

**DRAFT Analysis of Brownfields Cleanup Alternatives
Carlin Combustion Site
70 Maple Street
East Longmeadow, Massachusetts**

I. Introduction & Background

This Analysis of Brownfields Cleanup Alternatives (ABCA) has been prepared to evaluate cleanup alternatives for the Carlin Combustion Site located at 70 Maple Street in East Longmeadow, Massachusetts (the Site).

1. Site Location

The Site encompasses two parcels, separated by a private driveway, totaling 4.1-acres parcel of land located on Maple Street in East Longmeadow, Massachusetts. The larger 3.6-acre parcel contains a vacant 80,452 square foot single story building constructed in phases between 1950 and 1978 of concrete block and steel frame, slab-on-grade, and a tar and gravel flat roof. Two dilapidated garages are located on the smaller 0.5-acre parcel. The Site is abutted to the north by Maple Street followed by primarily industrial and commercial properties, with one residential property. A multi-use paved recreation path, formerly a rail line, abuts the Site to the east. East of the rail trail is a vacant lot formerly occupied by Community Feed Stores, Inc. (Community Feed), Jos. Chapdelaine Builders & Sons (Chapdelaine), and Hampden Engineering Corporation. South of the Property is land owned by W.J. Quinn Company, Inc. (Quinn) which operates a construction contractor business. Residential properties abut the Site to the west and northwest.

2. Previous Site Use(s) and Any Previous Cleanup / Remediation

The Site was historically operated by R.E. Phelon from the 1950s until the early 1990s for manufacturing of small engine ignition system components and die casting. Carlin Combustion Technologies, Inc. (Carlin) operated the facility from 1994 to 2014 for the manufacturing of gas and oil-fired burners, components, controls and igniters for small residential to medium size industrial heating systems. The Town of East Longmeadow took ownership of the Site in 2023 through municipal tax foreclosure. Since taking ownership as a Municipality with Exempt Status, as defined by Massachusetts General Law (MGL) Chapter 21E, Section 2, the Town has not conducted response actions at the Site due to a lack of funding.

Environmental assessments completed for the Site between 2009 and 2018 identified five conditions requiring Immediate Response Actions (IRAs). IRAs and associated response actions are summarized as follows:

1. Dense non-aqueous phase liquid (DNAPL) at monitoring well MW-48: On April 19, 2011, 18-inches of DNAPL was measured in monitoring well MW-48. DNAPL gauging and removal were performed regularly (monthly and then quarterly) between July 2011 and January 2020. A groundwater containment system (Waterloo Barrier[®]) surrounding a chlorinated volatile organic compounds (CVOC) source area, inclusive of MW-48, was completed in May 2018. Dewatering of the containment system was performed between December 2018 and October 2019. Recovered groundwater was treated with granular activated carbon (GAC) prior to discharge to

the Town sewer under a temporary discharge permit from the Springfield Water Sewer Commission (SWSC). A soil vapor extraction (SVE) system was operated within the containment area from April 2019 to January 2020 to remove CVOCs from unsaturated soils.

2. Detections of CVOCs in surface water samples collected from Pecousic Brook: CVOCs were detected in surface water samples collected from the Pecousic Brook on October 12, 2012 in the area where Site groundwater was expected to discharge to surface water. Surface water sampling was conducted on a semi-annual basis until December 2019 when there were no detections of CVOCs in surface water samples.
3. Vapor intrusion at 34 and 36 Center Square: Indoor air sampling at several nearby properties conducted in 2013 and 2014 identified trichloroethene (TCE) in indoor air at 34 and 36 Center Square exceeding the MassDEP Imminent Hazard concentration. Response actions included adjusting the heating, ventilation, and air conditioning (HVAC) systems, sealing cracks/penetrations in the floor, installation of a subslab depressurization system (SSDS), and additional indoor air sampling. Subsequent indoor air sample results and SSDS monitoring completed through 2020 indicate that the SSDS are effectively mitigating vapor intrusion and the Immediate Hazard condition no longer existed.
4. Detections of TCE in exceedance of the Massachusetts Contingency Plan (MCP) Method 1 GW-2 standard in monitoring well 82S, which is in close proximity to a two-family residence: Based on Weston & Sampson's review of historical Site assessment and cleanup reports, no remedial actions specific to this IRA have been taken.
5. Presence of soil with polychlorinated biphenyls (PCBs) exceeding the MCP Imminent Hazard (IH) threshold: In October and November 2018, approximately 200 cubic yards of PCB-impacted soil were excavated from within the groundwater containment system area and stockpiled on-Site. The excavation area was backfilled and covered with an ethylene propylene diene monomer (EPDM) membrane prior to paving the entire area, which is within the groundwater barrier. A fence was installed around the groundwater barrier area and soil stockpile in November 2018 to restrict access. Removal of PCB-impacted soil has not been completed and the soil stockpile was reportedly moved to inside the Site building.

3. Site Assessment Findings

The Site has been assigned two Release Tracking Numbers (RTNs) by MassDEP. The following subsections include summaries of environmental assessments for each RTN since 2009. Tables and figures for the response actions summarized below are presented in the following Tighe & Bond reports available via the EEA Data Portal for Waste Sites & Reportable Releases:

RTN 1-17724

<https://eeaonline.eea.state.ma.us/portal/dep/wastesite/results?queryString=rtn:1-0017724>

RTN 1-20607

<https://eeaonline.eea.state.ma.us/portal/dep/wastesite/results?queryString=rtn:1-0020607>

i. Phase I Environmental Site Assessment (ESA) – 2009

In February 2009, O'Reilly, Talbot & Okun Associates (OTO) of Springfield, Massachusetts completed a Phase I (ESA) of the Site. The Phase I ESA identified the historical use of chlorinated solvents at the Site from the 1960s to the early 1990s as a Recognized Environmental Condition (REC). In addition, chlorinated solvents have been historically detected at a location downgradient of the Site (45 Baldwin Street, RTN 1-10061). The source of the chlorinated solvents has not been identified.

ii. Phase II ESA – 2009

In September 2009, Woodard & Curran of Andover, Massachusetts completed a Phase II ESA at the Site in association with a potential commercial real estate transaction. The Phase II ESA identified tetrachloroethene (PCE) in soil and groundwater and TCE in groundwater at the Site at concentrations that exceed the applicable MCP Reportable Concentrations (RCs) for soil (RCS-1) and groundwater (RCGW-2). W&C attributed the source of PCE and TCE to historical use and storage of industrial solvents at the Site. MassDEP was notified of the release on February 2, 2010, and RTN 1-17724 was assigned to the Site.

iii. Phase I Initial Site Investigation and Tier Classification – 2011

Tighe & Bond, Inc. of Westfield, Massachusetts (T&B) completed a Phase I Initial Site Investigation and Tier Classification for DP Properties, the former Site owner, in February 2011. Initial Site Investigation field activities were completed between December 2009 and October 2010 and included:

- In December 2009, twelve subslab soil gas samples (SG-1 through SG-12) were collected from below the main Site building for VOC analysis
- Twelve groundwater monitoring wells were constructed in December 2009 at interior locations within soil borings B-1 through B-12. Soil samples were collected in two foot intervals from each boring and analyzed for VOCs on-Site by a mobile laboratory. Groundwater samples were collected from each well using a foot valve and analyzed for VOCs by an on-Site laboratory with three duplicates analyzed for VOCs by a fixed laboratory.
- In January 2010, seven indoor air samples and two exterior ambient air samples were collected at the Site for VOC analysis.
- Eleven soil borings (B-13 through B-23) were completed as groundwater monitoring wells in January 2010. Soil samples were collected from borings and analyzed for VOCs as described above for interior soil borings. Two split soil samples were submitted to a fixed laboratory for VOC analysis. Groundwater samples were also collected from the eleven new wells as described above for interior wells and analyzed for VOCs by a mobile laboratory with a subset of duplicates collected for confirmation by a fixed laboratory. Two temporary wells (TMW-13 and TMW-23) were advanced to evaluate CVOC concentrations in deeper groundwater.
- In March 2010, groundwater samples were collected from seven interior wells (MW-1 through MW-5, MW-10, and MW-11), five exterior on-Site wells (WC-1, WC-3, WC-5, WC-7, and WC-9), and four off-Site wells (CF-10, CF-11, CF-21, and PE-1). Groundwater samples were analyzed for VOCs by EPA Method 8260.

- In June 2010, groundwater samples were collected from two depths at twelve temporary monitoring well locations (TMW-24 through TMW-35). Groundwater samples were analyzed for VOCs by EPA Method 8260.
- Seven indoor air samples and one outdoor ambient air sample were collected from the Site in July 2010 and analyzed for VOCs by EPA Method TO-15.
- In September 2010, ten temporary monitoring wells (TMW-37 through TMW-46) were installed to delineate elevated PCE and TCE groundwater concentrations previously identified in temporary monitoring well TMW-26. Eleven soil samples were collected from soil borings prior to temporary well installation. Groundwater samples were collected from the temporary wells and monitoring well MW-36. Soil and groundwater samples were analyzed for VOCs by EPA Method 8260.
- Based on previous soil and groundwater results, permanent groundwater monitoring wells were installed in October 2010. Four wells, MW-47S (shallow), MW-47I (intermediate), MW-47D (deep), and MW-47T (till/bedrock interface), were installed at depths of 15, 25, 34, and 44 feet below grade, respectively and co-located with former temporary well TMW-33. Monitoring well MW-48 was installed to be co-located with former temporary wells TMW-26 and TMW-37. Soil and groundwater samples were analyzed for VOCs by EPA Method 8260.

PCE and TCE were detected in soil samples collected from locations near the southern property boundary at concentrations that exceed MCP Method 1 reporting standards. In groundwater, PCE, TCE, 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cis-1,2-DCE), and 1,1,1-trichloroethane (TCA) were detected at concentrations that exceeded the applicable MCP standards. Vinyl chloride (VC) was also detected along with other CVOCs at concentrations lower than the applicable MCP standards. In soil gas, PCE, TCE, 1,1-dichloroethane (1,1-DCA), 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE and TCA were detected. In indoor air PCE, TCE, 1,1-DCE, carbon tetrachloride, chloroform, chloromethane, 1,2-dichlorobenzene, dichlorodifluoromethane, methylene chloride, trichlorofluoromethane, and 1,1,2-trichloro-1,2,2-trifluoroethane were detected. A focused evaluation of commercial work risk by inhalation was conducted and determined a condition of No Significant Risk by inhalation of indoor air existed.

iv. Phase II Comprehensive Site Assessment – 2015

Phase II ESA activities conducted at the Site between 2009 and 2015 included soil boring advancement and sampling, temporary and permanent monitoring well installation, groundwater sampling, water supply well sampling, surface water sampling, sediment sampling, soil vapor screening, soil gas sampling, and indoor air sampling. These activities are reported by T&B in their 2015 Phase II Comprehensive Site Assessment (CSA) report prepared for REPC Holdings, Inc and summarized below.

- CVOC impacts were identified in two primary areas; a “northern impacted area (NIA)” located beneath the former Site building and a “southern impacted area (SIA)” located near the south end of the Site. Site-related CVOCs included PCE with lesser amounts of TCE, TCA, 1,1-DCA, 1,1-dichloroethene (1,1-DCE), cis-1,2-DCE, and VC.
- Soil: One hundred forty four (144) soil samples were collected from 123 soil borings advanced throughout the Site and adjoining properties and analyzed for volatile organic compounds (VOCs). CVOCs (predominantly PCE with lesser amounts of TCE) were identified primarily in the

south end of the Site at depths ranging from 1.5 feet below grade to greater than 10 feet below grade.

- Groundwater:
 - One hundred (100) groundwater samples were collected from 57 temporarily installed monitoring wells and analyzed for VOCs. CVOCs, primarily PCE with lesser amounts of TCE, were primarily identified in the south end of the Site.
 - Sixty four (64) permanent monitoring wells were installed at the Site and adjoining properties including co-located wells at various depths installed at 15 locations to evaluate the vertical extent of CVOCs within the glaciofluvial overburden aquifer and within bedrock. Several rounds of groundwater sampling occurred between 2009 and 2014. CVOCs, consisting primarily of PCE and its degradation products TCE and cis-1,2-DCE were detected in overburden monitoring wells with the highest concentration occurring in the southern extent of the Site (MW-48) where DNAPL was observed. CVOc concentrations generally reduce with depth in the overburden aquifer. Monitoring wells installed in the bedrock aquifer have shown the presence of site-specific CVOCs, consisting primarily of TCE with lesser amounts of PCE.
 - Groundwater samples were collected from select monitoring wells (BMW-1, BMW-2, BMW-3, MW-36, MW-48, MW-82D, MW-87D, MW-92, MW-96D, and WC-3) in December 2013, January 2014, and January 2015 for microbial analyses to aid in the evaluation of groundwater remedial technologies. Aerobic conditions and lack of organic carbon content available to drive reductive dechlorination processes were identified in the glaciofluvial aquifer, however, a dehalococcoides determination of 61.3 cells/mL was observed at the base of the aquifer at MW-87D. Therefore, it was decided that a groundwater biological pilot test should be initiated in the southern impacted area at the Site. In-situ biological injections were performed between March 10 and 17, 2015.
- DNAPL Gauging, Sampling, and Management: In April 2011, 18-inches of DNAPL was measured in monitoring well MW-48, located on the south end of the Site. A DNAPL sample was collected and analyzed for VOCs and total petroleum hydrocarbons (TPH) with fingerprint and oil & grease. The DNAPL was found to be comprised of PCE (51%), TCA (0.01%), TCE (0.56%), and oil & grease. Fingerprint analysis of the DNAPL identified a C9 to C36 hydrocarbon fraction matching mineral spirits and a heavier hydrocarbon fraction in the range of motor oil with a TPH concentration of 270,000 mg/kg (27%). A total of 5.93 gallons of DNAPL were removed during 45 DNAPL gauging and extraction events performed between July 2011 and January 2015. During this time, DNAPL thickness reduced to trace amounts. In April 2013 monitoring well MW-92 was installed west of MW-48 as a potential second DNAPL recovery well and gauging was generally performed concurrent with activities at MW-48. No measurable DNAPL has been observed in MW-92.
- Water Supply: One water supply sample was collected from one of the three on-Site industrial water supply wells and analyzed for VOCs. No VOCs were detected above laboratory detection limits.

- Surface Water & Sediment: Surface water samples were collected from Pecousic Brook in October 2012 at locations inferred to be upstream, midstream, and downstream of the discharge point for groundwater migrating from the Site. PCE was detected in the midstream sample exceeding the Environmental Protection Agency (EPA) National Recommended Water Quality Criteria (NRWQC) for consumption of water and organism. Cis-1,2-DCE was also detected in the midstream sample and does not have a EPA NRWQC standard. Upstream, midstream, and downstream surface water samples collected quarterly or semi-annually between October 2012 and February 2015 returned detectable concentrations of CVOCs. CVOCs were not detected in sediment samples that were collocated with surface water samples in February 2013.
- Vapor Intrusion Assessments: Vapor intrusion assessments at the Site and 22 nearby commercial and residential properties included the collection and analysis of soil gas and indoor air samples for CVOC analysis. These assessments indicated no significant risk attributable to site-specific CVOCs at the Site or nearby properties except for at 34 and 36 Center Square. An SSDS was installed at 34 and 36 Center Square and subsequent indoor air assessments have indicated that the SSDS is effectively mitigating vapor intrusion.

Based on these environmental conditions, T&B recommended identifying, evaluating, and selecting remedial action alternatives as part of Phase III activities.

v. Southern Impacted Area Phase III and Phase IV – 2016

T&B prepared the Phase III Remedial Action Plan (RAP) and Phase IV Remedy Implementation Plan for REPC Holdings, Inc. to address the contamination in the Southern Impacted Area “source zone” considered to be primarily responsible for the CVOC groundwater plume that flows north of Maple Street and discharges to Pecousic Brook. The selected Remedial Action Alternatives (RAAs) was groundwater containment using sheet piles (barrier wall), dewatering and SVE. Implementation of the selected RAA began in August 2017.

The Waterloo Barrier® (i.e., sheet piles) was completed in May 2018 to restrict the migration of contaminated groundwater away from the Southern Impacted Area. Dewatering of the containment system was performed between December 2018 and October 2019 with recovered groundwater treated with GAC prior to discharge to the Town sewer under a temporary discharge permit from the Springfield Water Sewer Commission (SWSC). A soil vapor extraction (SVE) system was operated within the containment area from April 2019 to January 2020 to remove CVOCs from unsaturated soils.

In January and February 2019, 38 SVE points (air inlet and extraction wells) were installed to the top of the till layer throughout the area within the barrier wall. These points were connected to an extraction and treatment system which commenced soil vapor extraction operations in April 2019. Except for interruptions due to maintenance work and power outages, the SVE system operated continuously up to at least February 2020.

REPC Holdings Inc, received Financial Inability status from MassDEP in December 2020 and subsequently ceased participation in response actions.

Groundwater sampling was conducted across the Site as part of Phase IV activities. As of December 2019, all CVOC detections in bedrock and the alluvial aquifer were less than GW-3 standards. In the shallow alluvial aquifer, December 2019 PCE and TCE concentrations exceeded the GW-2 standards in monitoring well WC-1.

vi. Northern Impacted Area RAM Completion Report – 2017

In November 2015, T&B oversaw the installation of a SVE system within the NIA below the main Site building. The SVE system was installed and operated to reduce CVOC concentrations in soil to levels approaching background and/or below the MCP RCS-1 Reportable Concentrations. The SVE system was operated intermittently from December 2015 until March 2017 with periodic influent and effluent sampling performed to monitor CVOC removal. In February 2017, only TCA was detected in SVE influent. CVOCs detected in subslab soil gas samples collected from four monitoring points after a temporary SVE shutdown in February 2016 were below MassDEP Commercial/Industrial Sub-Slab Soil Gas Screening Values, indicating that the SVE system effectively reduced the CVOCs within the building footprint of the NIA.

In May 2017, twelve soil borings (SB-1 through SB-12) were advanced to 10 feet below grade to evaluate the need for future soil management below the main Site building. One soil sample was collected from each boring for CVOC analysis. PCE was detected in six borings (SB-3, SB-4, SB-5, SB-6, SB-11 and SB-12) TCA was detected in three borings (SB-4, SB-5, and SB-12), and TCE was detected in two borings (SB-4 and SB-12). All CVOC concentrations were below the MCP S-1/GW-2 standards. Based on these results, the objective of the RAM was achieved.

vii. PCBs and Extractable Petroleum Hydrocarbons (RTN 1-20607) – 2018

In February 2018, PCBs and extractable petroleum hydrocarbons (EPH) were detected in soils up to two feet below grade within the footprint of the proposed Waterloo Barrier[®] at concentrations greater than the MCP RCS-1. In April and May 2018, additional samples of soil, groundwater, and DNAPL were collected from the Southern Impacted Area to evaluate the potential source and approximate extent of the PCBs. Additional soils were identified with PCBs above the RCS-1. DNAPL collected from MW-48 contained 223 milligrams per kilogram (mg/kg) of PCBs. In May 2018 samples of groundwater and light non-aqueous phase liquid (LNAPL) were collected from MW-48. The LNAPL was assumed to be the result of emulsified edible oil, which had collected in the well following a biological remediation pilot that was performed in the area in 2015. Analytical results identified PCBs at 298 mg/kg in the LNAPL sample and at 0.00217 milligrams per liter (mg/L) in the groundwater sample. The PCB concentration detected in the groundwater sample is below the applicable MCP GW-2 and 3 standards of 0.005 mg/L and 0.010 mg/L, respectively. In July 2018, a 120-day Release Notification Form was submitted to MassDEP under RTN 1-17724 regarding the findings of the PCB and EPH exceedances.

In July 2018, soil borings (P-9 through P-43) were advanced to further assess the nature and extent of PCBs and EPH impacts to soil. Soil samples were collected in one-foot intervals to 5 feet below grade. PCBs were detected in surficial soil at concentrations of greater than 10 mg/kg within 500 feet of a recreation area (Redstone Rail Trail, located east of the Site). MassDEP assigned RTN 1-20607 to the Imminent Hazard (IH) condition. On July 26, 2018, temporary fencing was installed around the entire barrier wall area to restrict potential exposure to the elevated PCB concentrations in surficial soil. In

August 2018, additional soil samples (P-44 through P-51) and soil pile samples (P-43A and P-43B) were collected to further delineate the vertical and horizontal extent of PCB and EPH impacts in the Southern Impacted Area and to the east in the vicinity of the rail trail. Soil samples were collected in one-foot intervals to 5 feet below grade and one boring was advanced to 10 ft below grade. The samples were analyzed for PCB and EPH analysis. Concentrations of PCBs and EPH exceeded S-1/GW-2 and S-1/GW-3 Cleanup Standards in some of the samples but did not exceed the IH condition in any samples.

In October 2018, three areas were excavated to 2 feet below grade and two areas were excavated to 1 foot below grade. Approximately 200 cubic yards of soil were excavated from the Waterloo Barrier® area. PCBs remain within the excavated area at concentrations up to 20.9 mg/kg at P-34 (3-4 ft below grade). The excavation area was backfilled with clean fill, an EPDM membrane was placed over the fill, and the area within the barrier wall was paved. Excavated soils were stored onsite encapsulated with polyethylene sheeting and covered with a tarp. A permanent fence was installed around the barrier wall area and stockpiled soil in November 2018. MassDEP has indicated that the stockpile was moved to within the building, likely in 2020.

Additional soil samples were collected for EPH and/or PCB analysis in January and February 2019. PCBs were detected in subsurface soils (4 to 21 ft) at locations within the barrier wall area at concentrations below 1 mg/kg (S-1/GW-1). Also, EPH was detected at 14 to 16 feet at a concentration below the S-1/GW-1 (3,000 mg/kg). As part of Phase IV activities, additional soil sampling was completed at locations east of the barrier (P-58 to P-75) in November and December 2019. Samples were collected from 0 to 1, 1-2, and 2-3 feet below ground surface. Some of the samples had concentrations of PCBs and/or EPH compounds that exceeded the S-1/GW-2 and GW-3 standards. One sample located within the barrier fence (P-65, 1-2 feet) had PCB concentrations that exceeded the IH.

In February 2025, soil samples were collected from the stockpile within the Site building.

4. Project Goal

The goals of the project are to protect human health and the environment and to redevelop an underutilized property for mixed commercial and residential reuse including the demolition of the existing Site building and construction of three new buildings. The new buildings conceptually include up to 6,700 square feet of commercial space on the ground floor with up to forty apartments of various sizes on the second and third floors. Outdoor areas will include recreation spaces and parking. The objective is to remove or contain targeted impacted soil and groundwater that pose a potential exposure risk to future users of the Site. Once complete, a Permanent Solution Statement with Conditions (PSC) will be filed to close response actions under the Massachusetts Contingency Plan (MCP; 310 CMR 40.0000).

5. Regional and Site Vulnerabilities

The northeastern United States, including the East Longmeadow area, experiences warm and often humid summers and cold winters. Rainfall can be severe with summer thunderstorms common and severe weather resulting from regional nor'easter anticyclone storms and/or hurricanes. Winter conditions can also be severe with ice storms and heavy snow common.

According to the US Global Change Research Program (USGCRP), the northeastern United States can expect increased temperatures and temperature variability and extreme precipitation events. USGCRP notes that "Urban residents still face increased exposure to extreme heat events, flooding, and episodes of poor air quality. Likewise, rural areas are still susceptible to droughts, and floods that affect agricultural productivity and ecosystem function. These events still pose compounding threats to aging transportation, water, and wastewater infrastructure. The communities most vulnerable to extreme weather risks remain those that are historically overburdened and disadvantaged in both rural and urban areas." Increased precipitation will increase stormwater runoff, which is applicable to the cleanup and redevelopment of the Site for residential reuse and open space. Additionally, once developed, the Site is expected to include improved stormwater infrastructure which will account for increasing precipitation.

According to FEMA Flood Zone Maps 25013C0409E and 25013C0417E the Site is not located within a Special Flood Hazard Area or Other Areas of Flood Hazard. Based on the location of the Site, other factors related to extreme weather change, such as changing temperature, rising sea levels, wildfires, changing dates of ground thaw/freezing, changing ecological zone, etc.) are unlikely to impact the Site in a significant way.

II. Applicable Regulations and Cleanup Standards

1. Cleanup Oversight Responsibility

The cleanup will be overseen by a Commonwealth of Massachusetts Licensed Site Professional (LSP) in accordance with Massachusetts General Law Chapter 21E and the MCP. In addition, required regulatory documents prepared for this Site will be submitted to the Massachusetts Department of Environmental Protection (MassDEP) electronically and tracked under the Release Tracking Numbers (RTN) issued for the Site by MassDEP (RTN 1-17724 and RTN 1-20607). All documents will be in the public record.

2. Cleanup Standards

MassDEP is the state authority that regulates cleanup of sites in the Commonwealth of Massachusetts. The MCP, 310 CMR 40.0000, includes risk-based cleanup standards for use in screening-level and semi-site-specific risk characterizations (Method 1 and Method 2 Risk Characterizations) to evaluate risk to human health and the environment. The MCP also outlines a Method 3 Risk Characterization, in which site-specific cleanup standards and characteristics and/or limitations on use and activity are used to evaluate risk. Under the MCP, regardless of the approach or type of risk characterization, a condition of No Significant Risk (NSR) to human health and the environment must be documented for the Site to achieve regulatory closure.

PCBs are regulated by the United States Environmental Protection Agency (EPA) under 40 CFR Part 761, under the authority of the Toxic Substance Control Act (TSCA). PCBs present within Site soil require cleanup as a PCB remediation waste because PCBs are present at levels above 1.0 milligrams per kilogram (mg/kg) and have been released from a source with unknown PCB concentrations > 50 mg/kg. PCB cleanup levels include:

- High occupancy without a cap: ≤ 1.0 mg/kg

- High occupancy with a cap: < 1.0 mg/kg but ≤ 10 mg/kg.
- Low occupancy without a cap: ≤ 25 mg/kg
- Low occupancy without a cap but with signage indicating the presence of PCBs: > 25 mg/kg but ≤ 50 mg/kg.
- Low occupancy with a cap: > 25 mg/kg but ≤ 100 mg/kg

A high occupancy area is defined as any area where occupancy for any individual not wearing dermal and respiratory protection for a calendar year is greater than 840 hours (an average of 16.8 hours or more per week). A low occupancy area is defined as any area where occupancy for any individual not wearing dermal and respiratory protection for a calendar year is less than 840 hours (an average of 16.8 hours or more per week). Site reuse is generally considered high occupancy, however, exterior areas where occupancy is transitory, such as parking lots, could be considered low occupancy areas. PCB cleanup plans must be prepared in accordance with 40 CFR Part 761.61. MassDEP defers PCB cleanup authority to the EPA Region 1 PCB Coordinator.

3. Laws and Regulations

Laws and regulations that are applicable to this cleanup include the Federal Small Business Liability Relief and Brownfields Revitalization Act, the Federal Davis-Bacon Act, the MCP, and Town of East Longmeadow by-laws. Federal, state, and local laws regarding procurement of contractors to conduct the cleanup will be followed. As described all cleanup will be in accordance with the MCP; 310 CMR 40.0000. All applicable permits and documentation (e.g., Building Permit, Dig Safe, soil transport/disposal manifests) will be obtained prior to the work commencing, and all work will be conducted in accordance with the conditions for approval.

III. Evaluation of Cleanup Alternatives

1. Cleanup Alternatives Considered

EPA requires that this ABCA includes the evaluation of a minimum of three (3) remedial alternatives. To address the remediation of CVOC impacted soil and groundwater at the Site, the following alternatives were considered:

- Alternative #1 – No Action
- Alternative #2 – Operation, maintenance, and monitoring of the existing Waterloo Barrier® and SVE system
- Alternative #3 – In-Situ Chemical Oxidation (ISCO)
- Alternative #4 – Vapor barriers and subslab depressurization systems (SSDS).

To address the remediation of PCB impacted soil at the Site, the following two (2) alternatives were considered in addition to Alternative #1 – No Action:

- Alternative #5 – Removal, Transport & Off-Site Disposal of all PCB Remediation Wastes
- Alternative #6 – Target Removal, Transport & Off-Site Disposal and On-Site Soil Disposal, Capping, and Activity Use Limitation (AUL).

2. Cost Estimate of Cleanup Alternatives

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

Effectiveness – Including Vulnerability/Resiliency Considerations

- Alternative #1: No Action is not effective in controlling or preventing exposure of receptors to soil and groundwater impacts during or after redevelopment.
- Alternative #2: Operation, maintenance, and monitoring of the existing Waterloo Barrier® and SVE system. Under this alternative, remedial actions include the long-term maintenance and monitoring of the Waterloo Barrier® and operation/maintenance of the SVE system for as long as needed to reduce CVOC concentrations in soil and groundwater until a condition of NSR is demonstrated. The Waterloo Barrier® and SVE system would be decommissioned once the NSR condition is reached.

Groundwater monitoring following historical barrier dewatering and SVE operation have demonstrated significant reductions in CVOC groundwater concentrations both on-Site and downgradient of the Site, therefore, this alternative has already been demonstrated to be effective.

- Alternative #3: ISCO includes the introduction of oxidants into target areas of the subsurface to reduce CVOC mass and concentrations through oxidation. ISCO can be completed as a stand-alone remediation technology or in combination with other technologies, such as in-situ bioremediation (ISB), which involves the introduction of amendments, and sometimes strains of bacteria, to the subsurface to encourage native or introduced bacteria to metabolize CVOCs. The effectiveness of ISCO and ISB technologies are determined by Site-specific physical and chemical conditions that control whether the amendments, oxidants, or bacteria can be dispersed throughout the contaminated zone such that they directly contact the contaminant. A remedial design investigation (RDI) would be required to collect the data necessary to determine whether ISCO. RDIs may include further source area delineation, soil-oxygen demand determination, hydraulic conductivity determination, grain size distribution, and conducting bench-scale and/or field-scale pilot treatability tests.

In addition to the additional data required and challenges with delivering the oxidant to the source area, chemical oxidation can result in increased CVOC concentrations by destroying carbon on the soil skeleton that the CVOCs would previously adsorb to. For these reasons, ISCO is unlikely to be an effective remedial alternative.

- Alternative #4: Installation of vapor barriers and SSDS would be completed following the removal of the existing Site building and during construction of proposed building foundations (estimated 10,000 square feet based on preliminary redevelopment plans). Vapor barriers operate passively to limit the migration of contaminants into a structure by providing a physical barrier to vapor intrusion. A vapor barrier does not reduce the mass of contaminant beneath the buildings. To be effective, a vapor barrier must seal around all floor penetrations, cracks, and gaps and must

be resistant to future wear and penetration. Vapor barriers would be installed below the building slabs and could be installed by several methods, including a vapor-proof membrane, a spray-applied multi-layer epoxy coating, or spray-applied membrane.

Sub-slab depressurization would be achieved by passive or active venting beneath vapor barriers and provides additional surety regarding reduction of potential vapor intrusion. With an SSDS, vapor intrusion is mitigated by depressurization of the soil pore space beneath the building slab. This removes the driving force for soil gas transport through the building slab. SSDS extraction piping would consist of slotted piping installed within four to six inches of coarse engineered fill materials below the vapor barrier. The venting piping is plumbed through the roof and either connected to a turbine ventilator for passive ventilation or an electric blower for mechanical ventilation. The combination of vapor barriers and subslab depressurization would be very effective at mitigating vapor intrusion into the proposed buildings but would not reduce CVOC concentrations in soil and groundwater to achieve a condition of NSR.

Alternative #5: Removal, Transport & Off-Site Disposal of PCB Remediation Wastes. Under this alternative, all PCB remediation wastes with concentrations ≥ 1 mg/kg would be characterized and disposed of off-Site under a self-implementing and/or risk-based cleanup plan. Known PCB remediation wastes include at least 200 cubic yards of stockpiled soil and an estimated 450 cubic yards of in-situ soil. Once PCB remediation wastes are delineated, excavation and off-site disposal is an effective way to eliminate risk at the Site, since contamination will be removed and the exposure pathways will no longer exist.

- Alternative #6: Target Removal, Transport & Off-Site Disposal and On-Site Soil Disposal, Capping, and Activity Use Limitation (AUL). Under this alternative, approximately 175 cubic yards of soil with PCB concentrations ≥ 10 mg/kg and 200 cubic yards of stockpiled soil would be excavated for off-Site disposal. Approximately 275 cubic yards of soil with PCB concentrations < 10 mg/kg would be disposed of on-Site below a cap. This approach would allow for high occupancy reuse of the entire Site. PCB remediation waste disposed of on-Site would be placed in a designated area, presumably below a parking area in the southern end of the Site where PCBs remain in soil at concentrations exceeding the MCP Method 1 Cleanup Standards. The on-Site disposal area would be approximately 5,000 square feet. A geotextile demarcation would be installed over the impacted soil. The cap would be constructed of a minimum 10-inches of clean soil then a typical asphalt section. A Method 3 Risk Characterization will be conducted to evaluate Site closure. Remaining Site-wide contaminant concentrations will not be removed to below the threshold for unrestricted use; therefore, institutional controls in the form of a deed restriction known as AUL will be required to mitigate exposure to remaining impacted soils and maintain a condition of NSR under the MCP.

The cap would require maintenance and may degrade over time requiring replacement. This alternative would be effective at removing the exposure pathway as long as the cap is maintained. On-Site disposal would limit the reuse alternatives to an estimated 5,000 square feet of the southern extent of the property to use as a parking lot.

Implementability

- Alternative #1: No Action is easy to implement since no actions will be conducted.
- Alternative #2: Operation, maintenance, and monitoring of the existing Waterloo Barrier® and SVE system would be easy to implement since these remedial systems have already been constructed. A monitoring well network is already in place and could be utilized to monitor CVOC concentrations in groundwater. Implementing this alternative would require minimal disturbance to the community. However, continued operation and maintenance of the Waterloo Barrier® and SVE system would either reduce the developable area in the southern extent of the Site or require reconfiguration of SVE piping and treatment equipment.
- Alternative #3: As described above, challenges to implementing ISCO to remediate CVOCs include additional site characterization/pilot testing, difficulty in achieving direct contact between the oxidant and CVOCs, and the potential that CVOCs adsorbed to soil could be mobilized exacerbating the problem. CVOC mobilization could be mitigated if ISCO injections are limited to inside the Waterloo® Barrier. However, we anticipate that ISCO injections would be required outside of the Waterloo® Barrier in order to achieve remedial goals in a reasonable amount of time for Site redevelopment. In addition to these challenges, ISCO injections would require lengthy field work that would be disruptive to the community. This alternative is considered difficult to implement.
- Alternative #4: Construction of vapor barriers and SSDS is easy to incorporate and implement with new construction. The primary challenge to this alternative are ensuring that the vapor barrier and SSDS designs are incorporated into the overall project design from an early stage.
- Alternative #5: Excavation and off-Site disposal of PCB remediation wastes is relatively easy to implement. Previously excavated soils are accessible in the building. In-situ PCB contaminated soils extend off-Site to the south-southeast approaching the recreational path, requiring additional coordination and Site controls. Excavation depths are relatively shallow, 2-6 feet below ground surface, and would not require dewatering. This alternative requires coordination to maintain environmental controls (e.g., dust suppression and monitoring) during removal activities.
- Alternative #6: Targeted removal and on-Site disposal of PCB remediation wastes would be moderately easy to implement with access to off-Site PCB impacted soil and control of the off-Site areas during remediation as the primary challenges. This alternative would require ongoing maintenance and monitoring of the cap, greater coordination to maintain environmental controls (e.g., dust suppression and monitoring) during remediation, and disturbance to the community (e.g., trucks transporting backfill and cover materials). In addition, this alternative will require the implementation of an AUL on the property; however, the AUL is moderately easy to implement.

Cost

- Alternative #1: No Action are limited to the regulatory reporting required under the MCP; however, it is believed that regulatory closure cannot be achieved with no action. Estimated Cost, approximately \$50,000.
- Alternative #2: The operation, maintenance, and monitoring of the existing Waterloo Barrier® and SVE system for five years is expected to cost approximately \$3,000,000. The primary cost drivers include groundwater extraction and SVE monitoring, long-term groundwater monitoring,
- Alternative #3: The implementation of the ISCO alternative is expected to cost approximately \$5,100,000. The primary cost drivers include ISCO design, installations, injections, and monitoring.
- Alternative #4: The installation of 10,000 square feet of vapor barriers and SSDS for all three of the proposed buildings is expected to cost approximately \$400,000. The primary cost drivers are the 6-inch coarse backfill material, SSDS pipe materials and installation, and 20-mil vapor barrier materials, installation, and leak testing.
- Alternative #5: The removal, transport, and off-Site disposal of PCB remediation wastes is expected to cost approximately \$1,500,000. The primary cost driver is transport and disposal of up to approximately 1,500 tons of soil at a hazardous waste landfill.
- Alternative #6: The targeted removal of 475 cubic yards of soil with PCB concentrations ≥ 10 mg/kg, on-Site disposal of 175 cubic yards of soil with PCB concentrations < 10 mg/kg, and construction of a 10-inch soil cap topped with 3.5-inches of asphalt is expected to cost approximately \$1,750,000.

3. Recommended Cleanup Alternative

Alternative #1: No Action cannot be recommended because it does not address Site risk and does not allow for the Site to be used in a beneficial way to the Town or the surrounding community. Alternative #3: ISCO, may not be effective at eliminating the CVOC exposure pathways at the Site and the cost to implement such a remedy could be approximately two times more than the cost of controlling the exposure risks to CVOCs in Alternative #2. Additionally, Alternative #3 will increase impacts to the neighborhood and will take more time to implement. Alternative #2: Operation, maintenance, and monitoring of the existing Waterloo Barrier® and SVE system, would be more cost effective and control exposure risks to CVOCs both on and off-Site and is the recommended cleanup alternative to address the CVOC exposure pathways to soil and groundwater. Alternative #4 is recommended to address potential exposure to CVOCs through the vapor intrusion pathway since including vapor barrier and SSDS construction in the new buildings would be easy and cost effective to implement while significantly reducing exposure risk.

Alternative #6 eliminates the PCB exposure pathway but would require an AUL with costly long-term maintenance and monitoring requirements. Additionally, this alternative limits the reuse alternatives for the southern area of the Site. Alternative #5, Removal, Transport & Off-Site Disposal of PCB Remediation Wastes would be simple and cost effective to implement and is the recommended cleanup alternative to address the PCB exposure pathway.

In summary, the recommended remedial actions are Alternative #2 and Alternative #5.

Green and Sustainable Remediation Measures for Selected Alternative

The Town of East Longmeadow will refer to ASTM Standard E-2893: Standard Guide for Greener Cleanups, EPA's Principles for Greener Cleanups, and MassDEP's Greener Cleanup Guidance (WSC #14-150) to incorporate practices and procedures that reduce carbon emissions, burning of fossil fuels, and the impact on the environment. This will include standard specifications prohibiting equipment idling, encouraging the selection of disposal facilities that are not at excessive distance, and requiring reuse/recycling/treatment over disposal when available.

DRAFT