOC impacts to overburden and bedrock groundwater have not been fully delineated.
  - ii. It is unclear if CVOC impacts identified south of Mine Brook are originating from the Site or from an off-Site source (i.e., Lot 26).
  - iii. Concentration trends of CVOCs in groundwater appear to be generally stable or decreasing in Site overburden and bedrock monitoring wells.
  - iv. Based upon recent groundwater analytical results there is no evidence of vapor intrusion impacts to the south of Mine Brook.
2. CVOC impacted soil is present in the northern and southwestern portions of the Site. The majority of CVOC impacted soil was identified in the upper six feet below ground surface (bgs); however, localized impacts have been identified at the bedrock interface. Data gaps exist within the footprint of the current Site building.
  3. The source of CVOC impacts to soil and groundwater are attributable to historic manufacturing operations.
  4. Localized PAH impacts are present in surficial soils in the vicinity of MW-2 and MW-3 in the western portion of the Site. The suspect source is attributed to the historic placement of fill or other historic Site operations. PAH impacts to sediment within Mine Brook are attributable to releases from historic manufacturing operations and/or placement of fill during channelization of the brook. PAH and metal impacts to soils within a former raceway structure are attributable to releases from historic manufacturing operations. Remediation activities were conducted in the eastern portion of the raceway in 2012, and similar impacts are likely present within the intact portion of the raceway in the western portion of the Site.
  5. The Partial PSSC supports the implementation of remedial measures to mitigate potential vapor intrusion impacts to future receptors, which is consistent with portions of the Site at which there is evidence of CVOC impacts exceeding MCP Method 1 GW-2 Groundwater concentrations and localized areas of CVOC impacts to soils.
  6. Additional assessment activities are recommended to address data gaps related to the extent of CVOC impacts to soil and overburden and bedrock groundwater. A Method 3 Risk Characterization is recommended to characterize the risk of harm to health, public welfare, and the environment for sediment, surface water, and indoor air at the Site.

This report was prepared in accordance with 310 CMR 40.0850 of the Massachusetts Contingency Plan (MCP).

## 1.1 PURPOSE

The purpose of this Phase III RAP is to evaluate Remedial Action Alternatives (RAAs) for remediation and/or mitigation of CVOCs which have impacted to Site environmental media. This Phase III RAP evaluates a number of potential RAAs and selects Institutional Controls, Passive Containment, Active Treatment, *In-Situ* Technologies, and Monitoring.

In accordance with the MCP (310 CMR 40.0850), the goal of the Phase III RAP is to identify, evaluate, and select RAAs that: (1) are likely to achieve a level of No Significant Risk (NSR) at the Site; and (2) address MCP issues regarding source elimination/control and restoration to background. The RAA evaluation is summarized in the RAP Section of this report in accordance with 310 CMR 40.0861 of the MCP. This report contains a narrative describing the proposed remediation.

## 1.2 SCOPE OF THE REPORT

The scope of work for the preparation of the Interim Phase III RAP Section included:

1. Identifying and screening potential remedial technologies;
2. Developing RAAs;
3. Performing a comparative evaluation of RAAs; and
4. Selecting the preferred RAA.

This report is organized as follows:

1. Section 1.0 presents the Introduction.
2. Sections 2.0 through 5.0 contain background information, including a summary of the Site history, previous studies, the nature and extent of identified constituents of concern (COCs) at the Site.
3. Section 6.0 outlines the remedial objectives for the Site.
4. Section 7.0 provides the Identification of RAAs.
5. Section 8.0 provides the evaluation of RAAs, including general classes of remedial technologies applicable at sites exhibiting similar conditions and presents a preliminary applicability assessment for these classes based upon site-specific factors. Following this assessment, retained technologies are screened to identify their applicability to site conditions.
6. Section 9.0 provides a description of the selected RAAs and justification for selection, as well as a discussion of the feasibility of achieving background conditions in accordance with 310 CMR 40.0860.
7. Section 10.0 is the Phase III Completion Statement.

## 2.0 SITE BACKGROUND

This section presents a brief general description and history of the Site, and a summary of the nature and extent of constituents of concern at the Site including the nature and extent of impacts to Site soil and groundwater.

### 2.1 SITE LOCATION AND DESCRIPTION AND SURROUNDING USE

The Site consists of an approximately 0.83-acre parcel, identified as Lot 22, and is located in an area of mixed-use. The Site is improved with an approximately 4,000-SF collapsing building constructed circa 1945, situated at the western portion of the Site. The remainder of the Site consists of landscaped areas. The Site is currently vacant/unoccupied. Access to the building is restricted by a fenced enclosure.

The Site is in an area of mixed residential, industrial, and commercial use. Mine Brook flows along the western and southern perimeter of the Site. The Site is abutted by a stone countertop commercial business to the north/northeast; a Massachusetts Bay Transportation Authority (MTBA) commuter rail line to the north; Grove Street to the east/southeast; and Old Forge Road to the west/southwest. A Site Locus Map and Site Plan are provided as Figures 1 and 2, respectively.

Based upon a review of the MassDEP Phase I Site Assessment Map, included as Appendix A, the Site lies within a 100-year FEMA floodplain. There are no Public Water Supply Protection Areas at the Site or within 500 feet of the Site. Zone II Wellhead Protection Areas are located within 0.5-mile southeast and northwest of the Site.

### 2.2 NATURE AND EXTENT OF RELEASE

The following summarizes the nature and extent of the release based upon the data collected at the Site.

1. Soils: Localized CVOC impacts have been identified at the bedrock interface in a sample collected from MW-105D. Localized PAH impacts have been identified in shallow soils in the western (MW-2 and MW-3) portion of the Site. Remedial activities conducted to date have addressed CVOC impacts to soil at the northern and southwestern portions of the Site; however, post-excavation confirmatory results indicate that CVOC impacted soil remains in the northern portion of the disposal site. CVOC impacts to soil beneath the existing Site building are unknown. Additional assessment is warranted following demolition.
2. Groundwater: Based upon the results of groundwater results collected between 2006 and 2023, both overburden and bedrock groundwater are impacted by CVOCs. As shown on Figure 3, the horizontal extent of CVOC impacts to overburden and bedrock groundwater have not been fully delineated. It is unclear if CVOC impacts identified south of Mine Brook are originating from the Site or from an off-Site source. The vertical extent of CVOC impacts in bedrock groundwater has not been fully delineated.

3. Raceway sediments: There is evidence of PAH and metals impacts to raceway sediments.
4. River sediments: PAHs have historically been detected in sediments in the downstream portion of Mine Brook at the Site.

## 3.0 DISPOSAL SITE HISTORY

### 3.1 HISTORY OF OWNER AND OPERATIONS

Based upon historic reports and records reviewed, the Site was developed by at least the early 1890s and was occupied by the Unionville Woolen Mills. The existing Site building was constructed circa 1945 and the former Site building was constructed circa 1900. The Site and adjacent parcel south of Mine Brook was occupied by the Franklin Paint Company in the 1950s. The Site was purchased in 1969 by Carol and Richard Armstrong and was used for jewelry manufacturing until the late 1980s as the Nu-Style Jewelry Factory. A 1975 plan for a proposed addition to the former Lot 27 building indicated that this building was a manufacturing plant, and the Lot 22 building was a garage. The Lot 22 building was used by a construction company for vehicular repair until it was vacated in 1989. Operations on both parcels ceased in late 1989. The Town acquired Lot 22 in 2002 and Lot 27 in 2005 as tax takings.

### 3.2 WASTE MANAGEMENT HISTORY

Four underground storage tanks (USTs) were removed from the Site in 1990, which included two 2,000-gallon tanks, one 5,000-gallon tank, and a 1,000-gallon tank. One or more of these tanks reportedly contained chlorinated solvents. Additionally, one 5,000-gallon No. 2 fuel oil UST, located west of the former Site building, was removed from the Lot 27 parcel in 2007.

Manufacturing processes conducted at the Site included electroplating and metals finishing, and chemical use/storage including heavy metals (nickel and chromium), acids, bases, cyanides, oils, and chlorinated solvents. The United States Environmental Protection Agency (US EPA) conducted an inspection of the property in 1992. The inspection documented the presence of chemicals and process equipment associated with the historic manufacturing facility which were abandoned at the Site when Nu-Style declared bankruptcy in approximately 1991. The US EPA subsequently conducted Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) removal actions which included the removal and off-Site disposal of hazardous waste, impacted soil and debris, and product associated with process equipment.

## 4.0 RELEASE HISTORY

### 4.1 RELEASE NOTIFICATION AND MCP COMPLIANCE

In July 2007, Fuss & O'Neill, Inc. (Fuss & O'Neill) conducted a Phase II Environmental Site Assessment (ESA) at the Site on behalf of the County of Norfolk, Massachusetts as part of the County Hazardous Materials Brownfield Program. A release of metals (beryllium, lead, and nickel), CVOCs (PCE and TCE), and PAHs (benzo(a)pyrene and fluorene) were identified in soil. A release of lead and CVOCs (PCE and TCE) was also identified in groundwater at the Site. These conditions represented a 120-day reporting condition and the MassDEP assigned RTN 2-16694 in May 2007.

In May 2008 Fuss & O'Neill prepared a Phase I Initial Site Investigation Report and tier classification.

Tata & Howard (T&H) prepared a Partial Permanent Solution with Conditions (PPSC) Report in 2015 for a portion of the Site located south of Mine Brook (currently identified as Lot 26). To support the PPSC, T&H collected groundwater samples from the existing monitoring wells south of Mine Brook in May 2015. Groundwater samples were recollected from monitoring wells MW-101S and MW-101D in June 2015. Analytical results detected TCE and PCE at concentrations exceeding their applicable MCP GW-2 and GW-3 criteria in the groundwater samples collected from MW-101S and MW-101D during both sampling events. No other constituents of concern were detected at concentrations exceeding their applicable MCP Method 1 Groundwater Standards in the remaining monitoring wells sampled by T&H. T&H concluded that the portion of the disposal site south of Mine Brook and east of monitoring wells MW-101S and MW-101D meet the criteria for a PSSC, noting that if a building is constructed a vapor barrier or sub-slab depressurization system may be necessary to mitigate vapor intrusion.

## 5.0 SUMMARY OF REMEDIAL ACTIVITIES

### 5.1 UNDERGROUND STORAGE TANK (UST) REMOVAL

In May 2007, Fuss & O'Neill oversaw the removal of a 5,000-gallon UST containing No. 2 fuel oil, located southwest of the former Lot 27 building. Soil samples were collected from the tank grave and submitted for laboratory analysis of metals, volatile organic compounds (VOCs), and petroleum hydrocarbons. Analytical results did not detect concentrations of constituents of concern at concentration greater than their applicable MCP Reportable Concentrations (RCs) or Method 1 Soil Standards.

### 5.2 RELEASE ABATEMENT MEASURE ACTIVITIES

In May 2012, Fuss & O'Neill prepared a Release Abatement Measure (RAM) Plan which proposed the demolition of the former Lot 27 building, and excavation and disposal of overburden soil impacted with CVOCs and metals. It is noted that these activities were limited to Lot 27, and did not include remediation at Lot 22.

RAM activities were completed between May 2012 to February 2013, and included the demolition of the building and excavation of impacted soils. CVOC impacted soil was excavated from the northwestern portion of the Site to a depth of approximately four feet below ground surface (bgs); however, excavations were halted when a sewer line was damaged. Lead impacted soils were excavated in the northeastern portion of the Site (designated as the "MW-05 area") to an approximate depth of six feet bgs. Additionally, CVOC impacted soils were excavated in the southwestern portion of the Site (designated as the "B-4 Excavation Area") to a depth of approximately 7 feet bgs. Confirmatory soil sampling was performed in each of these areas, and Fuss & O'Neill concluded that the excavations were successful in significantly reducing concentrations of CVOCs and metals to the "extent feasible". It is noted that an area of CVOC impacted soils remains in the northern portion of the Site where excavations were limited due to the sewer line, and several of the post-excavation confirmatory samples collected from the northwestern excavation area contained concentrations of TCE and PCE above their applicable MCP Method 1 Soil Standards. A total of 406.53 tons of soil was transported for off-Site disposal from the three excavation areas. Soil excavation areas are provided on Figure 2.

During demolition of the former Lot 27 building a stone-lined raceway structure, trending east-west, was encountered at the Site which extended to the existing building on Lot 22 (Figure 2). This structure was demolished between August 2012 and January 2013. Analytical results of soil samples collected from the raceway detected metals (chromium and lead) and PAHs at concentrations exceeding their applicable MCP Method 1 Soil Standards. Surface water samples from the raceway detected elevated concentrations of petroleum hydrocarbons, metals, and the CVOC cis-1,2-dichloroethylene (DCE), with concentrations of lead exceeding its applicable MCP Method 1 Groundwater Standards. Concentrations of constituents of concern in impacted soil and surface water in the raceway were noted to be higher than concentrations typically encountered in Site soil

and groundwater. A total of 116.4 tons of soil was excavated and transported for off-Site disposal from the raceway.

Following completion of RAM activities, the Site was backfilled with a combination of crushed brick, concrete, and masonry rubble generated from the building demolition as well as sand and gravel acquired from off-Site locations.

## 6.0 PHASE III REMEDIAL OBJECTIVES

The remedial objectives for the Site are to achieve a Temporary or Permanent Solution by reducing source impacts and mitigating potential vapor intrusion impacts to receptors.

The remedial performance standards applicable to this Site were assessed based upon the results of a Phase II Comprehensive Site Assessment, which included a Method 1 Risk Characterization (addressing soil and groundwater impacts) and MCP-defined requirements for achieving a Permanent or Temporary Solution.

## 7.0 PHASE III - IDENTIFICATION OF REMEDIAL ACTION ALTERNATIVES

This section presents the identification of potential technologies for addressing remediation of Site constituents of concern.

To develop a set of RAAs for detailed analysis, an initial screening of available remediation technologies (RTs) was performed. These RTs, which address the nature and extent of the impacted media, are described and considered in this section.

An RT was judged to be acceptable for further evaluation if: (1) it was likely to reduce risks to human health and the environment to levels which would permit the achievement of a Permanent Solution; and (2) the technology appeared to be technically and economically feasible for the Site.

Seven general classes of potentially applicable RTs for the Site have been identified and screened (see Table 1 and below) that may reduce levels of CVOCs and petroleum hydrocarbons to soil and groundwater. Technologies in each of these categories were evaluated during the preliminary screening to facilitate a comprehensive review of technologies applicable for the Site. Alternatives from the following categories were evaluated during the preliminary screening:

1. No Remedial Action;
2. Institutional Controls;
3. Passive Containment;
4. Active Treatment/Removal/Containment;
5. *In-Situ* Treatment Technologies; and
6. Monitoring.

An overview of the classes of technologies and a general description of the ranking of each class of technology developed during the screening process is presented below. Table 1 presents a summary of the initial screening of potential RTs.

### 7.1 NO REMEDIAL ACTION

The “No Remedial Action” alternative assumes that no additional remedial efforts are implemented to address Site impacts. This option can provide a basis for assessing the effects of implementing remedial actions; however, it does not directly reduce the toxicity, mobility, or volume of impacted environmental media. This RAA does not reduce site risks associated with impacted soil or groundwater, and provides no additional protection to human health or public welfare. Additionally, the constituents of concern are at concentrations that are unlikely to attenuate below standards in a reasonable timeframe, and therefore, “No Remedial Action” would not reduce potential risks to human health and/or the environment in the long term.

Conclusion: The “No Remedial Action” alternative does not reduce the toxicity, mobility, or volume of impacted environmental media. Because a Condition of NSR does not currently exist at the Site, the “No Remedial Action” alternative does not maintain a

Temporary Solution or achieve a Permanent Solution. However, this RT was retained for future consideration.

## 7.2 INSTITUTIONAL CONTROLS

Institutional controls are mechanisms to limit access to impacted media and include alternatives such as fencing, barriers, and Notices of Activity Use Limitations (AULs) in the form of deed restrictions. While institutional controls do not eliminate impacted media, they can provide an effective, low cost means of reducing exposure potential, and thus risk, if properly maintained and enforced.

Institutional controls may be effective in mitigating exposure to impacted media at locations at which it may be infeasible to achieve background conditions. Implementation of a Notice of AUL on a site to restrict access to impacted groundwater (other than as "exposure pathway elimination measures" or to restrict access to drinking water) is not supported by MassDEP. However, Notices of AUL may be implemented to ensure that engineering controls be maintained to mitigate potential risk.

Conclusion: This RT is a viable option that will be retained for further consideration.

## 7.3 PASSIVE CONTAINMENT AND/OR MITIGATION MEASURES

The primary purpose of containment technologies is to isolate impacted media, and thus control potential exposure risks. Passive containment involves placement of horizontal physical barriers, such as a cap, sealant or membrane, or vertical barriers such as a grout curtain, slurry wall, or sheet piling in the impacted areas. Asphalt pavement, concrete and building slabs also serve as barriers to impacted soils.

Conclusion: This RT is a viable option that will be retained for further consideration.

### 7.3.1 Vertical Barriers

A vertical barrier, such as a permeable reactive barrier (PRB), is defined as an *in-situ* method for remediating impacted groundwater that combines a passive chemical or biological treatment zone with subsurface fluid flow management. Treatment media may include zero-valent iron, chelators, sorbents, and microbes to address a wide variety of constituents of concern in groundwater, such as CVOCs, other organics, metals, inorganics, and radionuclides. The constituents of concern are concentrated and either degraded or retained in the barrier material, which may need to be replaced periodically. For vertical barriers, such as slurry walls, hydraulic capture may also be required (i.e., an active groundwater recovery/treatment system), since slurry walls divert groundwater flow. Although passive vertical containment may be designated as a feasible RT for containment of constituents of concern /sources, this RT does not address source removal.

Conclusion: This RT is a viable option that will be retained for further consideration.

### 7.3.2 Horizontal Barriers

The primary purpose of passive containment technologies is to isolate impacted media, and thus control potential exposure risks. Passive containment using horizontal barriers involves placement of physical barriers, such as a cap, in order to limit the potential for exposure to impacted media. A vapor barrier is considered as a horizontal barrier for future occupied buildings at the Site property and an engineered cap is considered for impacted soils and transmission of CVOCs.

The purpose of a cap is to protect human and environmental receptors from constituents of concern by means of physical separation. A cap consists of a physical barrier that can range widely in composition and can consist of a single or multiple layers. Caps are designed to be either permeable or impermeable. Permeable caps are intended to provide a physical barrier to exposure and typically consist of soil or stone, sometimes supplemented with synthetic materials (e.g., geotextiles). Impermeable caps are designed to prevent infiltration of precipitation or migration of gases and typically include a synthetic membrane or low-permeability soil layer. Caps are usually accompanied with a Notice of Activity and Use Limitation (AUL) in order to prevent the possibility of future exposure as a result of a change in site use. In addition, a visual marker (i.e., geotextile fabric) is installed under the cap to delineate clean versus impacted soil and assist in identifying when cap erosion has occurred.

Vapor barriers may be composed of high-density polyethylene (HDPE), low density polyethylene (LDPE), very-low density polyethylene (VDPE) materials; spray-applied materials composed of a rubberized asphalt emulsion or epoxy; or any other chemical resistant membrane that prevents the transmission of CVOCs.

Conclusion: Passive containment measures (horizontal barriers/cap) may be feasible for the Site. This RT (horizontal barriers/cap) is a viable option that will be retained for further consideration.

### 7.3.3 Passive Sub-Slab Depressurization System (SSDS)

A Passive SSDS serves as a venting system to create a preferential pathway to divert the vapors from the subsurface to the ambient air above future occupied buildings. Passive mitigation measures include the installation of a barrier or barriers to prevent the migration of CVOC vapors to the indoor air, or a venting system to create a preferential pathway to divert the vapors from the subsurface to the ambient air above the building. These measures are considered "passive" because they do not employ a fan or blower or other electro-mechanical device as a component of the mitigation system. Passive mitigation measures are considered Passive Exposure Pathway Mitigation Measures under the MCP (as defined at 310 CMR 40.0006(12)).

SSDS are based upon traditional radon-mitigation technology and consist of a fan or blower that draws soil vapor from beneath the building slab. When an existing building is retrofitted with an SSDS, extraction points are installed through the building slab. In most cases these points are installed vertically. In cases where vertical extraction points are

not able to influence all areas where vapors enter through the slab, horizontal extraction points may be required.

Passive venting mitigates the vapor intrusion pathway by intercepting sub-slab soil gas with a series of perforated pipes (typically 4-in. diameter), installed below the slab within a permeable bedding material, such as sand or gravel. The perforated piping is typically connected to solid piping and vented to the atmosphere above the roof line. Where possible, a vapor barrier, should be used in conjunction with a passive venting system.

A passive venting system relies on temperature and pressure differences, and wind speed to induce soil gas flow and removal. As a result, to ensure its effectiveness, the system must include sufficient interception piping and highly permeable bedding, and the barrier system must be properly installed. Passive venting systems should be designed so that a fan can be easily added to transform the system to an active SSDS if a greater reduction in the concentrations of CVOCs is necessary to achieve mitigation goals.

Pre-fabricated floor systems that create a continuous aerated space beneath the slab or raised aerated floor above an existing slab are a form of passive venting system that eliminates the need for passive vent piping and permeable bedding material. Aerated floor systems may also, when fitted with a fan or blower, be converted to an active SSDS.

As with a vapor barrier, passive venting systems are more easily installed in and generally better suited to new construction, where the appropriate amount and type of sub-slab bedding material can be specified, verified, and proper installation can be assured.

Conclusion: A passive SSDS may be feasible for the Site for future occupied buildings. This RT is a viable option that will be retained for further consideration.

## **7.4 ACTIVE TREATMENT/REMOVAL/CONTAINMENT SYSTEMS**

### **7.4.1 Groundwater Recovery and/or Treatment**

Groundwater recovery may be utilized solely for containment purposes or may also be used for groundwater treatment. Groundwater extraction/recovery and treatment ("pump and treat") is a proven technology for the recovery of impacted groundwater. This method is also a conventional means to induce hydraulic containment of a groundwater table surface. Implementation of these systems may involve the installation of multiple large diameter extraction wells, treatment equipment, and a means to discharge treated effluent. The effectiveness of groundwater pump and treat systems is highly dependent on factors such as secondary groundwater quality (iron content, hardness, pH), source location and volume, and soil type, permeability, and saturated thickness.

Soil permeability and well field design will directly influence well yields, and determine whether the system will operate intermittently or continuously. Excessive intermittent operation of a system or "cycling" can be detrimental to system components. Although groundwater recovery and treatment is successful in establishing groundwater plume capture, the limitations and challenges of this technology include high utility costs,

numerous extraction wells for larger plumes, and generation of high quantities of groundwater.

Conclusion: This RT is a not viable option and will not be retained for additional consideration.

#### **7.4.2 Soil Vapor Extraction and Air Sparging**

Soil vapor extraction (SVE) is a proven remedy for reducing concentrations of CVOCs in unsaturated soils. To be effective, the SVE system must move large volumes of air through the soil, which alters the equilibrium conditions and induces desorption of chlorinated solvents from soil and volatilize into the soil vapor. The soil vapor is removed and CVOCs captured or destroyed by an air treatment system.

At the Site, overburden groundwater was encountered at depths ranging from 4 to 7 feet bgs. Additionally, CVOC impacted soil has generally been identified in a limited area of the northern portion of the Site. CVOC impacts to soil beneath the existing Site building has not been assessed. While evaluating SVE, it is important to consider air treatment requirements for the extracted soil vapor, short-circuiting of air flow, and SVE blower noise issues to avoid a nuisance condition.

Air sparging involves forcing pressurized air into groundwater. The injected air is driven by buoyancy and moves upward through the soil where it can volatilize CVOCs adsorbed to soil in the vadose zone. The air enters the unsaturated zone, where it can be captured by the SVE system. A secondary benefit of air sparging is that it can also volatilize CVOCs from groundwater.

Current analytical results have detected limited CVOC impacts to soil within the vadose zone at the Site. Considerations for air sparging include the permeability of soil, and effective capture of volatile soil vapor with the SVE system. Additionally, air sparging may alter hydrogeological conditions in overburden and bedrock groundwater and has the potential to accelerate downward migration of impacted groundwater through fractured bedrock.

Conclusion: This RT is a not viable option and will not be retained for additional consideration

#### **7.4.3 Active Exposure Pathway Mitigation Measures (AEPMMs)**

An Active SSDS is effective at mitigating vapor intrusion impacts to receptors in buildings, due to volatile constituents of concern in groundwater that can accumulate in the vadose zone and impact indoor air. Vapor intrusion mitigation systems that employ a fan or blower to draw CVOC vapors into collection points and discharge them away from the affected building are considered "active" mitigation systems. Active mitigation systems are considered Active Exposure Pathway Mitigation Measures or AEPMMs under the MCP (as defined at 310 CMR 40.0006(12)), measures directed at an Exposure Pathway which rely on the continual or periodic use of a mechanical or

electro-mechanical device to reduce exposures and meet applicable performance standards. Active systems require ongoing monitoring and maintenance and the use of telemetry or remote monitoring measures.

Active sub-membrane depressurization (SMD) systems are typically used in buildings with earthen floor basements or crawlspaces. SMD systems are similar to SSD systems with the exception that depressurization occurs below an impermeable membrane instead of a concrete slab. The best approach for using an SMD system is to place various lengths of perforated piping horizontally over the earthen floor and cover the piping with a vapor barrier. To prevent the impermeable membrane from blocking the perforations in the piping when a vacuum is drawn, highly permeable material (gravel or pea stone) can be packed between and on top of the piping. Vapor barriers used in SMD systems should be chemical resistant membranes that prevent the transmission of CVOCs.

Conclusion: This RT is a viable option and will be retained for further consideration for future occupied buildings.

#### **7.4.4 EX-SITU TREATMENT**

The primary purpose of *ex-situ* treatment technologies is to remove impacted media, and thus control potential exposure risks.

Excavation involves the removal of impacted soil that presents a potential direct contact risk, along with soil which may serve as a continuing source of impacts to groundwater. The impacted soil is removed from its current setting and transported off-Site for constituent of concern removal, recycling and/or disposal. CVOC impacted soil remains in the northern and southwestern portions of the Site. The majority of CVOC impacted soil was identified in the upper six feet bgs; however, isolated impacts have been identified at the bedrock interface. Dewatering would be required to remove isolated subsurface soil, which would also require treatment and management of impacted groundwater. Dewatered groundwater would be temporarily stored on-site using fractionation (frac) tanks and following treatment through the use of granulated activated carbon units may be discharged to a municipal utility under a permit, or to a catch basin/water body under a US EPA Dewatering and Remediation General Permit (DRGP); or, disposed to a licensed acceptance facility under a MassDEP Bill of Lading (BOL), or managed as hazardous remediation waste.

Conclusion: This RT is a viable option and will be retained for further consideration.

#### **7.5 IN-SITU TREATMENT**

*In-situ* (organic or inorganic/chemical) treatment or augmentation technologies are most dependent upon the ability to deliver the treatment material to the affected subsurface area, and the sustainability or effective life of the material. CVOC constituents in Site groundwater are amenable to chemical oxidative technologies (ozone, permanganate, persulfate, oxygen releasing compounds (ORC), and hydrogen peroxide), aerobic and anaerobic biological technologies, and chemical reducing

technologies (zero valent iron). To effectively assess performance, bench-scale treatability studies and pilot testing is recommended prior to implementation.

*In-situ* chemical oxidation (ISCO) is a remediation process in which constituents of concern are chemically converted to less toxic compounds (water, oxygen, and carbon dioxide). There are several types of commercially available oxidants that have been demonstrated to be effective in reducing CVOC constituents of concern in groundwater. Effective distribution of the reagents and the reactivity of the selected oxidant with the constituents of concern are crucial in achieving reduction in CVOC concentrations. Soil oxidant demand varies with soil type, the nature of the site groundwater, and soil composition. Oxidant demand is based upon total mass of impacted media and mass distribution. Groundwater monitoring is essential in evaluating the performance of this remedy. Chemical oxidation typically involves reduction/oxidation (redox) reactions that chemically convert hazardous compounds to nonhazardous or less toxic compounds that are more stable, less mobile, or inert. Redox reactions involve the transfer of electrons from one compound to another. Specifically, one reactant is oxidized (loses electrons) and one is reduced (gains electrons). The oxidizing and reducing agents most commonly used for treatment of hazardous constituents in soil and groundwater are zero valent iron, hydrogen peroxide, catalyzed hydrogen peroxide, potassium permanganate, sodium permanganate, sodium persulfate, and ozone. Each reagent has advantages and limitations, and while applicable to soil and some source zone impacts, they have been applied primarily toward remediating groundwater.

Bioremediation uses microorganisms to degrade organic constituents in soil, sludge, and solids either excavated or *in-situ*. The microorganisms break down constituents of concern by using them as a food source or co-metabolizing them with a food source. Aerobic processes require an oxygen source, and the end products typically are carbon dioxide and water. Anaerobic processes are conducted in the absence of oxygen, and the end products can include methane, hydrogen gas, sulfide, elemental sulfur, and dinitrogen gas.

*In-situ* techniques stimulate and create a favorable environment for microorganisms to grow and use constituents as a food and energy source. Generally, this means providing some combination of oxygen, nutrients, and moisture, and controlling the temperature and pH adjustment. Sometimes, microorganisms that have been adapted for degradation of specific constituents are applied to enhance the process.

Conclusion: This RT is a viable option and will be retained for further consideration. To effectively assess performance, bench-scale treatability studies and pilot testing is recommended prior to implementation.

## 7.6 MONITORING

Groundwater monitoring is conducted as a measure to assess the effectiveness of the cleanup. Groundwater is collected from monitoring wells at and/or hydraulically downgradient of the cleanup area. This option is also effective for assessing groundwater conditions surrounding impacted areas that have been capped.

Monitoring of Active and Passive Containment Systems includes inspections and sampling and analysis to evaluate system effectiveness.

Conclusion: This RT is a viable option that will be retained for additional consideration.

## 8.0 PHASE III - EVALUATION OF REMEDIAL ACTION ALTERNATIVES

As discussed earlier, six potential RTs are evaluated from the set of viable technologies at this Site for addressing impacted media at the Site. The following RAAs have been developed and are summarized below and in Table 1.

1. RAA-1: No Remedial Action;
2. RAA-2: Institutional Controls;
3. RAA-3: Passive Containment and/or Mitigation Measures;
4. RAA-4: Active Treatment/Removal/Containment;
5. RAA-5: *In-Situ* Technologies; and
6. RAA-6: Monitoring.

The identified RAAs were evaluated with respect to the criteria established in the MCP for a detailed evaluation (310 CMR 40.0858). These criteria are:

1. Comparative Effectiveness. This criterion provides an evaluation of the effectiveness of the RAAs in achieving a Permanent or Temporary Solution; reusing, recycling, destroying, detoxifying, or treating oil or hazardous material (OHM); and reducing levels of residual OHM to background levels.
2. Comparative Reliability. This criterion evaluates the degree of certainty that the RAA will be successful, and the effectiveness of any measures required to treat residues or remaining waste, or control emissions or discharges to the environment.
3. Comparative Difficulty in Implementation: This criterion evaluates the comparative difficulty in implementing the RAA. It includes an evaluation of:
  - The technical complexity of the RAA;
  - Integration of the RAA with facility operations or other remedial actions;
  - Necessary monitoring, operations, maintenance or site access;
  - Availability of necessary services, materials, equipment or specialists;
  - Availability, capacity and location of off-Site treatment, storage, and disposal facilities; and
  - Whether the RAA meets the requirements for any necessary regulatory approvals, permits or licenses.
4. Comparative Cost. This criterion includes evaluation of implementation costs, including design, construction and, if necessary, operation and maintenance costs, costs of environmental restoration, and costs of consumption of energy resources.
5. Comparative Risks. This criterion includes an evaluation of short-term on-Site and off-Site risks posed by implementation of the RAA associated with excavation, transport, disposal, containment, construction, operation or maintenance activities, or discharges from the remedial system; on-Site and off-Site risks posed by the RAA until the remedial objectives are attained; and potential risks to human health, public welfare, the environment posed by residual impacted media once the remedial action is completed.

6. Comparative Benefits. This criterion includes an evaluation of the benefit of restoring natural resources, providing for the productive reuse of the Site, the avoided costs associated with relocating people, and the avoided lost property value of the Site.
7. Comparative Timeliness. This criterion includes an evaluation of timeliness of the RAA in eliminating uncontrolled sources and attaining a condition of NSR.
8. Comparative Effect Upon Non-Pecuniary Interests. This includes an evaluation of the RAAs effect on non-pecuniary issues such as aesthetic issues.

## 8.1 COMPARATIVE EVALUATIONS

The comparative evaluation of each of these criteria is discussed below and is summarized in Table 2A. In order to quantify the benefits of each alternative and select the most appropriate RAA, a criteria-based numerical scoring of each of the RAAs has been conducted and is presented in Table 2B. In this evaluation, each of these criteria is given equal weight of importance. For a given RAA, a score ranging from 1 (lowest ranking) to 5 (highest ranking) was assigned for each criterion based upon that RAAs ability to satisfy the criterion. The RAA with the highest overall score was judged to be the most appropriate RAA for the Site (Tables 2A and 2B).

### 8.1.1 Comparative Effectiveness

In accordance with 310 CMR 40.0858, "the effectiveness of each RAA was evaluated in terms of a) achieving a Permanent or Temporary Solution under 310 CMR 40.1000; (b) reusing, recycling, destroying, detoxifying, or treating oil and hazardous material at the disposal Site; and (c) reducing levels of untreated OHM at the Site to concentrations that achieve or approach background." The relative effectiveness of a Permanent Solution is judged based upon the RAAs ability to reduce the mobility, toxicity, or volume. Refer to Tables 2A and 2B.

1. RAA-1: No Remedial Action: This RAA is ineffective at reducing concentrations of constituents of concern at the Site.
2. RAA-2: Institutional Controls: A Notice of AUL is implemented to effectively address engineering controls, if combined with another RAA.
3. RAA-3: Passive Containment: This technology is effective at mitigating potential direct contact exposure to impacted media. A vapor barrier can effectively mitigate exposure to CVOC impacts to indoor air in future occupied buildings. A Passive SSDS can effectively mitigate exposure to constituents of concern in indoor air in future occupied buildings and is more effective when combined with a vapor barrier.
4. RAA-4: Active Treatment/Removal/Containment: This technology is effective at remediating impacted soil, but requires combination with other RAAs. An AEPMM is an effective RT to mitigate CVOC impacts to indoor air in future occupied buildings.
5. RAA-5: In-Situ Technologies: are an effective RT to reduce CVOC impacts to Site soil and groundwater.

6. RAA-6: Monitoring: Monitoring is effective to monitor the effectiveness of other RAAs. Groundwater monitoring is an effective measure to evaluate the effectiveness of *in-situ* technologies, along with potential vapor intrusion impacts. However, this measure is ineffective at reducing Site impacts in areas where source removal is not conducted. Monitoring of passive and active remedial systems and monitoring of vapor barriers are effective RTs to evaluate the conditions and effectiveness of these RTs.

### 8.1.2 Comparative Reliability

In accordance with 310 CMR 40.0858 (2), the short and long-term reliability for each of the RAAs were evaluated based upon “(a) the degree of certainty that the RAA would be successful; and (b) the effectiveness of measures required to manage residues or remaining wastes or control emissions or discharges to the environment.” Specific factors considered in judging the short and long-term reliability include: protection of workers and the community during construction, environmental impacts resulting from implementation of the remedial response action, the time required to achieve protection and long-term reliability of management controls providing protection from residual wastes. Refer to Tables 2A and 2B.

1. RAA-1: No Remedial Action: This RAA is ineffective at controlling discharges to the environment and has a low degree of certainty of success in reliability since no remediation is conducted.
2. RAA-2: Institutional Controls: A Notice of AUL is a reliable measure to address engineering controls associated with impacted soils but ineffective for remediation of site impacts without another RT.
3. RAA-3: Passive Containment and/or Mitigation Measures: A clean cap is a reliable measure to mitigate potential direct contact exposure to impacted soils and prevent infiltration of rainwater. A vapor barrier, in combination with a passive SSDS, is a moderately reliable measure to mitigate exposure to constituents of concern in indoor air in future occupied buildings.
4. RAA-4: Active Treatment/Removal/Containment: Excavation of impacted soil is a reliable measure to remove sources of constituents of concern at the Site, but requires management of waste soil and groundwater if dewatering is required. An AEPMM is a reliable RT to mitigate CVOC impacts to indoor air in future occupied buildings.
5. RAA-5: In-Situ Technologies: *In-situ* technologies are reliable measures to reduce Site constituent impacts to soil and groundwater.
6. RAA-6: Monitoring: Groundwater monitoring is conducted to assess monitored natural attenuation and potential migration of impacted groundwater. Monitoring of indoor air and groundwater are reliable measures to evaluate the effectiveness of source removal/treatment technologies. Monitoring, when combined with maintenance, are reliable measures to evaluate the condition of passive and active remedial RTs.

### 8.1.3 Comparative Difficulty in Implementation

In accordance with 310 CMR 40.0858(3), difficulty in implementation of each of the alternatives was evaluated based upon: "(a) the technical complexity of the alternative; (b) where applicable the integration of the alternative with existing facility operations and other current or potential remedial actions; (c) any necessary monitoring, operations, maintenance or site access requirements or limitations; (d) the availability of necessary services, materials, equipment, or specialists; (e) the availability, capacity and location of necessary off-Site treatment, storage and disposal facilities; and (f) whether the alternative meets regulatory requirements for likely approvals, permits or licenses required by MassDEP or other state, federal or local agencies." Refer to Tables 2A and 2B.

1. RAA-1: No Remedial Action: There is no technical complexity associated with this alternative.
2. RAA-2: Institutional Controls: There is low to moderate technical complexity associated with implementation.
3. RAA-3: Passive Containment and/or Mitigation Measures: There is moderate technical complexity associated with implementation.
4. RAA-4: Active Treatment/Removal/Containment: There is moderate to high technical complexity associated with implementation.
5. RAA-5: In-Situ Technologies: There is moderate to high technical complexity associated with implementation.
6. RAA-6: Monitoring: There is low to moderate technical complexity associated with implementation.

### 8.1.4 Comparative Costs

In accordance with 310 CMR 40.0858 (4), the cost to implement each alternative was evaluated based upon (a) costs of implementing the alternative, including without limitation: design, construction, equipment, site preparation, labor, permits, disposal, operation, maintenance and monitoring costs; (b) costs of environmental restoration, potential damages to natural resources, including consideration of impacts to surface waters, wetlands, wildlife, fish and shellfish habitat; and (c) the relative consumption of energy resources in the operation of the alternatives, and externalities associated with the use of those resources.

1. RAA-1: No Remedial Action: Total estimated costs are high due to long-term OM&M.
2. RAA-2: Institutional Controls: There are low costs to implement this action.
3. RAA-3: Passive Containment and/or Mitigation Measures: There are low to moderate costs associated with this technology.
4. RAA-4: Active Treatment/Removal/Containment: There is moderate to high technical cost associated with implementation.
5. RAA-5: In-Situ Technologies: There are moderate costs associated with this technology.

6. RAA-6: Monitoring: There are low to moderate costs associated with short term monitoring and reporting, and moderate to high costs associated with long term monitoring and reporting.

### 8.1.5 Comparative Risks

In accordance with 310 CMR 40.0858(5), the risks associated with each RAA were evaluated based upon: (a) the short-term on-site and off-site risks posed during implementation of the RAA associated with any excavation, transport, disposal, containment, construction, operation or maintenance activities, or discharges to the environment from remedial systems; (b) the on-site and off-site risks posed over the period of time required for the RAA to attain applicable remedial standards, including risks associated with ongoing transport, disposal, containment, operation or maintenance activities, or discharges from remedial systems; and (c) the potential risk of harm to health, safety, public welfare or the environment posed to human or environmental receptors by any oil and/or hazardous material remaining at the disposal site after the completion of the remedial action.

1. RAA-1: No Remedial Action: There are high risks associated with this action as impacted media would not be remediated.
2. RAA-2: Institutional Controls: There are moderate risks associated with this action. However, there is a moderate risk of harm to human and environmental receptors if impacted media remains in place without additional RTs.
3. RAA-3: Passive Containment and/or Mitigation Measures: There are low to moderate risks associated with this technology.
4. RAA-4: Active Treatment/Removal/Containment: There are moderate risks associated with this technology.
5. RAA-5: In-Situ Technologies: There are moderate short-term risks associated with this technology, which are mitigated by proper Health and Safety measures.
6. RAA-6: Monitoring: There are low to moderate risks associated with implementation of this activity.

### 8.1.6 Comparative Benefits

In accordance with 310 CMR 40.0858(6), the benefits of each RAA were evaluated based upon: "(a) the benefit of restoring natural resources; (b) providing for the productive reuse of the Site; (c) the avoided costs of relocating people, businesses, or providing RAA water supplies; and (d) the avoided lost value of the Site."

1. RAA-1: No Remedial Action: There is no benefit associated with this alternative.
2. RAA-2: Institutional Controls: This measure is beneficial as it provides administrative control and provides productive Site reuse.
3. RAA-3: Passive Containment and/or Mitigation Measures: These technologies are moderately beneficial in mitigating exposure to impacted media. However, this technology is most feasible after source removal.
4. RAA-4: Active Treatment/Removal/Containment: This measure is beneficial in mitigating exposure to impacted media.

5. RAA-5: In-Situ Technologies: This is a beneficial technology to reduce constituent of concern impacts and allow for productive Site reuse.
6. RAA-6: Monitoring: Monitoring is a beneficial measure in combination with other RAAS.

### 8.1.7 Comparative Timeliness

In accordance with 310 CMR 40.0858(7), a review is required of "the comparative timeliness of the RAAs in terms of eliminating any uncontrolled sources of oil and/or hazardous material and achieving a level of No Significant Risk as described in 310 CMR 40.0900."

1. RAA-1: No Remedial Action: This alternative will not achieve a level of NSR in a reasonable timeframe.
2. RAA-1: Institutional Controls: A Notice of AUL can be implemented within a short time period (weeks) to achieve NSR, assuming successful implementation of other RTs.
3. RAA-2: Passive Containment and/or Mitigation Measures: Passive containment is moderate in the timeliness to achieve NSR and assumes combination with other RTs.
4. RAA-3: Active Treatment/Removal/Containment: This RT can be implemented within a short time period (weeks) to achieve NSR, assuming implementation of additional RTs.
5. RAA-4: In-Situ Technologies: This technology can be conducted within a moderate time period (weeks to months) to achieve NSR.
6. RAA-5: Monitoring: Groundwater monitoring is anticipated to be conducted within a long time period to achieve NSR.

### 8.1.8 Comparative Effect Upon Non-Pecuniary Interests

The non-pecuniary interests of each RAA were evaluated based upon aesthetics and interests of the local community in accordance with 310 CMR 40.0858(8), "the relative effect of the RAAs upon non-pecuniary interests, such as aesthetic values" was evaluated.

1. RAA-1: No Remedial Action: This alternative has a high effect on non-pecuniary values within the community.
2. RAA-1: Institutional Controls: A Notice of AUL has a minimal impact on the interests of the local community and no impact on aesthetics.
3. RAA-2: Passive Containment and/or Mitigation Measures: Implementation of this RAA will have a low effect on aesthetics and disturbance to the community.
4. RAA-3: Active Treatment/Removal/Containment: Implementation of this RAA will have a short-term moderate impact on aesthetics and disturbance to the community but provide a long-term positive effect on aesthetics.
5. RAA-4: In-Situ Technologies: Implementation of this RAA would have a short-term moderate effect on aesthetics and disturbance to the community.

6. RAA-5: Monitoring: Groundwater monitoring is anticipated to have a moderate effect on aesthetics and disturbance to the community, due to the visible presence of wells and monitoring activities.

## **8.2 FEASIBILITY EVALUATION**

In accordance with 310 CMR 40.0860, a feasibility evaluation has been performed.

Reducing concentrations of constituents of concern in Site groundwater to levels approaching "GW-2" and "GW-3" Standards appears to be feasible in overburden and bedrock groundwater. A number of RTs are required to remediate Site impacts and to mitigate potential impacts to receptors for Site constituents of concern.

## 9.0 PHASE III - SELECTION OF REMEDIAL ACTION ALTERNATIVE

RAAs were selected based upon the detailed evaluation criteria addressed in previous sections of this report and in compliance with the provisions set forth in 310 CMR 40.0850, 40.0900 and 40.1000. The following RAAs were selected as feasible measures to remediate Site constituents of concern. Based upon the results of the Interim Phase II CSA, Ransom has selected a combination of RAAs, which include the following:

1. Institutional Controls: A Notice of AUL is anticipated to be implemented at the Site as an administrative control.
2. Passive Containment: Passive containment, including a vapor barrier and passive SSDSs will be implemented on future Site buildings as a measure to mitigate potential vapor intrusion impacts.
3. Active Treatment/Removal/Containment: CVOC impacted soil in the northern portion of the Site, and impacted sediment within the raceway will be excavated for off-Site disposal. An active SSDS or SMD system may be implemented as an AEPMM on future Site buildings as a measure to mitigate potential vapor intrusion impacts.
4. In-Situ Technologies: *In-Situ* technologies (chemical/biological) will be implemented to reduce constituent of concern sources and mitigate vapor intrusion impacts to receptors. This will result in a reduction of concentrations in constituents of concern groundwater at abutting and downgradient properties and mitigate the threats to indoor air to existing and future buildings.
5. Monitoring: Groundwater monitoring will be conducted to assess the effectiveness of the remediation. Monitoring of passive and active containment systems will be performed to assess condition and effectiveness.

## 10.0 PHASE III COMPLETION STATEMENT

In accordance with CMR 40.0862 requirements, the following opinions are rendered:

1. This Phase III RAP conforms to applicable requirements and meets the Phase III performance standards.
2. The selected RAAs are anticipated to achieve a MCP Permanent or Temporary Solution.
3. The selected RAAs are anticipated to mitigate potential exposure impacts to environmental and human receptors.
4. A combination of RAAs is a feasible option to reduce constituent of concern impacts within a timely and cost-effective manner that reduces risk and is beneficial to the community and contributes to the overall aesthetics of the Site.
5. Implementation of the selected RAAs are likely to achieve a level of NSR at the Site.

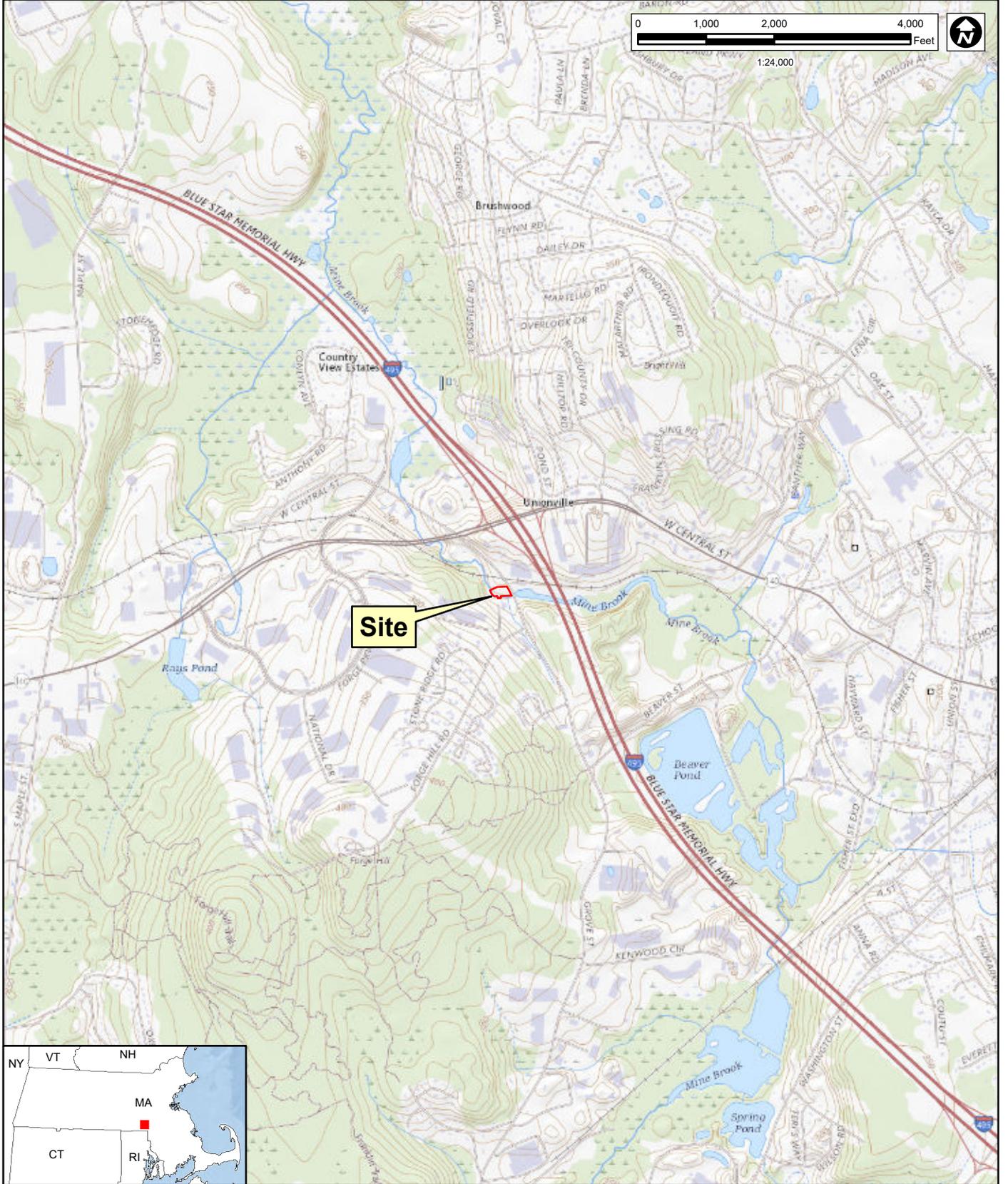
## 11.0 LIMITATIONS

This report was prepared for the use of the Town of Franklin. The findings provided by Verdantas in this report were based solely upon the information reported in this document. Should additional information become available in the future, this information should be reviewed by Verdantas and the findings presented herein may be modified.

The response actions completed at the Site have been undertaken in accordance with generally accepted consulting engineering practices. No other warranty, expressed or implied, is made. It is Verdantas' understanding that this report is to be used exclusively by the Town of Franklin until it is filed with MassDEP, at which time it will become a part of the public record. Until this report is filed with the MassDEP, the content of this report may not be copied, provided to, or otherwise communicated to any party not directly involved in this response, in whole or in part, without written consent of Verdantas.

## FIGURES

<b>FIGURE 1</b>	<b>SITE LOCATION MAP</b>
<b>FIGURE 2</b>	<b>SITE PLAN</b>
<b>FIGURE 3</b>	<b>CURRENT EXTENT OF CVOC IMPACTS IN GROUNDWATER</b>



**Site**



**Legend**

 Subject Property

Latitude 42°05'14"N  
Longitude 71°25'42"W

Source: The USGS topo quad is from The National Geographic Society, i-cubed web service "USA Topo Maps".

January 2024

Former NuStyle Property  
Town of Franklin

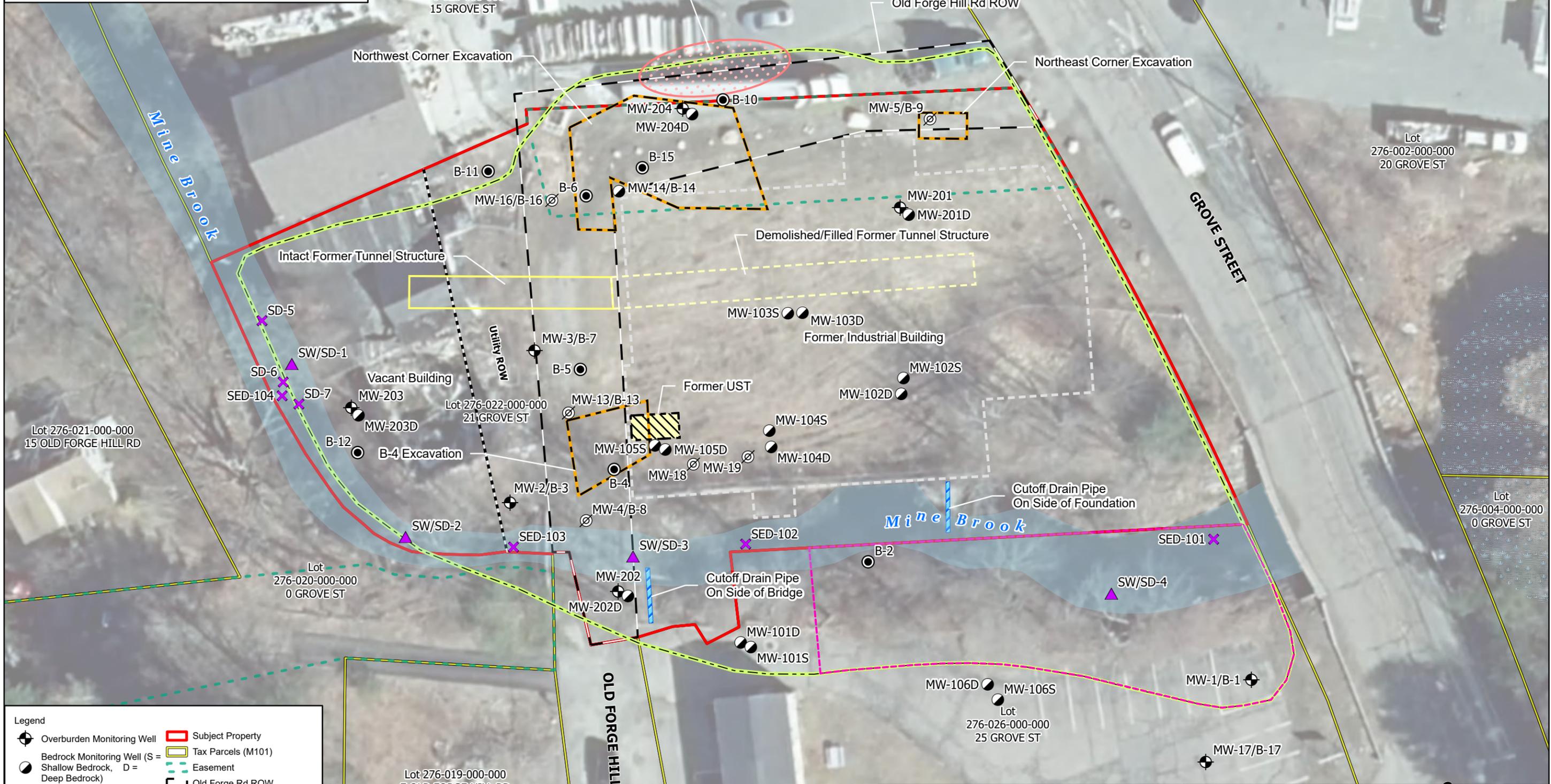
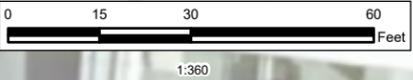
**Site Location Map**

21 Grove Street  
Franklin, Massachusetts

Figure

**1**

**Note:** The parcels and easements were acquired from the MassGIS Level 3 Parcel Data Layer; the aerial was acquired from the MassGIS imagery service "2021 USGS Color Ortho Imagery for Massachusetts". Site features are approximately located and acquired from three map sources: 1) "Site Plan" prepared by Fuss & O'Neill, dated January 2008 & March 2013; 2) "Nobis Sampling Locations" prepared by Nobis Engineering, Inc. dated May 2013; 3) "Disposable Site Boundary" prepared by Tata & Howard, dated September 2015.



Legend	
	Overburden Monitoring Well
	Bedrock Monitoring Well (S = Shallow Bedrock, D = Deep Bedrock)
	Missing/Destroyed Monitoring Well
	Soil Boring
	Sediment Sample
	Historic Sediment and Surface Water Sample
	Subject Property
	Tax Parcels (M101)
	Easement
	Old Forge Rd ROW
	Disposal Site Boundary (dashed where inferred)
	Area of Disposal Site Subject to the Permanent Solution - Partial
	Area of Excavation
	Former UST

**verdantas**  
PEOPLE FOCUSED FUTURE

January 2024

Former NuStyle Property  
Town of Franklin

**Site Plan**

21 Grove Street  
Franklin, Massachusetts

Figure

**2**



## TABLES

<b>TABLE 1</b>	<b>INITIAL SCREENING OF POTENTIAL REMEDIAL ACTION ALTERNATIVES</b>
<b>TABLE 2A</b>	<b>COMPARATIVE EVALUATION OF REMEDIAL ACTION ALTERNATIVES</b>
<b>TABLE 2B</b>	<b>REMEDIAL ACTION ALTERNATIVES EVALUATION MATRIX</b>
<b>TABLE 3</b>	<b>COST ESTIMATE FOR SELECTED REMEDIAL ACTION ALTERNATIVES</b>

**TABLE 1**  
**INITIAL SCREENING OF POTENTIAL REMEDIAL ACTION ALTERNATIVES**  
Phase III Identification, Evaluation and Selection of Comprehensive Remedial Action Alternatives and Remedial Action Plan  
21 Grove Street  
Franklin, Massachusetts  
MassDEP Release Tracking No. (RTN) 2-16694

General Remedial Action Technology	Specific Remedial Technology	Description	Effectiveness	Reliability	Implementability	Cost	Viability
1. No Remedial Action	No Remedial Effort	The no action alternative assumes no additional efforts are made to mitigate chemical constituents in the soil or groundwater at the Site.	Effective as a Temporary Solution, but does not provide any mitigation of constituents of concern or any protection for human and environmental receptors.	Low reliability.	Readily implementable.	Low costs.	Retained for further consideration.
2. Institutional Controls	AULs, Deed Restrictions	Limits future Site uses to those that pose acceptably low risk of human exposure to Site impacts and requires specific health and safety protocols for subsurface work.	Effective for protection of human health by limiting exposures to Site soils and/or groundwater if enforced. AULs cannot be used to mitigate the risk posed by impacted groundwater. Does not reduce toxicity or volume of compounds.	Low to Moderate Reliability.	Readily implementable.	Low costs.	Viable technology as an administrative control. Retained for further consideration.
3. Passive Containment	Vertical and Horizontal Barriers  Passive Subslab Depressurization System (SSDS)	Passive mitigation measures include the installation of a barrier or barriers to prevent the migration of impacted vapors to the indoor air. Passive containment involves placement of horizontal physical barriers, such as a cap or geotextile barrier, or vertical barriers, such as a grout curtain, slurry wall, sheet piling. Asphalt pavement, concrete and building slabs also serve as barriers to impacted soils.  Vapor barriers may be composed of high density polyethylene (HDPE), low density polyethylene (LDPE), very-low density polyethylene (VDPE) materials; spray-applied materials composed of a rubberized asphalt emulsion or epoxy; or any other chemical resistant membrane that prevents the transmission of volatile organic compounds (VOCs).  A Passive SSDS serves as a venting system to create a preferential pathway to divert the vapors from the subsurface to the ambient air above the building. Recover impacted groundwater by pumping to the surface and treating. Provides hydraulic containment and can be used to lower water table and treat groundwater.	Vertical barrier (i.e., permeable reactive barrier [PRB]) may be effective after source reduction, as a measure to mitigate off-site migration of a plume, rather than remediate source.  Horizontal barrier (i.e., cap, vapor barrier) is a feasible RT to mitigate vapor intrusion.  A Passive SSDS is an effective measure to mitigate vapor intrusion and may be used alone or in combination with a barrier (i.e., vapor barrier) under conditions of lower VOC concentrations.	For a vertical barrier, moderate to high reliability.  A horizontal barrier is reliable if properly constructed and maintained.  A passive SSDS is less reliable than an Active SSDS under conditions of high VOC concentrations. However, its reliability is increased when used in combination with another measure, such as a vapor barrier.	A vapor barrier is implementable for future construction, including underground utilities. May need to include groundwater control technologies to mitigate potential off-site migration of impacted groundwater. A Passive SSDS is implementable.	Horizontal passive containment/mitigation: Moderate capital costs.  Vertical barrier: High capital costs.	Horizontal and vertical barriers are retained for further consideration.
4. Active Treatment/Removal/Containment	Treatment of and/or mitigation of impacted media	Vapor intrusion mitigation systems that employ a fan or blower to draw VOC vapors into collection points and discharge them away from the affected building are considered "active" mitigation systems. Active mitigation systems are considered Active Exposure Pathway Mitigation Measures or AEPMMs under the MCP (as defined at 310 CMR 40.0006(12)), measures directed at an Exposure Pathway which rely on the continual or periodic use of a mechanical or electro-mechanical device to reduce exposures and meet applicable performance standards.  Excavation and off-site disposal of impacted soil. Excavation of isolated subsurface soil within the water table would also require dewatering and management of impacted groundwater.  Soil vapor extraction (SVE) with air sparging (AS) circulates air through overburden and saturated soils to induce desorption of chlorinated solvents from soil and	Groundwater recovery/treatment effective for protection of human health and the environment by limiting exposures and in controlling groundwater flow and in treatment of impacted groundwater.  AEPMM is effective for mitigating exposure to constituents of concern attributable to vapor intrusion.  Removal of impacted soil is effective for protection of human health and the environment by limiting exposure and removes a source of ongoing impacts.  While SVE and AS is generally effective at reducing concentrations of CVOCs in saturated and unsaturated soil, constituents of concern in soil are generally located in isolated portions of the Site. AS has the secondary benefit to volatilize CVOCs from groundwater.	Low to High reliability.	Groundwater recovery and treatment unlikely to remediate impacted bedrock groundwater.  AEPMM are implementable at existing and future buildings.  Soil excavation is readily implementable.  SVE and AS are implementable, but unlikely to significantly remediate impacted bedrock groundwater.	High costs associated with groundwater recovery and treatment.  AEPMM: Moderate implementation costs. Moderate operation, monitoring and maintenance (OM&M) costs.  Soil excavations are moderate to high costs.  SVE and AS costs are moderate to high implementation costs with high OM&M costs.	Groundwater recovery and treatment is not retained for further consideration.  AEPMM is retained for further consideration.  Soil excavation is retained for further consideration.  SVE and AS are not retained for further consideration.
5. In-Situ Technologies	In-Situ Chemical Oxidation (ISCO)  In-Situ Chemical Reduction (ISCR)  In-Situ Bioremediation (ISB)	Injection of oxidants, chemicals, reducing compounds and/or microbes and potentially coamendments directly across the Site.	Moderately to highly effective in reducing chlorinated volatile organic compound (CVOC) concentrations .	Moderate to high reliability.	Readily implementable.	Moderate to high costs. Moderate OM&M costs.	A viable technology. Retained for further consideration.
6. Monitoring	Monitoring to assess effectiveness of other RAAs.	Visual monitoring of passive/active containment measures to assess condition, along with collection and analysis of samples (i.e., indoor air, groundwater) based on measurement of specific parameters.	Effective after active measures have stabilized and/or reduce concentrations of constituents of concern impact.	Moderate to high reliability.	Readily implementable.	Moderate costs.	Viable technology. Retained for further consideration.

**TABLE 2A**  
**COMPARATIVE EVALUATION OF REMEDIAL ACTION ALTERNATIVES**  
Phase III Identification, Evaluation and Selection of Comprehensive Remedial Action Alternatives and Remedial Action Plan  
21 Grove Street  
Franklin, Massachusetts  
MassDEP Release Tracking No. (RTN) 2-16694

Evaluation Criteria	Remedial Action Alternative 1	Remedial Action Alternative 2	Remedial Action Alternative 3	Remedial Action Alternative 4	Remedial Action Alternative 5	Remedial Action Alternative 6
	No Remedial Action	Institutional Controls	Passive Containment and/or Mitigation Systems	Active Treatment/Removal/Containment	In-Situ Technologies	Monitoring
<b>1. Effectiveness</b>						
a) <b>Ability to Achieve a Permanent or Temporary Solution</b>	This alternative may not achieve a Permanent Solution.	This alternative may achieve a Permanent Solution when combined with at least one RT.	This alternative may achieve a Permanent Solution when combined with another RT.	This alternative may achieve a Permanent Solution when combined with another RT.	This alternative may achieve a Permanent Solution.	This alternative may achieve a Permanent Solution when combined with another RT.
b) <b>Ability to Reuse, Recycle, Destroy, Detoxify, or Treat</b>	This alternative does <b>not</b> reuse, recycle, destroy, detoxify, or treat impacted media.	This alternative does <b>not</b> reuse, recycle, destroy, detoxify, or treat impacted media.	This alternative does <b>not</b> reuse, recycle, destroy, detoxify, or treat impacted media.	This alternative does reuse, recycle, destroy, detoxify, or treat impacted media.	This alternative does reuse, recycle, destroy, detoxify, or treat impacted media.	This alternative does not reuse, recycle, destroy, detoxify, or treat impacted media.
c) <b>Ability to Achieve or Approach Background</b>	This alternative is not anticipated to achieve but it may approach background over time.	This alternative is not anticipated to achieve or approach background.	This alternative is not anticipated to achieve or approach background.	This alternative is not anticipated to achieve but it may approach background.	This alternative is not anticipated to achieve but it may approach background.	This alternative is not anticipated to achieve but it may approach background.
<b>Effectiveness Ranking</b>	1	2	3	4	5	3
<b>2. Reliability (Short-term and Long-term)</b>						
a) <b>Degree of Certainty of Success</b>	This alternative has a low degree of certainty of success in reliability, since no remediation is conducted.	This alternative has a moderate degree of certainty of success in reliability, when combined with another alternative.	This alternative has a moderate degree of certainty of success in reliability.	This alternative has a moderate to high degree of certainty of success in reliability.	This alternative has a moderate to high degree of certainty of success in reliability.	This alternative has a moderate certainty of success in reliability, since it relies on other technologies.
b) <b>Effectiveness in Managing Residues and Wastes</b>	No wastes generated.	No wastes generated.	Minimal wastes generated.	Minimal waste generated during construction of active exposure pathway mitigation measures (AEPMMs). For ex-situ treatment, waste will be generated for soil disposal, and groundwater if dewatering is required.	Minimal waste will be generated for injection well installation.	Minimal wastes generated during monitoring.
c) <b>Effectiveness in Controlling Emissions or Discharges</b>	No effectiveness in controlling constituent of concern sources.	Administrative control only.	Health & Safety measures will be implemented. Effective in controlling exposure to constituent of concern sources.	Health & Safety measures will be implemented. Effective in controlling exposure to constituent of concern source.	Effective in controlling discharges, assuming that groundwater mounding is controlled and migration pathways are protected.	Not effective in controlling emissions or discharges, but may be effective in assessing the presence thereof.
<b>Reliability Ranking</b>	1	2	3	4	5	3
<b>3. Ease of Implementation</b>						
a) <b>Technical Complexity</b>	No technical complexity associated with implementation of this alternative.	Low to moderate technical complexity associated with implementation of this alternative.	Moderate technical complexity associated with implementation of this alternative.	Moderate to high technical complexity associated with implementation of this alternative.	Moderate to high technical complexity associated with implementation of this alternative.	Low technical complexity associated with implementation of this alternative.
b) <b>Integration with Existing/Future Facility Operations</b>	Not easily integrated, due to exposure associated with future development.	Easily integrated.	Moderate integration.	Moderate integration, since majority of Site is unoccupied.	Moderate integration, since majority of Site is unoccupied.	Low integration, since majority of Site is unoccupied.
c) <b>Operations, Monitoring, and Maintenance (OM&amp;M) Requirements or Limitations</b>	OM&M required to assess Site conditions.	Not applicable.	Low OM&M measures required.	Moderate to high OM&M measures required.	Moderate to high OM&M measures required.	Low to moderate OM&M required.
d) <b>Site Access Requirements or Limitations</b>	Ongoing access limitations.	No access limitations during implementation.	Temporary access limitations during implementation.	Temporary access limitations during implementation.	Temporary access limitations during implementation.	Temporary access limitations during implementation.
e) <b>Availability of Services, Materials, Equipment or Specialists</b>	Specialized materials, equipment, or specialists not required for implementation.	Specialized materials, equipment, or personnel not required for implementation.	Specialized materials, equipment, or specialists will be required for implementation.	Specialized materials, equipment, or specialists will be required for implementation.	Specialized materials, equipment, or specialists will be required for implementation.	Specialized materials, equipment, or specialists will be required for implementation.
f) <b>Availability, Capacity and Location of Offsite Treatment, Storage and Disposal Facilities</b>	No level of capacity required.	No level of capacity required.	Low level of capacity required.	Moderate level of capacity required.	Low to Moderate level of capacity required.	Low level of capacity required.
g) <b>Meets Requirements for Required Permits or Licenses</b>	No.	Yes.	No specific permits/licenses.	Permits required for discharge.	Adhere to MCP requirements for discharges near water body.	No specific requirements/permits.
<b>Implementation Ranking</b>	2	4	4	2	3	4

**TABLE 2A**  
**COMPARATIVE EVALUATION OF REMEDIAL ACTION ALTERNATIVES**  
Phase III Identification, Evaluation and Selection of Comprehensive Remedial Action Alternatives and Remedial Action Plan  
21 Grove Street  
Franklin, Massachusetts  
MassDEP Release Tracking No. (RTN) 2-16694

Evaluation Criteria	Remedial Action Alternative 1	Remedial Action Alternative 2	Remedial Action Alternative 3	Remedial Action Alternative 4	Remedial Action Alternative 5	Remedial Action Alternative 6
	No Remedial Action	Institutional Controls	Passive Containment and/or Mitigation Systems	Active Treatment/Removal/Containment	In-Situ Technologies	Monitoring
<b>4. Comparative Cost</b>						
a) <i>Estimated Cost of Implementation (Design, Construction and Operation)</i>	Total Est. Costs -High-Due to ongoing OM&M.	Low to moderate.	Total Est. Costs -Low to moderate.	Total Est. Costs -Moderate to high.	Total Est. Costs -Moderate to high.	Total Est. Costs - Low to Moderate-Short term; Moderate to high long term.
b) <i>Estimated Cost of Environmental Restoration</i>	Included in above estimated cost calculations	Included in above estimated cost calculations	Included in above estimated cost calculations	Included in above estimated cost calculations	Included in above estimated cost calculations	Included in above estimated cost calculations.
c) <i>Estimated Cost for Energy Resources During Operation</i>	Included in above estimated cost calculations.	Included in above estimated cost calculations.	Included in above estimated cost calculations.	Included in above estimated cost calculations	Included in above estimated cost calculations.	Included in above estimated cost calculations.
<b>Comparative Cost Ranking</b>	1	4	4	3	2	3
<b>5. Risk</b>						
a) <i>Short-term Risk During Implementation</i>	High short term risk as a result impacted media.	Low short term risk implementation.	Low short term risk implementation.	Moderate short term risks associated with initial implementation; Long-term risks are mitigated by OM&M.	Moderate short term risk as a result of the need for OM&M during implementation.	Low risk associated with exposure to impacted media during sampling.
b) <i>On-site and Off-site Risk During Operation</i>	Not applicable.	Not applicable.	Moderate.	Moderate to high during operation.	Moderate to high during operation.	Low risk associated with exposure to impacted media during sampling.
c) <i>Potential Risk Associated with Remaining OHM</i>	High risk, due to potential risk associated with exposure to impacted media if not remediated.	High risk, due to impacted media.	Low to Moderate risk.	Moderate to high risk.	Low risk, assuming OHM is contained/isolated and reduced/mitigated.	Low risk associated with exposure to impacted media during sampling.
<b>Risk Ranking</b>	1	4	4	4	4	4
<b>6. Benefits</b>						
a) <i>Restores Natural Resources</i>	Does not restore natural resources.	Does not restore natural resources.	Reduces some potentially negative impacts of OHM to natural resources.	Reduces some potentially negative impacts of OHM to natural resources.	Reduces potentially negative impacts of OHM to natural resources.	Reduces some potentially negative impacts of OHM to natural resources.
b) <i>Provides Productive Reuse of Site</i>	Limits productive use of the Site for long-term.	Limits some productive use of portions of the Site for long-term.	Provides moderate productive reuse of site for lower concentrations of constituent of concern impacts	Limits some productive use of portions of the Site for short-term but provides productive reuse long-term	Limits some productive use of portions of the Site for short-term but provides productive reuse long-term	Limits some productive use of portions of the Site for long-term.
<b>Benefit Ranking</b>	1	2	3	4	4	3
<b>7. Timeliness</b>						
a) <i>Estimated Duration to Achieve No Significant Risk</i>	High.	Moderate, assuming combination with additional successful RTs.	Moderate to high.	Moderate.	Moderate.	High.
<b>Timeliness Ranking</b>	1	2	2	4	5	2
<b>8. Non-Pecuniary Interests</b>						
a) <i>Relative Effect on Aesthetic Value and Interests of Community</i>	High effect on non-pecuniary values.	Low since measure accommodates redevelopment but restricts some measures.	Low since measure accommodates redevelopment.	Moderate effect, since technology has visible features that impact aesthetics; has short-term impacts and supports redevelopment.	Moderate effect, since technology has few visible features that impact aesthetics; has short-term impacts and supports redevelopment.	Moderate effect on aesthetics, due to visible sampling locations (i.e., monitoring wells).
<b>Non-Pecuniary Interests Ranking</b>	1	4	3	3	4	3

**Notes:**

1. Rankings are comparative with the greatest number possible (5) being the most favorable and the lowest number possible (1) being the least favorable

**TABLE 2B  
REMEDIAL ACTION ALTERNATIVES EVALUATION MATRIX**

Phase III Identification, Evaluation and Selection of Comprehensive  
Remedial Action Alternatives and Remedial Action Plan  
21 Grove Street  
Franklin, MA  
MassDEP Release Tracking No. (RTN) 2-16694

Remedial Alternative	Description	Effectiveness	Reliability	Implementation	Cost	Risk	Benefits	Timeliness	Non-Pecuniary Interests	Total Score	Overall Ranking
1	No Remedial Action	1	1	2	1	1	1	1	1	<b>9</b>	6th
2	Institutional Controls	2	2	4	4	4	4	2	2	<b>24</b>	5th
3	Passive Containment	3	3	4	4	4	4	3	2	<b>26</b>	3rd
4	Active Treatment/Removal/Containment	4	4	2	3	4	4	4	4	<b>28</b>	2nd
5	In-Situ Technologies	5	5	3	2	4	4	4	5	<b>32</b>	1st
6	Monitoring	3	3	4	3	4	3	2	3	<b>25</b>	4th

**Notes:**

1. Rankings are comparative with the greatest number possible (5) being the most favorable and the lowest number possible (1) being the least favorable
2. Total Score = Sum of the individual rankings for the eight evaluation criteria

**TABLE 3**  
**COST ESTIMATE FOR SELECTED REMEDIAL ACTION ALTERNATIVES**  
Phase III Identification, Evaluation and Selection of Comprehensive Remedial Action Alternatives and Remedial Action Plan  
21 Grove Street  
Franklin, Massachusetts  
MassDEP Release Tracking No. (RTN) 2-16694

Task	Description	Estimated Quantity	Unit Cost	Estimated Cost
<b>Institutional Controls</b>				
<b>Engineering Costs</b>				
LSP Services/AUL Implementation		1 job	\$10,000	\$10,000
<b>Subtotal Engineering Costs</b>				<b>\$10,000</b>
<b>Engineering and Capital Contingency</b>				15% of subtotal
<b>TOTAL ESTIMATED ENGINEERING &amp; CAPITAL COSTS-INSTITUTIONAL CONTROLS</b>				<b>\$11,500</b>
<b>Passive Containment and/or Mitigation Measures</b>				
<b>Engineering Costs</b>				
Engineering Services	Design, procurement, permitting	15% of capital costs		\$13,500
Regulatory Reporting		1 reports	\$5,000 report	\$5,000
<b>Capital Costs</b>				
Vapor Barrier	Assume one (10,000 SF) building	1 job		\$30,000
SSDS	Assume one (10,000 SF) building	1 job		\$60,000
<b>Subtotal Capital and Engineering Costs</b>				<b>\$108,500</b>
<b>Capital and Engineering Contingency</b>				15% of subtotal
<b>Project Management</b>				3% of subtotal
<b>TOTAL ESTIMATED ENGINEERING &amp; CAPITAL COSTS-PASSIVE TREATMENT</b>				<b>\$130,000</b>
<b>Active Treatment/ Removal/Containment</b>				
<b>Engineering Costs</b>				
Engineering Services	Design, procurement, permitting	15% of capital costs		\$54,371
Regulatory Reporting		1 reports	\$5,000 report	\$5,000
<b>Capital Costs</b>				
SSDS	Assume 10,000 SF building	1 job		\$80,000
Excavation of shallow CVOC impacted soil	Assumes 450 tons	1 job		\$177,525
Excavation of impacted raceway soil	assumes 100 tons	1 job		\$84,950
Regulatory Reporting	LSP Services/MCP Reporting	1 job		\$20,000
<b>Subtotal Capital and Engineering Costs</b>				<b>\$421,846</b>
<b>Capital and Engineering Contingency</b>				15% of subtotal
<b>TOTAL ESTIMATED ENGINEERING &amp; CAPITAL COSTS-ACTIVE TREATMENT</b>				<b>\$490,000</b>
<b>IN-SITU TECHNOLOGIES-Remedial Injections</b>				
<b>Engineering and Capital Costs</b>			<b>Low Range (1 event)</b>	<b>High Range (2 events)</b>
Bench Scale and Pilot Testing		1 job	\$10,000	\$20,000
Design and Project Management		1 job	\$20,000	\$40,000
Baseline soil and groundwater sampling	Design, procurement, permitting	1 job	\$15,000	\$30,000
In-Situ Remediation -overburden/ bedrock	remedial injections	1 job	\$188,500	\$377,000
Meetings		4 ea	\$1,000	\$2,000
Regulatory Reporting	LSP Services/MCP Reporting	1 job	\$20,000	\$40,000
<b>Subtotal Engineering and Capital Costs</b>			<b>\$244,500</b>	<b>\$489,000</b>
<b>Engineering and Capital Contingency</b>			20% of subtotal	\$48,900
<b>TOTAL ESTIMATED ENGINEERING &amp; CAPITAL COSTS-IN-SITU TECHNOLOGIES (RANGE)</b>			<b>\$300,000</b>	<b>\$600,000</b>
<b>MONITORING</b>				
<b>Engineering Costs</b>			<b>Low Range</b>	<b>High Range</b>
Engineering Services	Design, well installation		\$10,000	\$20,000
Regulatory Reporting (low range)	Status Reports (5 years)	10 reports	\$30,000	
Regulatory Reporting (high range)	Status Reports (20 years)	40 reports		\$120,000
<b>Capital Costs</b>				
Monitoring (Assume 5 years) (low range)	Sampling/analysis (1st yr quarterly; subsequent years bi-annually)		\$120,000	\$150,000
Meetings (2/year)	Assume \$500/meeting		\$5,000	\$20,000
<b>Subtotal Capital and Engineering Costs</b>			<b>\$165,000</b>	<b>\$310,000</b>
<b>Capital and Engineering Contingency</b>			10% of subtotal	\$16,500
<b>TOTAL ESTIMATED ENGINEERING &amp; CAPITAL COSTS-MONITORING (RANGE)</b>			<b>\$180,000</b>	<b>\$340,000</b>
<b>TOTAL RANGE OF ESTIMATED COSTS</b>			<b>\$1,100,000</b>	<b>\$1,600,000</b>

Date: May 2024  
Project Number: 17356



## APPENDIX A

### MASSDEP PHASE I SITE ASSESSMENT MAP

# MassDEP - Bureau of Waste Site Cleanup

## Phase 1 Site Assessment Map: 500 feet & 0.5 Mile Radii

### Site Information:

NUSTYLE  
21 GROVE STREET FRANKLIN, MA

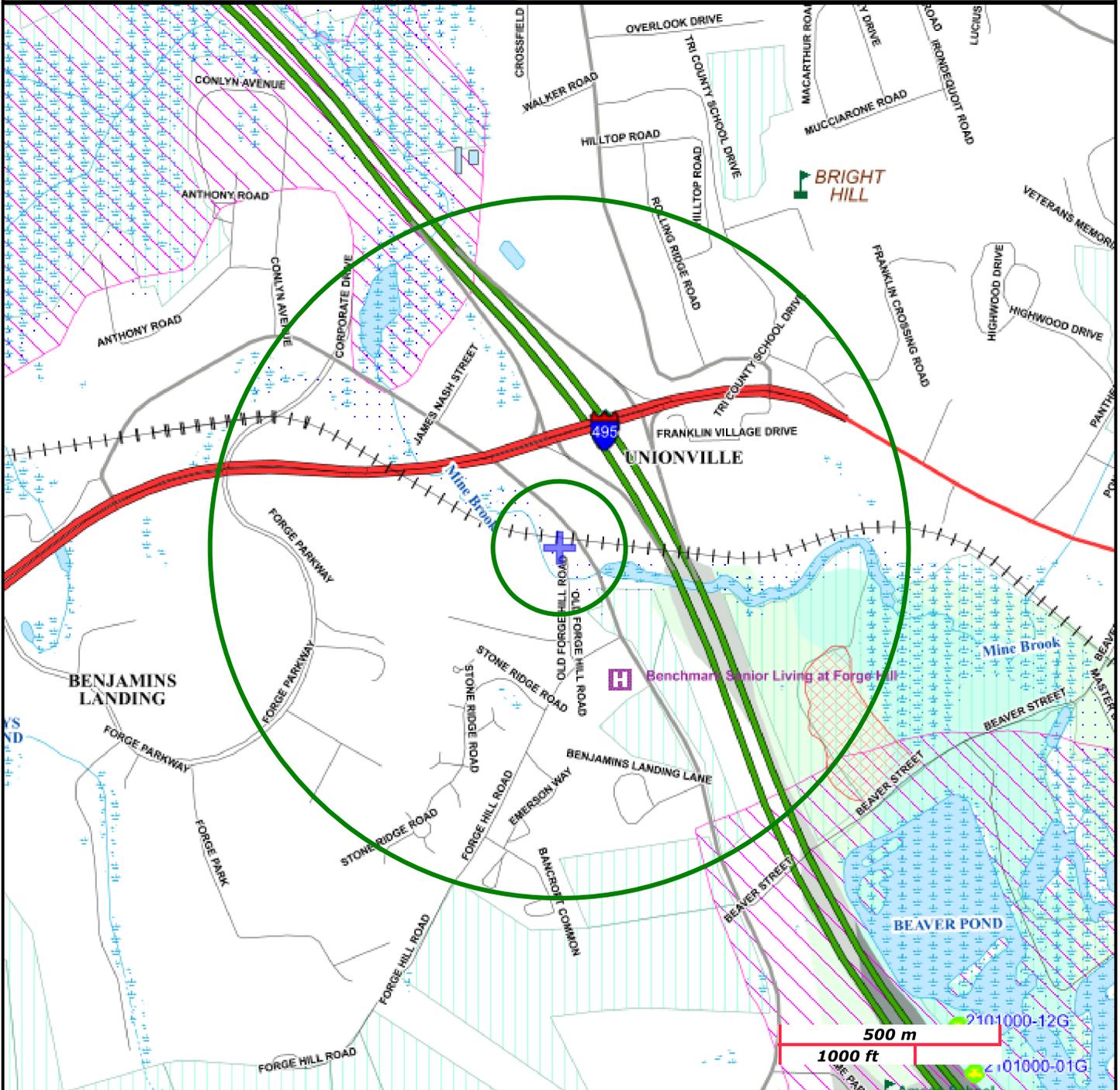
NAD83 UTM Meters:  
4662346mN , 299167mE (Zone: 19)  
October 10, 2022

The information shown is the best available at the date of printing. However, it may be incomplete. The responsible party and LSP are ultimately responsible for ascertaining the true conditions surrounding the site. Metadata for data layers shown on this map can be found at:  
<https://www.mass.gov/orgs/massgis-bureau-of-geographic-information>.



# MassDEP

Commonwealth of Massachusetts  
Department of Environmental Protection



Roads: Limited Access, Divided, Other Hwy, Major Road, Minor Road, Track, Trail

Boundaries: Town, County, DEP Region; Train, Powerline; Pipeline; Aqueduct

Basins: Major, PWS; Streams: Perennial, Intermittent, Man Made Shore, Dam

Aquifers: Medium Yield, High Yield, EPA Sole Source

Non Potential Drinking Water Source Area: Medium, High (Yield)

PWS Protection Areas: Zone II, IWPA, Zone A

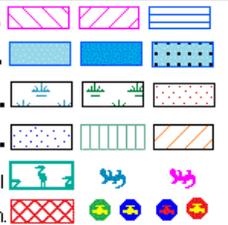
Hydrography: Open Water, PWS Reservoir, Tidal Flat

Wetlands: Freshwater, Saltwater, Cranberry Bog

FEMA 100yr Floodplain; Protected Open Space; ACEC

NHESP Pr-Hab of Rare Species; Vernal Pool: Cert., Potential

Solid Waste Landfill; PWS: Com. GW, SW, Emerg., Non-Com.



Date: May 2024  
Project Number: 17356



## APPENDIX B

### PUBLIC NOTIFICATION LETTERS

May 24, 2024

Verdantas Project 17356

Jamie Hellen  
Town Administrator  
Franklin Town Hall  
355 East Central Street  
Franklin, MA 02038

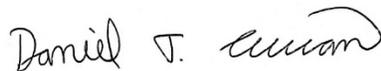
Cathleen Liberty, MPH  
Health Director  
Franklin City Hall  
355 East Central Street  
Franklin, MA 02038

Re: Phase III Remedial Action Plan Report  
Former Nu-Style Property  
21 Grove Street  
Franklin, Massachusetts  
MassDEP Release Tracking Number: 2-16694

As required by the Massachusetts Contingency Plan (MCP), notice is hereby given that a Phase III Identification, Evaluation and Selection of Comprehensive Remedial Action Alternatives and Remedial Action Plan Report has been submitted electronically to the Massachusetts Department of Environmental Protection (MassDEP) for the above referenced site. The report can be viewed on-line by searching for the MassDEP Release Tracking Number using the Massachusetts' Department of Energy and Environmental Affairs Data Portal (<https://eeaonline.eea.state.ma.us/portal#!/wastesite/2-0016694>). You may also contact MassDEP's Central Regional Office located at 8 New Bond Street in Worcester, Massachusetts (508-792-7650).

If you have any questions, please contact our office at 508-226-1800.

Sincerely,  
VERDANTAS LLC



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Daniel Curran  
Project Manager



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Tracey A. Costa, LSP, CHMM, TURP, ENV-SP, LEED Green Associate  
AVP/ Northeast Brownfields Leader