U.S. ENVIRONMENTAL PROTECTION AGENCY

EPA REGION 1 – NEW ENGLAND

RECORD OF DECISION

WALTON & LONSBURY, INC. SUPERFUND SITE

ATTLEBORO, MASSACHUSETTS

SEPTEMBER 2019

PART 1: THE DECLARATION FOR THE RECORD OF DECISION

PART 2: THE DECISION SUMMARY

PART 1: THE DECLARATION FOR THE RECORD OF DECISION

A. SITE NAME AND LOCATION

Walton & Lonsbury, Inc. Superfund Site
Attleboro, Bristol County, Massachusetts
CERLCIS ID#: MAD001197755

B. STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Walton & Lonsbury, Inc. Superfund Site (Site), in Attleboro, Massachusetts, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERLCA, also commonly referred to as "Superfund"), 42 U.S.C. § 9601 *et seq*., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300 *et seq*., as amended. The Region 1 Director of the Superfund and Emergency Management Division (SEMD) has been delegated the authority to approve this Record of Decision (ROD).

This decision was based on the Administrative Record for the Site, which has been developed in accordance with Section 113(k) of CERCLA, 42 U.S.C. § 9601 *et seq*., and which is available for review at the Attleboro Public Library, located at 74 North Main Street in Attleboro, Massachusetts, at the U.S. Environmental Protection Agency (EPA) Region 1 Superfund and Emergency Management Division (SEMD) Records Center located at 5 Post Office Square, Boston, Massachusetts, and online at: www.epa.gov/superfund/walton. The Administrative Record Index (Appendix G to the ROD) identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

The Commonwealth of Massachusetts, as the support agency, concurs with the selected remedy (see Appendix A of this ROD for a copy of the concurrence letter).

C. ASSESSMENT OF SITE

The response action selected in this ROD is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances, pollutants, or contaminants into the environment. The June 2019 Remedial Investigation (RI) Report (AECOM, 2019c) for the Site summarizes the nature and extent of the contamination and was used to prepare a July 2019 Feasibility Study (FS) Report (AECOM, 2019d) that identified all the remedial options considered for cleanup of the Site.

D. DESCRIPTION OF SELECTED REMEDY

This ROD sets forth the selected remedy for the Site, which is a comprehensive cleanup approach and is based on a combination of remedial alternatives set out in a Proposed Plan issued for public comment in July 2019 that addresses all current and potential future risks caused by contaminated soil, groundwater,

surface water, and the vapor intrusion pathway. The selected remedy utilizes soil excavation, off-site disposal, *in-situ* treatment, permeable reactive barriers, land use and access restrictions, and long-term operation, maintenance and monitoring to address unacceptable exposure to these risks posed by the Site.

The remedial measures selected in this ROD include the following:

Soil in Residential Yards West of North Avenue

EPA's selected remedy for Soil in Residential Yards West of North Avenue is SL-3: Soil excavation with off-site disposal, which includes the following components:

- Excavation and off-site disposal at an appropriate permitted facility of approximately 310 cubic yards of lead-contaminated soil with concentrations in excess of risk-based cleanup levels from residential properties; and
- Excavated areas will be restored with clean, imported backfill to grade and re-vegetated with native vegetation to control erosion and restore any altered wetland/floodplain habitat.

Groundwater/Surface Water

EPA's selected remedy for Groundwater/Surface Water is GW/SW-3b: Source Area soil removal with *in-situ* soil treatment and extension of the permeable reactive barrier, with mid-plume *in-situ* soil treatment, which includes the following components:

- Removal and off-site disposal of approximately 730 cubic yards of the remaining building concrete floor slab and cobble-filled "pit" to allow for removal of underlying contamination;
- Excavation of approximately 7,900 cubic yards down to a maximum depth of 15 feet below ground surface (bgs) of significantly-contaminated soil[1] within the source area and off-site disposal at a permitted facility;
- Soil blending with reactive media (e.g., zero-valent iron; ZVI) within the open excavation area down to the top of bedrock;
- Backfilling with reactive media and sand blend to 7.5 feet bgs or the water table (whichever is higher), with additional clean sand and graded topsoil backfilled to ground surface;
- De-watering the portion of the excavation that extends below the water table, and any excavated soils that require de-watering, collect the water in tanks and treat on-site as needed to meet surface water standards for discharge (or as appropriate off-site disposal at a permitted facility);
- Construction of a new permeable reactive barrier (PRB) filled with reactive media to extend the existing PRB intercepting the overburden groundwater plume prior to discharge into Bliss Brook;
- Excavation and off-site disposal at a permitted facility of approximately 4,400 cubic yards of soil in order to construct the PRB;
- Construction of mid-plume *in-situ* soil treatment line via a series of borehole wells filled with reactive media down to the top of bedrock to intercept the middle of the hexavalent chromium and chlorinated volatile organic compound (VOC) overburden groundwater plumes;

[1] Significantly-contaminated soil is defined as soil with hexavalent chromium concentrations greater than or equal to 100 mg/kg.

- Restoration with native vegetation of any wetland/floodplain habitat altered by the remedial action;
- Long-term monitoring of the overburden groundwater plumes, surface water in Bliss Brook, and existing buildings with sub-slab depressurization systems (SSDSs) or which may have the potential for vapor intrusion;
- Maintenance of any new and/or existing remedy infrastructure components, including the engineered cover system and PRB, existing SSDSs, and periodic replacement/regeneration of reactive media in the PRB;
- Institutional Controls to 1) prohibit future residential use at the W&L Property; 2) prevent future construction worker exposure to groundwater contamination at the W&L Property until groundwater cleanup levels are achieved; 3) prevent contact with contaminated groundwater and the installation of non-drinking water wells (i.e. irrigation wells) across the extent of the site-wide groundwater plume where non-drinking water scenario cleanup levels for residential groundwater are exceeded and/or which may cause migration of the contaminated plume until groundwater cleanup levels are achieved; 4) prevent disturbance of the existing engineered cover system and PRB, and any new remedy infrastructure components; 5) prevent contact with soil beneath the existing engineered cover system adjacent to Bliss Brook; and 6) require either a vapor intrusion evaluation or vapor mitigation system be installed if a new building is constructed over the shallow groundwater VOC plume (within or to the downgradient neighborhood of the former building on the W&L Property) until groundwater cleanup levels are achieved; and
- Five-year reviews of the remedy will be conducted to ensure that the remedy remains protective.

Bedrock Groundwater

EPA's selected remedy for Bedrock Groundwater is BR-3: Institutional Controls, and contingency remedy of focused *in-situ* injections, which includes the following components:

- Institutional Controls, where necessary, to prevent contact with contaminated groundwater and the installation of non-drinking water (i.e. irrigation) wells within the bedrock plume boundary until groundwater cleanup levels are achieved, and prevent the installation of wells within the potentially impacted portion of the Bungay River Water Resource Protection District (District) to prevent plume migration from the contaminated non-drinking water area into the District until groundwater cleanup levels are achieved;
- Pre-design investigation sampling to further refine the horizontal and vertical extent of the contaminated bedrock groundwater plume so that the area potentially requiring additional remedial action can be better defined;
- Monitoring of the site-wide bedrock groundwater contaminant plume to evaluate the attenuation of hexavalent chromium and chlorinated VOCs until groundwater cleanup levels are achieved;
- Contingency *in-situ* bedrock groundwater treatment to prevent further migration from the contaminated non-drinking water area into the District and restore groundwater to drinking water standards solely within the District, if groundwater contaminants are found to exceed federal and state drinking water standards upon further investigations. If standards are exceeded, construction of focused *in-situ* bedrock injection treatment line west of North Avenue via a series of borehole wells installed into bedrock and injected with reactive media; additional monitoring of the bedrock groundwater contaminant plume until groundwater cleanup standards are

achieved; and expansion of the area requiring Institutional Controls. There will be a well restriction zone established that extends to the border of the non-drinking water aquifer and the District to prevent the installation of wells that might draw contaminated groundwater into the District until groundwater cleanup levels are achieved; and

- Five-year reviews of the remedy will be conducted to ensure that the remedy remains protective.

E. STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and State requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

Based on technology considerations, EPA determined that it was impracticable to solely treat the chemicals of concern (COCs) within the source area. However, excavation and off-site disposal of soil within the source area combined with *in-situ* soil blending and backfilling with reactive media (e.g., ZVI) will provide localized soil and groundwater treatment within the source area, and to the extent practicable, Site-wide groundwater. Thus, the overall selected remedy partially satisfies the statutory preference for treatment as a principal element of the remedy.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that would allow for unlimited use and unrestricted exposure (and because land use restrictions are necessary), a statutory review will be conducted within five years after initiation of remedial actions to ensure that the remedy continues to provide adequate protection of human health and the environment. Five-year reviews will continue as long as waste remains at the Site and unlimited use is restricted.

F. SPECIAL FINDINGS

Issuance of this ROD embodies the following specific determinations:

Wetlands Impacts

Pursuant to Section 404 of the Clean Water Act (CWA), 44 C.F.R. Part 9, and Executive Order 11990 (Protection of Wetlands), EPA has determined that the selected remedy is the least environmentally damaging practicable alternative for protecting federal jurisdictional wetlands and aquatic ecosystems at the Site under these standards. EPA will minimize potential harm and avoid adverse impacts to wetlands by using best management practices during excavation and by restoring or replicating, if necessary, these areas consistent with federal and state wetlands protection laws. Any wetlands affected by remedial work will be restored (or replicated, if necessary) with native wetland vegetation and any restoration efforts will be monitored. Mitigation measures will be used to protect wildlife and aquatic life during remediation, as necessary. EPA's selected remedy balances the need to address the contamination that poses an ecological risk to the wetlands and waterways and its ability to restore any (temporarily or permanently) altered wetland resources and aquatic habitats impacted by the remediation. As required under applicable federal wetlands regulations, EPA solicited public comment regarding the remedy's potential impacts on wetland resources and received no negative comments (see Part 3 of this ROD).

Floodplain Impacts

Pursuant to Executive Order 11988 (Floodplain Management) and federal regulations, EPA has determined that the selected remedy will cause temporary impacts to 100-year and 500-year floodplains but will not result in the occupancy and modification of floodplains. Best management practices will be used during construction to minimize temporary impacts to floodplains and excavated areas will be returned to original grade to avoid diminishing flood storage capacity. Restoration and monitoring activities are included in the response actions. As required under applicable federal wetlands regulations, EPA solicited public comment regarding the remedy's potential impacts on floodplain resources and received no negative comments (see Part 3 of this ROD).

G. DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record file for this Site.

1. Chemicals of concern (COCs) and their respective concentrations;
2. Baseline risk represented by the COCs;
3. Cleanup levels established for COCs and the basis for the levels;
4. Current and future land and groundwater use assumptions used in the baseline risk assessment and ROD;
5. Land and groundwater use that will be available at the Site as a result of the selected remedy;
6. Estimated capital, annual Operation & Maintenance (O&M), and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected; and
7. Decisive factors that led to selecting the remedy.

H. AUTHORIZING SIGNATURES

This ROD documents the selected remedy for soil, groundwater, and surface water of the Walton & Lonsbury, Inc. Superfund Site. This remedy was selected by EPA with concurrence of the Massachusetts Department of Environmental Protection. A copy of the State's concurrence letter is attached to this ROD (Appendix A).

U.S. Environmental Protection Agency

By: _____ Date: 9/30/19

Bryan Olson, Director
Superfund and Emergency Management Division
Region 1

PART 2: THE DECISION SUMMARY

A. SITE NAME, LOCATION, AND BRIEF DESCRIPTION

The Walton & Lonsbury, Inc. Superfund[2] Site or "Site" (CERCLIS ID# MAD001197755) is located in Attleboro, Bristol County, Massachusetts. EPA is the lead agency and MassDEP is the support agency. EPA has performed and financed Remedial Investigation/Feasibility Study (RI/FS) activities for this Site. The Site was the former location of an electroplating facility that operated from 1940 until 2007. The plating operations were performed in a 13,500-square foot building on a 2.72-acre parcel of land at 78 North Avenue in Attleboro. The property is bounded to the north by Walton Street, with industrial/commercial properties immediately beyond; to the south by wetland and wooded areas, with abutting residential properties along North Avenue and Deanville Road; to the east by North Avenue, with a recreational use area (Hayward Field), residential properties along North Avenue and Paulette Lane, and Bliss Brook beyond; and to the west by industrial/commercial properties, with the Interstate 295 and 95 exchange beyond. A portion of the Walton & Lonsbury (W&L) Property is currently leased for industrial/commercial use. Portions of the Site are within the 100-year and 500-year floodplains delineated on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map for the area. (See **Figures 1 and 2** in **Appendix C** of this ROD for Site Locus and Features.)

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

1. History of Site

Electroplating operations at the Walton & Lonsbury (W&L) facility had been conducted at the Property since 1940, and W&L performed chromium plating until it closed in 2007. Copper plating was also conducted at the Property until the building was remodeled in the late 1950s. Facility operations included parts degreasing using solvents, hard chrome plating, stripping with acids, aqueous rinsing, grinding, and polishing. Chemical usage at the facility reportedly included: trichloroethene (TCE); 1,1,1-trichloroethane (1,1,1-TCA); chromic oxide; chromic acid; hydrochloric acid; sulfuric acid; phosphoric acid; paint thinner; aluminum oxide; sodium hydroxide; sodium bisulfate; sodium hydrosulfate; and lead sulfate. Wastes generated at the facility reportedly included hydrochloric acid, chromium hydroxide sludge, chromic acid wastewater, chromic acid contaminated solids, TCE, 1,1,1-TCA, aluminum oxide dust, and cyanide plating bath solution. After W&L ceased copper plating operations in the 1950s, cyanide was no longer used in the plating process.

From 1940 until 1970, wastewater and waste streams generated at the facility were directly discharged without treatment via an underground pipe from the plating room into the wetlands located on the southern portion of the W&L Property (see **Figure 3** in **Appendix C** of this ROD for historic W&L site features). The wetlands extend onto southern abutting properties. In 1970, W&L abandoned and plugged its underground discharge pipe and installed a batch wastewater treatment system for metals removal and pH adjustment. Following startup of the treatment system, treated wastewater was discharged to a surface impoundment that was located west of the facility building. The impoundment was used to remove

[2] "Superfund" is the common name given for the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9601 *et seq*.

suspended solids remaining in the final discharge after chemical treatment. Wastewater flowing through the surface impoundment was then discharged to a storm water trench located on the west side of the facility building. The discharge from the storm water trench flowed through the wetland area, into several storm water culverts, and into the Ten Mile River. This practice continued until the mid-1980s. In addition, during the period of 1970 to the mid-1980s, chromium hydroxide sludges generated by the batch wastewater treatment system were discharged into an earthen sludge lagoon south of the surface impoundment for dewatering.

In 1984, W&L was ordered by Massachusetts Department of Environmental Quality Engineering (MassDEQE) (now the Massachusetts Department of Environmental Protection) to cease discharge to both the surface impoundment and the sludge lagoon. A closure plan was prepared and subsequently approved by MassDEQE. The wastewater treatment system was converted to a closed-loop for process water, while chromium hydroxide sludge was accumulated and shipped off-site for disposal (approximately 4,000 gallons of sludge were shipped off-site every 90 days).

During a 2004 State inspection of the W&L Property, it was noted that W&L was leasing the portion of the Property that includes the capped surface impoundment and lagoon. The tenant had filled, graded, and paved the area so that it could be used for parking and storage of vehicles and equipment.

Two above-ground storage tanks containing TCE and 1,1,1-TCA were located on the west side of the former building and supplied solvents for internal degreasing operations. TCE was used on the Property from an unknown period of time until 1983, at which time 1,1,1-TCA was determined to be a more environmentally permissible alternative. Several overflow spills of solvents reportedly occurred during the early 1980s. An abandoned dry-well located on the south side of the facility was reportedly used for the disposal of waste solvents including TCE and 1,1,1-TCA.

Three underground storage tanks (USTs) were also present at the Property, and a release of oil to soils was observed during removal of one of the USTs in 1995. Approximately 20 cubic yards of petroleum-contaminated soil were removed from the excavation and a Response Action Outcome pursuant to the Massachusetts Contingency Plan (MCP), 310 CMR 40.000, was filed by W&L's consultant indicating No Significant Risk remained based on soil samples from the excavation that were analyzed for total petroleum hydrocarbons.

The W&L facility ceased all operations in 2007. During the 2004 inspection, wastes being managed at the facility included a one to two percent chromic acid solution stored in four above-ground tanks, and chromium-contaminated solid waste stored in open-top, one-ton plastic totes. These wastes were being shipped off-site by licensed contractors.

A more detailed description of the Site history can be found in Section 1 of the June 2019 RI (AECOM, 2019c).

2. History of Federal and State Investigations and Removal and Remedial Actions

Environmental investigations have been implemented at the property by W&L since about 1970. In 1989, the W&L Facility became regulated under the MCP (RTN 4-0000023). W&L retained a consultant to perform a Phase I Limited Site Investigation and a Phase II Interim Comprehensive Site Assessment, in addition to other compliance activities, under the MCP between 1990 and 2001. These investigations

confirmed that soil and groundwater at the W&L Property had been impacted by metals including trivalent chromium and hexavalent chromium and lead, as well as VOCs including TCE, 1,1,1-TCA, and their breakdown products. Groundwater contamination was documented to have migrated southeastward from the Property towards Bliss Brook, passing beneath a residential area along Paulette Lane, but it was acknowledged that the full extent of contamination had not been defined, either vertically (with respect to deep overburden and bedrock groundwater) or along Bliss Brook and the Bungay River.

In 2005, a Draft Site Inspection Report was prepared for the EPA by Tetra Tech NUS (TtNUS), which summarized past work done, and included a reconnaissance of the W&L Property and nearby residential neighborhoods, a survey of the wetlands and Bliss Brook, interviews, and collection of soil, sediment, surface water, and groundwater samples. The surface water and sediment samples were collected from Bliss Brook as well as further downstream (i.e., Bungay River, Ten Mile River, and Mechanics Pond). The soil samples were collected from residential property in areas along Bliss Brook that are subject to flooding. A well couplet was also installed on the eastern side of Bliss Brook downgradient in the vicinity of the known contaminated groundwater plume at that time, to determine the vertical gradient in the vicinity of the brook to assess whether the brook was a groundwater divide. The sampling confirmed that contaminants released at the W&L Property were present in sediments and surface water (including downstream water bodies; the Bungay River and Ten Mile River/Mechanics Pond). Results from the well couplet sampling indicated that the contaminant plume discharges to Bliss Brook, but does not cross below it. The soil sampling showed elevated concentrations of total chromium and hexavalent chromium.

In December 2008 and March 2009, EPA Region 1 Office of Environmental Measurement and Evaluation (OEME) performed indoor air sampling at nearby residences to assess the possibility of vapor intrusion. Sub-slab soil gas samples and/or indoor air samples were collected at two properties. One property had detections of TCE and other chlorinated VOCs in the indoor ambient air, and a sub-slab depressurization system (SSDS) was subsequently installed by MassDEP, while the other property was noted to have a radon mitigation system present and appeared effective since TCE was not detected in the indoor ambient air.

In February 2010, MassDEP's Field Assessment and Support Team (FAST) performed a vapor intrusion study for five other properties that consisted of sub-slab soil gas and indoor air sampling. MassDEP conducted second vapor intrusion study in December 2010 that included several additional homes along Paulette Lane and North Avenue, which consisted of sub-slab soil gas sampling only. Both of the studies concluded that Site-related contaminants, while present, were found at levels which do not pose an unacceptable risk to indoor air at these additional homes.

In 2011 and 2012, MassDEP installed shallow and deep well couplets and also installed piezometers and staff gauges in Bliss Brook. This work established that groundwater was discharging to Bliss Brook. All of the MassDEP monitoring wells and selected older wells were sampled for hexavalent chromium, lead, and VOCs in early March 2012.

In August 2010, the EPA Emergency Planning and Response Branch ("removal program") performed a removal program preliminary assessment/site investigation (PA/SI) that documented the presence of chromic acid in on-W&L Property tanks. In addition, high concentrations of metals were found in surface soils along the western bank of Bliss Brook and in the backyards of several residences along Paulette Lane and North Avenue. The contamination found in these soils was determined to be from the migration of contaminated groundwater from the original on-W&L Property release areas to this area, wicking up

into the unsaturated soil behind these homes and eventually discharging to Bliss Brook. As a result of the findings of the initial phases of the PA/SI, EPA initiated a Time-Critical Removal Action (removal action) in October 2010 with the objective of mitigating ongoing human health exposure to metals-impacted soil and groundwater and preventing potential future releases. Activities conducted as part of the Time-Critical Removal Action included removal of the W&L buildings and residual waste materials, excavation and off-site disposal of contaminated sediment from wetlands south of the former building where the wastewater was historically discharged, and construction of an engineered cover to isolate surficial soils adjacent to Bliss Brook (behind the North Avenue/Paulette Lane residential area) to mitigate future dermal contact risk. Chromium-contaminated soil and groundwater remain under the cover. A permeable reactive barrier PRB wall was constructed on the downgradient edge of the cover, with the goal of reducing hexavalent chromium to the less toxic trivalent chromium in the groundwater before it discharged to Bliss Brook.

The engineered cover was designed to serve several purposes: provide physical separation from chromium-impacted soils that remain, raise the ground surface elevation above the water table to limit influence of chromium-impacted groundwater on the near surface soils, and promote enhanced movement of groundwater beneath the cover. The existing grade in the area of the cover was excavated to the proposed grade and "hot spot" excavation was performed to remove chromium-impacted soils. The existing soil under the cover was stabilized with Portland cement for subsequent placement of cover materials and regraded to the specified preparatory grade. The soil cover is comprised of a 6-inch granular fill layer (common fill) over a woven geotextile above the regraded soils. Above the granular fill is a geo-composite drainage layer to provide a low-profile layer of high groundwater transmissivity. Above the drainage layer is a minimum 8-inch layer of crushed stone to serve as a capillary break to limit migration of impacted groundwater upward into surface soils. Overlying the crushed stone is a geotextile warning layer and then 6 inches vegetated support sand and a 4-inch topsoil layer to provide physical separation and media for vegetation. The PRB consists of a mixture of zero-valent iron (ZVI) particles and granular fill at a ratio of 1:20 by volume. Restoration activities for the removal action were completed in August 2014.

During implementation of the Time-Critical Removal Action, EPA also conducted additional soil, sediment and surface water sampling to further assess the extent of the chromium contamination. The 2012 EPA Site Reassessment work focused on the surface water pathway and included sampling of sediment and surface water in the wetlands between the W&L Property and the drainage culvert beneath Deanville Road, and downstream along Bliss Brook as far as south as West Street (approximately 1,800 feet south of the W&L Property). Surface and shallow soil samples were also collected from upland areas along these water courses to assess possible flood plain impacts. The results were presented in the Expanded Trip Report and indicated that chromium impacts from the W&L Property exist as far downstream as West Street. It had already been previously documented that detections of chromium are present as far south as the southeastern outlet of Mechanics Pond, nearly a mile downstream of the W&L Property.

In September 2012, EPA completed the Hazardous Ranking System (HRS) evaluation and, with community and State support, the W&L site was proposed to the Superfund National Priorities List (NPL). The W&L site was added to the Final list of NPL sites on May 21, 2013.

3. History of CERCLA Enforcement Activities

EPA has performed a number of potential responsible party (PRP) search related activities, including sending information requests pursuant to CERCLA § 104(e), reviewing files, and performing record searches. As a result of those PRP search activities, EPA determined there were no viable PRPs that could finance and/or perform the RI/FS. Thus, EPA determined to proceed with a fund-financed RI/FS at the Site.

C. COMMUNITY PARTICIPATION

Throughout the Site's history, community concern and involvement has been moderate and consistent. EPA has kept the community and other interested parties apprised of Site activities through informational meetings, fact sheets, press releases, and public meetings. Below is a brief chronology of public outreach efforts.

- In September 2012, EPA published a press release on the Walton & Lonsbury Site's proposal to the National Priorities List.
- On May 21, 2013, EPA published a press release that the Site was finalized on the National Priorities List.
- On February 26, 2014, EPA held a public information meeting at the Attleboro Public Library to provide the community with an update on activities.
- On October 1, 2014, EPA initiated consultation with the Massachusetts Historical Commission, the Mashpee Wampanoag Tribe, and the Wampanoag Tribe of Gay Head (Aquinnah), pursuant to EPA's obligations under Section 106 of the National Historic Preservation Act of 1966, as amended, to provide notification concerning the upcoming RI/FS activities.
- On November 1, 2016, EPA published a fact sheet Site update, which announced an upcoming public informational meeting.
- On December 7, 2016, EPA held a public informational meeting at the Attleboro Public Library to provide the community and stakeholders with an update of Site cleanup progress, which included discussion of the remedial investigation.
- On May 1, 2018, EPA published a fact sheet Site update, which announced an upcoming public informational meeting.
- On May 7, 2018, EPA held a public informational meeting at the Attleboro Public Library to provide the community and stakeholders with an update of Site cleanup progress, which included discussion of the remedial investigation, potentially impacted areas from the Site, and potential cleanup alternatives evaluated in the feasibility study.
- On July 9, 2019, EPA continued consultation with the Massachusetts Historical Commission, the Mashpee Wampanoag Tribe, and the Wampanoag Tribe of Gay Head (Aquinnah), pursuant to EPA's obligations under Section 106 of the National Historic Preservation Act of 1966, as amended, to provide notification concerning the findings and conclusion of RI/FS activities.
- On July 25, 2019, EPA published a legal notice announcing the release of an online link to EPA's Proposed Plan which identified EPA's proposed remedy for the Site in the Attleboro Sun Chronicle and posted a publicly-accessible link on EPA's website.

- On July 26, 2019, EPA made the administrative record for the Proposed Plan, including the Remedial Investigation and Feasibility Study Reports, available for public review at EPA's office in Boston, MA, and at the Attleboro Public Library, 74 North Main Street, Attleboro, MA. This is the primary Site information repository for local residents and has been kept up to date by EPA.
- From July 26, 2019 through August 26, 2019, EPA held a thirty-day public comment period to accept public comments on EPA's proposed remedy for the Site presented in the Proposed Plan.
- On July 31, 2019, EPA held a public information meeting, immediately followed by a Public Hearing, to describe and then discuss the Proposed Plan, and to accept any oral or written comments. A transcript of this meeting and the comments, as well as EPA's response to comments, comprise the Responsiveness Summary, which is included as Part 3 of this ROD.

D. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The selected remedy was developed by combining components of different source control and management of migration alternatives to obtain a comprehensive approach for Site remediation. In summary, the selected remedy provides: soil excavation and off-site disposal at residential yards west of North Avenue; soil excavation and off-site disposal at the W&L Property; *in-situ* soil treatment at the W&L Property; mid-plume *in-situ* treatment west of North Avenue; extension of the existing PRB along Bliss Brook; long-term monitoring of groundwater, surface water, and the vapor intrusion pathway; operation and maintenance of existing SSDSs, the existing engineered cover system and PRB, and any new remedy infrastructure components; wetland/floodplain habitat restoration or replication if necessary; Institutional Controls to: prohibit future residential use at the W&L Property; prevent future construction worker exposure to groundwater contamination at the W&L Property until groundwater cleanup levels are achieved; prevent contact with contaminated groundwater and the installation of non-drinking water wells (i.e. irrigation wells) across the extent of the Site-wide groundwater plume where non-drinking water scenario cleanup levels for residential groundwater are exceeded and/or which may cause migration of the contaminated plume until groundwater cleanup levels are achieved; prevent the installation of wells within the potentially impacted portion of the Bungay River Water Resource Protection District ("District") to prevent plume migration from the contaminated non-drinking water area into the District; prevent disturbance to the existing engineered cover system and PRB, and any new remedy infrastructure components; prevent contact with soil beneath the existing engineered cover system adjacent to Bliss Brook; and require either a vapor intrusion evaluation or vapor mitigation system be installed if a new building is constructed over the shallow groundwater VOC plume (within or to the downgradient area of the former building on the W&L Property) until groundwater cleanup levels are achieved; and five-year reviews to ensure the remedy remains protective of human health and the environment.

No principal threat wastes were identified at the Site. Principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Wastes generally considered to be principal threats are liquid, mobile and/or highly-toxic source material. However, low-level threat wastes at the Site are present beneath the existing engineered cover system. Low-level threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. Wastes that are generally considered to be low-level threat wastes include non-mobile contaminated source material of low to moderate toxicity, surface soil containing COCs that are relatively immobile in air or groundwater, low leachability contaminants, or low

toxicity source material. The selected response actions will address low-level threat wastes at the Site by maintaining the integrity of the existing engineered cover system through implementation of Institutional Controls and long-term maintenance of the engineered cover.

There is no current exposure to contaminated groundwater at the Site. However, non-potable groundwater on Site does present a potential future residential direct contact risk and groundwater downgradient of the Site is part of a City-designated drinking water aquifer (Bungay River Water Resource Protection District; the District), which has been assigned a "medium" value, as determined in the March 2017 MassDEP Groundwater Use and Value Determination (MassDEP, 2017). Therefore, the remedy provides for treatment of sources of groundwater contamination on Site, restrictions to prevent residential exposure to contaminated groundwater until non-potable groundwater cleanup levels are achieved, and additional bedrock groundwater investigations to determine the extent of potential contamination within the downgradient District. If levels in the District are found to be above drinking water standards, implementation of a contingency remedy of *in-situ* injections west of North Avenue is provided.

E. SITE CHARACTERISTICS

The significant findings of the RI can be found in the final RI Report and are summarized below. In addition, Section 1 of the FS contains an overview of the RI activities conducted and results.

1. Physical Setting

This section, summarized from the Draft Final June 2019 RI, presents information on the physical setting of the Site.

Site Geology

The Site study area is located in the Seaboard Lowland section of the New England physiographic province. The regional geology in the vicinity of the study area is characterized by Paleozoic metasedimentary rocks of the Narragansett Basin overlain by unconsolidated glacial deposits of Pleistocene age. The general topography of the area is flat to gently sloping with scattered prominent hills (glacial drumlins) elongated in a north-northwest to south-southeast direction. The valleys are typically occupied by semi-continuous marshes.

The geology in the vicinity of the W&L Property is consistent with a filled wetland area that had developed on glacial outwash after the last glacial period. The geologic units identified are as follows (in descending order from the ground surface):

- Fill: consists of fine to coarse sand with varying amounts of silt, gravel, cobbles, and boulders. Typically dry and well-compacted (medium dense). Fill was observed in all upland boring locations at the surface and varied in thickness from about 3 to 9 feet.
- Recent Wetland Deposits: consist of silty fine sand that was light grey with mottled orange-brown coloration. This layer was typically found near the elevation of the water table and was moist to wet and soft. This layer is believed to represent the former wetland soils upon which the fill was placed. The recent wetland deposits are not present in all locations, suggesting there were

isolated areas that were excavated prior to placement of the fill. The wetland deposits vary in thickness from 0 to nearly 4 feet.

- Organic Silt and Clay: these deposits were found only in the area immediately adjacent to Bliss Brook and are believed to be recent organic deposits that formed in a depression in the glacial outwash deposits possibly related to a kettle hole. These deposits are saturated and extremely soft, with little to no bearing strength. They vary in thickness from 0 to more than 12 feet along Bliss Brook. Most were removed or buried during the 2010 EPA Removal Action and placement of the engineered cover in this area.
- Fine Sand and Silt: found to overlay the glacial outwash deposits and are likely later stage deposits as the glaciers withdrew from this area. These deposits tend to contain a greater proportion of silt and are not as permeable as the coarser underlying deposits. This layer is sometimes thin or missing.
- Glacial Outwash Deposits: consist of very coarse to fine sand with little silt. These deposits are saturated and fairly dense, generally exhibiting an orange-brown color. They represent material deposited during the last glacial period in a fairly high-energy environment in the presence of significant amounts of water, though not far from the glacier based on the relatively angular nature of the particles. The outwash extends to a depth of about 25 to 40 feet depending on the elevation of the ground surface and the depth to bedrock.
- Glacial Till: consists of fine to coarse sand with higher amounts of silt and clay as well as angular gravel and cobbles. The contact between the till and the outwash is not distinct but rather is transitional and can be difficult to identify. The same can also be true of the transition from till into weathered bedrock at the base of the till. It is likely that the study area is located in an area where the terminus of the glacier advanced and retreated several times, reworking the underlying till. In general, the till is very dense, is more gray to red than the underlying outwash, and contains larger, more angular gravel. The till varies in thickness from about 10 to 20 feet.
- Bedrock: consists of grey to grey-black silt/mudstone and greywacke/sandstone with some conglomerate; consistent with the Wamsutta Formation. The bedrock surface slopes gently (2 to 2.5% grade) to the southeast based on drilling refusal depths and bedrock boreholes drilled during the remedial investigation.

Hydrogeology

Groundwater at the study area exists as a water table aquifer under unconfined conditions in the outwash and wetland deposits (where present). The water table is generally encountered at a depth of two to 13 feet below grade. It is deepest in the residential areas adjacent to North Avenue and shallowest in the wetlands south of W&L Property along Bliss Brook. Shallow groundwater flow is generally to the southeast across the study area toward Bliss Brook and the associated wetlands. Groundwater flow in the deeper overburden is slightly more southerly and is not as strongly influenced by Bliss Brook. The horizontal gradients range from 0.010-0.015 on the W&L Property and in the residential neighborhood near Paulette Lane to 0.002-0.003 in the areas closer to Bliss Brook. Vertical gradients measured in well couplets/triplets throughout the study area show variable results that are seasonally affected at many locations. In general, to the east of North Avenue, little or no vertical gradients exist between shallow and deep overburden. Further east, along Bliss Brook, vertical gradients are non-existent to weakly upward along the northern reach of Bliss Brook but are more strongly upward in the southern reach

(beyond the Attleboro housing complex called Brookside Apartments). Piezometers installed in Bliss Brook by MassDEP showed that the shallow groundwater discharges into the brook, which agrees with base-flow gauging results from Bliss Brook that show increasing flow as you move downstream. West of North Avenue in the vicinity of the W&L Property, gradients seem to be a combination of upward from shallow bedrock to deep overburden and downward from shallow overburden to deep overburden.

Hydraulic conductivity estimates of the outwash deposits at the study area range from 1 to 5 feet/day, though the Weston report stated that these values appeared to be very low based on visual inspection of the soil and on pumping rates employed for dewatering during construction activities. Subsequent slug tests estimated the hydraulic conductivity of the outwash deposits near Bliss Brook to range from 20 to 440 feet/day with an average of about 140 feet/day. Slug tests conducted for a Supplemental Phase II Comprehensive Site Assessment Report for a Property located northwest of the W&L Property on Walton Street suggest that hydraulic conductivities on the W&L Property are likely much lower than those along Bliss Brook. Hydraulic conductivity values measured were on the order of 0.5-3.2 feet/day (0.7 feet/day average) in the upper silty sands and 4.4-5.5 feet/day in the lower medium-coarse sands and gravel.

Based on the values reported in the Supplemental Phase II Report and using an effective porosity of 22% for non-uniform sand and gravel, the estimated velocity of groundwater west of North Avenue is about 0.34 feet/day or 124 feet/year. East of North Avenue, using an effective porosity of 30% for well-sorted sands and a hydraulic conductivity of 140 feet/day, the estimated groundwater velocity is 1.3 feet/day or 511 feet/year. The higher transmissivities (T=Kb, hydraulic conductivity times aquifer thickness) to the east may explain the rather abrupt decrease in the hydraulic gradient that occurs just to the east of North Avenue.

Surface Water Hydrology

The study area lies within the Ten Mile River watershed, which covers approximately 54 square miles in southeastern Massachusetts and a small area of northeastern Rhode Island. Two major tributaries empty in the Ten Mile River along the way, the Seven Mile River and the Bungay River. The latter originates approximately five miles to the north in the Town of North Attleboro at the outlet of Greenwood Lake. The Bungay River flows south-southwesterly through an extensive wetland system until it joins the Ten Mile River just upstream of Mechanics Pond. Bliss Brook, which receives essentially all the drainage from the W&L Property, appears to originate about 1.3 miles to the north of the W&L Property, although its uppermost reaches have been significantly affected by the presence of the Exit 5 interchange on Route 95 and by commercial development to the northwest. From its headwaters, the brook flows generally south, passes approximately 500 feet east of the W&L Property, and ends in the Bungay River just upstream of its confluence with the Ten Mile River. Just upstream of the W&L Property, Bliss Brook flows through a large wetland area that contains a small pond. The watershed of Bliss Brook encompasses only about one square mile or less and is thus a relatively small portion of the Ten Mile River basin.

Surface drainage in the vicinity of the study area is divided by North Avenue. To the west of North Avenue, including the W&L Property, surface water flows to the south through a large wetland complex (southern wetland). The primary outlet of this complex is a culvert under Deanville Road that eventually discharges into Bliss Brook near its confluence with the Bungay River. To the east of North Avenue, surface water drains into Bliss Brook.

The majority of the southern wetland and areas along either side of Bliss Brook are located within the 100-year floodplain. The W&L Property itself is not located within either the 100-year or 500-year floodplain (see **Figure 2** of this ROD).

2. Conceptual Site Model

The sources of contamination, release mechanisms, exposure pathways to receptors for soil, groundwater, surface water, sediment, indoor air, as well as other site-specific factors, are considered while developing a Conceptual Site Model (CSM). The CSM is a three-dimensional "picture" of site conditions that illustrates contaminant sources, release mechanisms, exposure pathways, migration routes, and potential human and ecological receptors. It documents current and potential future site conditions and shows what is known about human and environmental exposure through contaminant release and migration to potential receptors. The risk assessment and response action for all environmental media for the Site are based on this CSM.

Sections 1.4, 1.5, and 1.6 of the July 2019 FS (AECOM, 2019d) for the Site contains a more detailed discussion of the sources of contamination, nature and extent of contamination, and contamination fate and transport. The significant findings of the Remedial Investigation are summarized below.

Sources of Contamination

The majority of contamination is believed to have occurred prior to 1970 as a result of direct discharge of wastes to an abutting wetland on the southern side of the Property. The untreated wastewater was historically discharged via an underground pipe. Standing water was historically present in this wetland in aerial photos taken prior to 1970. The pipe was abandoned and plugged in 1970, when a wastewater treatment system was constructed. The treated wastewater was discharged to a stormwater trench located on the west side of the W&L Property, after flowing through a surface impoundment, the purpose of which was to remove suspended solids remaining in the discharge after chemical treatment. Chrome hydroxide sludge generated by the wastewater treatment process was also discharged to the surface impoundment. The impoundment area and an associated lagoon were capped in place in 1985, after excavation and disposal of sludges off-site at a facility in Canada. The MCP Phase IIA report concluded that these areas were not significant contributors to groundwater contamination. Samples were collected from the bottom of the impoundment/lagoon area after removal of visible sludge and visibly contaminated soil and were analyzed for several contaminants, and the approved closure goal for the area was met. The soil data from the RI do not indicate presence of significant soil contamination in this area.

A number of overflow spills from an outside TCE storage tank were known to have occurred in the early 1980s. This location was identified as a major source of contamination. This area and the drum storage pad area, which was historically used to store process chemicals and wastes, are possible sources of the TCE groundwater plume mapped during the RI. However, historic subsurface soil sampling that was performed to attempt to locate this area did not find elevated TCE concentrations. An abandoned dry well located on the south side of the Property, which has not been located, was reportedly also used for disposal of TCE.

Emissions from plating operations exhausted to the roof of the former plating building, and the roof was noted to be stained with chromium. Runoff from the roof discharged to the ground in several places. Roof runoff samples were found to contain significant concentrations of chromium. Roof runoff is a

probable source of the surface soil chromium contamination present on the W&L Property. Exhaust to the roof from the area of the former building where grinding operations were performed was also suspected to be a source of metals contamination to soil, but it was concluded that this exhaust was not likely to be a significant contributor.

A total of three fuel USTs were present at the W&L Property, which have all reportedly been removed. Localized soil and groundwater contamination with petroleum hydrocarbons was detected during a 2001 Phase IIC investigation. A release of petroleum to soil was confirmed during removal of one of the tanks and the contaminated soil was removed in 1995.

Of the above sources, most of those associated with the former building (e.g., former tanks, drum storage pad, roof runoff, and trenches) are no longer present as they were removed by W&L or by EPA and MassDEP removal actions. Residual contamination associated with these sources remains in the subsurface. The original wetland discharge area was partially excavated during the 2010 EPA removal action, but contamination remains to the south of the immediate discharge area.

Nature and Extent of Contamination

The primary contaminant is chromium, present in both trivalent and hexavalent forms in study area surface soil, subsurface soil, sediment, and surface water, with trivalent chromium being more prevalent. In groundwater, the chromium present is almost entirely in the hexavalent form. The extents of other contaminants in soil, sediment, and groundwater generally fall within the boundaries of the total chromium contamination.

Surface and Subsurface Soil

Total chromium impacts in soil extend from the former W&L Property itself, south through the southern wetland to Deanville Road, to the east of North Avenue as far as Bliss Brook, and south along the brook to its confluence with the Bungay River. In general, total chromium concentrations are higher in wetland soil samples from the southern wetland and along the brook than they are in upland soil samples from these same areas. The highest concentrations of total chromium (greater than 5,000 milligrams per kilogram (mg/kg)) are found in soil located beneath the cover installed by the removal program and in the wetland soil in the southern wetland, based on results from samples collected in November 2010 (before the cover was designed and constructed). Soil in the area of the engineered cover system was stabilized with Portland cement because the soil did not have sufficient bearing strength to support the weight of the cover. Some of this stabilized soil was also removed and consolidated on the W&L Property and was later disposed off-site, as necessary to grade the area to support the cover and also remove "hot spots" of contamination. Additional sampling of the stabilized soil that underlies the cover was not performed after the soil stabilization and grading/removal work was performed.

Along Bliss Brook south of the cover, total chromium concentrations exceed those in reference soil samples. On-W&L Property subsurface soil concentrations ranged from 1,000 to 5,000 mg/kg total chromium. The extent of soil contamination with metals other than chromium (e.g., copper, lead, and silver) is similar to that for total chromium, but concentrations are much lower overall, with very few detections greater than 500 mg/kg.

The extent of soil contamination with hexavalent chromium extends from the former W&L Property to the south into the southern wetland and to the east of North Avenue to the engineered cover system. The soil along the banks of Bliss Brook does not appear to be impacted by hexavalent chromium. Hexavalent chromium was detected in the majority of on-W&L Property surface soil and subsurface soil samples at concentrations in the range of 0.2 to 100 mg/kg, but some results exceeded 100 mg/kg. The extent of hexavalent chromium contamination in soil is smaller than that for total chromium, in that it does not extend downstream along Bliss Brook. Concentrations of hexavalent chromium in soil are also orders of magnitude lower than those for total chromium, indicating that most of the chromium present in the soil is in the trivalent form.

Petroleum releases are documented to have occurred at the W&L Property from former USTs and possibly other sources. Soil samples along Bliss Brook and in the southern wetland had total polycyclic aromatic hydrocarbon (PAH) concentrations consistent with reference soil samples, except one sample along Deanville Road and three samples south of West Street, all of which are a considerable distance from the W&L Property. Surface soil and subsurface soil samples collected from the W&L Property itself showed elevated total PAH concentrations compared to reference soil samples. Potential sources are historic petroleum releases from former USTs and historic fill. Detections of chlorinated VOCs in soil samples were limited to the W&L Property itself and the northern portion of the southern wetland. The most commonly detected chlorinated VOC was TCE, and with few exceptions, it was detected at every location where any chlorinated VOCs were detected.

Lead was identified as a possible contaminant of concern during initial MCP investigations at the Site, and lead sulfate was reportedly used at the facility. During earlier RI phases and other historic sampling efforts including the 2010 EPA removal action, surface soil samples analyzed for total lead were analyzed in bulk (i.e., the samples were not sieved to create different fractions for analysis). Most of the unsieved surface soil samples with total lead concentrations above 500 mg/kg are located either on the W&L Property itself, or in wetland soil of the southern wetland, although no clear pattern is evident. It is possible that the source of lead in the wetland soil south of the Property is from former W&L facility operations, and that upland soil bordering the wetland area became contaminated with lead also due to flooding. Other contributing factors are likely, such as road runoff, historic fill, and lead paint.

During Phase 5 of the RI, surface soil sampling was performed and involved the collection of additional samples to evaluate human health risk due to lead in surface soil. This involved analysis of the less than 150 μm fraction (fine fraction) for total lead, and potentially *in-vitro* bioaccessible (IVBA) lead. Both of these analyses were performed on all of the Phase 5 surface soil samples. Concentrations of fine fraction total lead are generally greater than 200 mg/kg, and are also generally greater in wetland soil samples than in upland soil samples.

Results for total lead and total chromium in unsieved samples are also compared to their respective reasonable maximum exposure (RME) concentrations as found in soil samples from reference areas. There appears to be a weak correlation between elevated total lead and elevated total chromium concentrations. Nearly all samples with elevated total lead also have elevated total chromium. However, there are a significant number of samples where the total chromium concentration is elevated but the total lead concentration is consistent with background. Therefore, an elevated total chromium concentration is not necessarily indicative of a higher total lead concentration. After evaluation of the Phase 5 data, EPA determined that additional sampling for fine fraction lead should be performed for residential (upland) soil west of North Avenue to refine the extent and to provide a sufficient number of samples on each

individual property so that risk could be evaluated on a property-by-property basis. Samples were located within the FEMA AE flood zone (1% annual chance of flooding; the 100-year flood zone) but outside of the southern wetland to characterize upland soil subject to flooding, as this is the mechanism by which it is believed that site-related contamination would have been deposited. This second round of fine fraction lead sampling was performed in November 2018. As with the previous data, there appears to be only a weak correlation between elevated levels of lead (bulk and fine fraction) and elevated levels of chromium.

Samples used for the lead risk evaluation are those of residential soil within the floodplain, as these samples represent the part of each property likely to have been impacted by flooding from the wetland and also represent residential exposure. Two soil samples within the floodplain (10-DE-10 and 28-NO-01) appear to be outliers (inconsistent with other nearby results), and the soil in these locations may be impacted by other sources. Sample 28-NO-01 is close to the road and where the property owner currently parks recreational vehicles. Sample 10-DE-10 is in the rear of the lot in an area that appears to have been a disturbed area, based on examination of historic aerial photos from before the home was built. Unlike the other properties north of Deanville Road, it appears that the lead on these two properties is localized to two areas (one on each lot) rather than being present throughout the floodplain. A technical memorandum that discusses all of the fine fraction lead results from west of North Avenue and includes a risk evaluation for each property is presented in Appendix G of the Baseline Human Health Risk Assessment (HHRA).

Sediment

The extent of sediment contamination with total chromium extends from the W&L Property through the southern wetland, to Bliss Brook from the section just east of the engineered cover downstream to its confluence with the Bungay River, and into Mechanics Pond. Virtually all sediment samples from these areas had total chromium concentrations greater than those found in reference sediment samples.

The highest total chromium concentrations (greater than 5,000 mg/kg) in sediment are found in the southern wetland. The presence of elevated total chromium in this sediment is consistent with the fact that chromium-containing wastewater was directly discharged to the southern wetland prior to 1970. Chromium-contaminated surface soil also was likely transported by overland flow from the W&L Property itself to depositional areas in the southern wetland. Along Bliss Brook and in Mechanics pond, the majority of sediment samples showed total chromium concentrations in the range of 23 to 1,000 mg/kg.

The extent of sediment contamination with hexavalent chromium is similar to that for total chromium, but concentrations are much lower. Detections exist in numerous samples as far south as the southern end of Mechanics Pond, and there is no apparent correlation with respect to distance from the W&L Property itself or the concentration of total chromium detected at the same location.

Sediment contamination with lead and silver is evident in the southern wetland, and mirrors the extent of total chromium contamination. In contrast, sediment samples from Bliss Brook do not show evidence of lead or silver contamination above the concentrations of these analytes detected in reference sediment samples. In Mechanics Pond, however, there are some detections of these metals in sediment samples at levels above reference concentrations. Transport of lead and silver contamination from the southern wetland to the pond via overland flow or the stormwater drainage system is possible, as is the possibility of other sources impacting the Ten Mile River and the pond. Concentrations of copper in sediment

samples exceed 1,000 mg/kg in multiple samples from Mechanics Pond, but are not significantly elevated in the southern wetland, with only one sample exceeding this value. This suggests that there may be another source of the copper contamination in Mechanics Pond sediment. Similarly, concentrations of total PAHs in Mechanics Pond and the Bungay River are generally higher than those in southern wetland sediment samples, suggesting that other sources are more significant contributors.

Groundwater

Hexavalent chromium contamination in the shallow groundwater (i.e. overburden) extends east and south of the W&L Property crossing under North Avenue, Paulette Lane, and eventually discharges to Bliss Brook and nearly as far as Payson Street. Migration under Bliss Brook occurs in the deep overburden and in the bedrock. The shallow overburden flow is discharging to Bliss Brook. Phase 5 of the RI included installing and sampling additional piezometers along Bliss Brook to attempt to define the extent of hexavalent chromium discharge to the brook. The results show elevated hexavalent chromium concentrations in shallow groundwater immediately west of or under the brook at PZ-10, PZ-13, and PZ-14 (**Figure 3-8** in **Appendix C** of this ROD), demonstrating that the plume is discharging to the brook in this area.

Hexavalent chromium in bedrock appears to take a similar flow pattern as in the overburden, though with a notable extension under Bliss Brook. Although only one bedrock well exists east of Bliss Brook, the hexavalent chromium in the well indicates that the plume has traveled in bedrock under Bliss Brook. The downgradient extent of hexavalent chromium in bedrock has not been defined and may potentially extend beneath a portion of the Bungay River Water Resource Protection District. Additional bedrock monitoring wells will need to be installed to determine if this District is impacted.

TCE in overburden has been detected off-W&L Property across North Avenue from the W&L Property. In the overburden, the TCE plume is not as wide as the hexavalent chromium plume and does not cross under any part of Hayward Field or Paulette Lane to the northeast side of the plume. The plume does extend, however, slightly further southwest and west of North Avenue. The overburden plume extends as far as Bliss Brook, but there is no evidence that it extends beyond the brook to any significant degree in the overburden based on shallow well data east of the brook.

Although the TCE concentrations are not as high in the bedrock as in the overburden, the width of the plume is wider than in the overburden, extending slightly further northeast under the corner of Hayward Field and part of Paulette Lane. The eastern most extent also appears to have traveled further under Bliss Brook, but not very significantly.

Other contaminants of note in groundwater include 1,1,1-TCA and 1,4-dioxane, which is likely associated with 1,1,1-TCA. The distribution of the two contaminants is similar, in that higher concentrations of 1,4-dioxane seem to correspond with higher concentrations of 1,1,1-TCA. The spread of 1,4-dioxane, due to its non-reactive nature and being readily soluble in water, tends to be greater than that of 1,1,1-TCA. Overall, the extent to which 1,4-dioxane is found matches that of hexavalent chromium; however, the concentrations are significantly lower.

Total (unfiltered) lead in groundwater exceeds the Safe Drinking Water Act (SDWA) action level of 15

micrograms per liter (µg/L) in three monitoring wells. However, dissolved lead results from these wells were all less than 15 µg/L except for one dissolved lead result for a monitoring well collected in August 2014, corresponding to the highest total lead result. The elevated detections of total lead in these three monitoring wells may be related to suspended particulates in the samples, rather than to dissolved lead concentrations. One monitoring well is located within the mapped hexavalent chromium plume migrating from the W&L Property. This monitoring well is downgradient of the location with the highest soil concentration of lead. This monitoring well (AE-09S) was destroyed sometime between Phase 2 and Phase 3 of the RI.

Surface Water

Contaminants other than total chromium and hexavalent chromium were detected in surface water samples from Bliss Brook and other locations, but hexavalent chromium is the most significant, and is most easily attributed to discharge of the hexavalent chromium groundwater plume to the brook. The RI Phase 1 revealed hexavalent chromium is first detected within the brook across from the southern end of the cover. Concentrations of hexavalent chromium rise in surface water to 200 µg/L for the next three locations moving downstream, indicative of the fact that the shallow groundwater hexavalent chromium plume is discharging to this area. Results were similar for the RI Phase 2 samples, except that hexavalent chromium impacts were observed further downstream. Surface water toxicity testing results showed a significant effect on survival and reproduction for some locations, which is attributed to the hexavalent chromium concentrations observed in these locations.

Contaminant Fate and Transport

Hexavalent chromium is the predominant contaminant in groundwater and has migrated to a large extent with the groundwater due to its high mobility in this medium. Hexavalent chromium is also found in surface water along a stretch of Bliss Brook where contaminated groundwater discharges. It is also found in soil and sediment on-W&L Property and in the southern wetland, consistent with the CSM that it was directly discharged to the southern wetland and also leaked from plating trenches. Finally, it is found in soil under the area covered by the removal program. Hexavalent chromium is present to a lesser extent in Bliss Brook sediments and sediments in Mechanics Pond, most likely because it is reduced to trivalent chromium in the sediments due to the presence of sulfides, ferrous iron, and organic matter acting as reducing agents. Hexavalent chromium does not volatilize from soil or groundwater, and therefore is not of concern with respect to vapor intrusion, although historically (when the W&L facility was in operation) it was likely emitted to air from the plating baths. These emissions deposited on the roof and the ground surface in the immediate proximity of the former building.

Trivalent chromium is prevalent in soil and sediment on the W&L Property, within the southern wetland, east of North Avenue under the cover, along Bliss Brook, and in Mechanics Pond. In general, for off-W&L Property soil sample locations, concentrations are higher in wetland soil than in upland soil. As with hexavalent chromium, trivalent chromium concentrations in soil are elevated under the cover. It is likely the trivalent chromium in soil under the cover is from hexavalent chromium that migrated to this area via groundwater and was then reduced to trivalent chromium by reducing agents present in the soil. In groundwater, there is virtually no trivalent chromium; essentially all the chromium detected in both total (unfiltered) and dissolved (field-filtered) samples is in the hexavalent form.

Chlorinated VOCs (TCE; 1,1,1-TCA; and their daughter products) were detected to a limited extent in soil, but are present in both overburden and bedrock groundwater, forming a plume that is of generally smaller lateral and vertical extent than the hexavalent chromium plume. The TCE plume is likely being attenuated due to mechanisms such as biodegradation (as evidenced by the presence of daughter products), adsorption to soil particles, and volatilization into soil gas. Homes overlying the plume show evidence of vapor intrusion, based on the fact that the chlorinated VOCs found in groundwater are also detected in
sub-slab soil gas samples and indoor air samples.

1,4-Dioxane is present in groundwater in low concentrations, with an approximate extent similar to that of the hexavalent chromium contamination. Similar to hexavalent chromium, it is high water soluble, and thus migrates quickly in groundwater. Because 1,4-dioxane is used as a stabilizer in chlorinated solvents, the spills/releases of solvents to the W&L Property are believed to also be one source of the 1,4-dioxane.

Lead is present in in numerous bulk (unsieved) surface soil samples collected from the W&L Property itself, and in wetland soil of the Southern Wetland, at concentrations above 500 mg/kg (well above the residential screening value of 200 mg/kg). No pattern to the distribution of the lead is apparent. The source of the lead found in surface soil on the W&L Property is not definitively known, but it is known that lead sulfate was used at the W&L facility. Few soil samples east of North Avenue (e.g., under the engineered cover) show substantially elevated lead concentrations, indicating that unlike chromium, lead has not migrated to this area via groundwater.

Concentrations of fine fraction total lead are generally greater than 200 mg/kg for residential properties west of North Avenue that border the southern wetland, and are also generally greater in wetland soil samples than in upland soil samples. Lead concentrations in the fine fraction are also consistently higher than the corresponding bulk (unsieved) soil sample collected from the same location.

There is no clear direct correlation of higher unsieved or fine fraction total lead results with elevated total chromium results in the same samples, but there does appear to be some association, suggesting that releases from the W&L facility may be the source of at least a portion of the fine fraction lead. It is probable that the source of lead in the wetland soil south of the W&L Property is the former W&L facility operations (e.g., discharge of lead-contaminated wastes), and that upland soil bordering the wetland area became contaminated with lead due to transport of wetland soil particles to bordering upland areas by flooding. Other factors that may contribute to lead contamination in the wetland soil and bordering upland soils are road runoff, historic fill, and lead-based paint. In addition, there is a possible additional sources of lead contamination (as well as petroleum/PAHs) from a former bus garage located on North Avenue. Aerial photos from 1959 and 1961 show what appear to be buses parked on the western side of North Avenue just north of its intersection with Deanville Road.[3] Sediment lead concentrations show a greater likelihood of association with former W&L facility activities, because elevated concentrations are clustered in the southern wetland.

Metals other than chromium and lead are present in soil and sediment on the W&L Property and in the southern wetland, although concentrations are much lower. The source(s) of many of the metals are not known; however, it is known that copper was used at the facility. Silver plating may also have been performed based on the high levels of silver found in southern wetland sediment that are coincidental with

[3] Lockheed Martin, 2013

elevated chromium concentrations. Historic fill on the W&L Property is also a potential source of metals. Metals other than chromium do not appear to be significantly above reference sample concentrations for soil and sediment along Bliss Brook. This indicates that, in contrast to hexavalent chromium, other metals are not being transported to Bliss Brook via the groundwater migration pathway. Other metals are found in Mechanics Pond sediments at concentrations well above those found in reference sediment samples. In part, these metals may have been transported from the W&L Property and southern wetland via migration through storm water discharge from the Southern Wetland, but numerous other sources along the Ten Mile River and the pond itself are also likely contributors. It is noted that sediment samples from Farmer's Pond (which feeds the Ten Mile River upstream of Mechanics Pond and was sampled originally for possible use as a reference pond) showed elevated total chromium, copper, and silver concentrations compared to the samples ultimately selected as reference samples.

PAHs are semi-volatile organic compounds with 2- to 6-ring structures. PAHs are commonly found in the environment, stemming from petrogenic (associated with oils) and pyrogenic (associated with combustion) sources. PAHs are present in on-W&L Property soil and in some off-W&L Property soil samples at concentrations in excess of those found in reference soil samples, but the extent is much more limited than for chromium. The source of the PAHs in on-W&L Property soil may be from historic petroleum releases as well as the presence of historic fill from an unknown (off-site) source. PAH concentrations in soil samples collected along Bliss Brook were mostly consistent with reference soil sample concentrations. Similarly, concentrations of PAHs in sediment samples from Bliss Brook were similar to or lower than those in reference sediment samples. PAH contamination in off-W&L Property samples is not clearly associated with the W&L Property, and other sources are likely.

Routes of Exposure and Potential Receptors

Human Health

The following is a summary of the pathways evaluated at each exposure scenario/exposure point in the HHRA (AECOM, 2019a):

Receptor Population	Scenario Timeframe	Exposure Medium	Exposure Point	Exposure Route
Recreational user	Current and future	Wetland/Floodplain surface soil, sediment, and/or surface water	Southern Wetland and Bliss Brook	Ingestion and dermal contact
		Sediment and surface water	Bungay River / Mechanics Pond	Ingestion and dermal contact
		Sediment and/or surface water	Downstream of Mechanics Pond	Ingestion and dermal contact
Resident	Current and future	Indoor air	Paulette Lane / North Avenue	Inhalation via vapor intrusion
		Floodplain surface soil and/or fugitive dust and VOCs	West and East of North Avenue	Ingestion, inhalation, and dermal contact
	Future	Groundwater	Site-wide groundwater	Ingestion, inhalation, and dermal contact

		Upland/Floodplain surface/subsurface soil and/or fugitive dust and VOCs	W&L Property	Ingestion, inhalation, and direct contact
Commercial worker	Future	Upland/Floodplain surface/subsurface soil and/or fugitive dust and VOCs	W&L Property	Ingestion, inhalation, and direct contact
Construction worker	Future	Upland/Floodplain surface/subsurface soil and/or fugitive dust and VOCs	W&L Property	Ingestion, inhalation, and direct contact
		Upland/Floodplain surface/subsurface soil, shallow groundwater, trench air, and/or fugitive dust and VOCs	W&L Property	Ingestion, inhalation, and direct contact
		Shallow groundwater and/or trench air	Off-Property Areas	Ingestion, inhalation, and direct contact

Potential Exposure Pathways and Receptors Under Current Land Use Conditions

Due to the presence of a secure fence surrounding the W&L Property, no current exposures are assumed to be occurring at this exposure point. There are occupied residences along the east and west sides of North Avenue. The floodplain areas of these properties (adjacent to the southern wetland and Bliss Brook) may have been impacted by Site-related contamination through flooding or via groundwater discharge. Residential exposures to these floodplain surface soils have been quantitatively evaluated, including incidental ingestion, dermal contact, and the inhalation of fugitive dust and VOCs.

Residential buildings located near the shallow groundwater plume (along Paulette Lane and North Avenue) may be impacted by Site-related VOCs. Therefore, residents may be exposed to contaminants in indoor air via inhalation as a result of a potentially complete vapor intrusion pathway. Because there are no known potable wells on or in the vicinity of the Site, current residential exposures to groundwater used as tap water are not addressed. Residents may be impacted by exposure to Site-related contaminants in shallow groundwater, although there are no known irrigation wells on or in the vicinity of the Site.

Currently there are no known potable wells within the Bungay River Water Resource Protection District immediately downgradient from the Site.

Recreational uses of the wetlands and surface water bodies downgradient of the W&L Property (southern wetland, Bliss Brook, Bungay River/Mechanics Pond, and downstream of Mechanics Pond) are known to be occurring. Recreational users may be exposed to floodplain/wetland surface soil, sediment, and surface water at these exposure points, either by wading or swimming. Wading exposures include incidental ingestion of floodplain/wetland surface soil and sediment, and dermal contact with floodplain/wetland soil, sediment, and surface water. Swimming exposures additionally include incidental ingestion of surface water. The inhalation of fugitive dust and VOCs is not evaluated for wetland/floodplain surface soil because these soils are moist the majority of the time, decreasing the likelihood that fugitive emissions will occur.

Potential Exposure Pathways and Receptors Under Future Land Use Conditions

To evaluate potential future exposures, it was assumed that no additional remedial action was taken, and that the levels of contamination currently existing at the Site would remain the same in the future. However, since future activities at the W&L Property may result in the removal of the security fence, future receptors are assumed to be exposed to soil on the W&L Property and immediately adjacent to the W&L Property (i.e., between the W&L Property and the wetland). Since future activities at the W&L Property may also result in the movement of soils currently at depth to the surface, future receptors are also assumed to be exposed to subsurface soil (2 to 10 feet bgs) as well as surface soil (0 to 2 feet bgs) for areas where impacts extend into the subsurface interval.

For the purposes of this baseline risk assessment, the exposures described under current land use conditions for residents to the east and west of North Avenue, for residential buildings potentially impacted by the vapor intrusion pathway, and for recreational users throughout the Site remain unchanged in the future. However, it was assumed that redevelopment of the W&L Property would occur in the future, and that the engineered cover currently in place at the Residential Yards East of North Avenue would become compromised, resulting in the potential for exposure to soil currently beneath the engineered cover. A qualitative evaluation of soil contaminant concentrations beneath the engineered cover is included to evaluate whether concentrations are likely to cause a risk above EPA risk limits if exposures were to occur. In addition, the future use of groundwater for potable purposes was also evaluated.

The following justifies the selection or exclusion of exposure points, receptors and exposure routes under assumed future land use conditions.

Both residential and commercial development of the W&L Property are evaluated, including exposure to upland/floodplain surface and subsurface soil by incidental ingestion, dermal contact, and inhalation of fugitive dust and VOCs. The future vapor intrusion pathway has been qualitatively evaluated, identifying locations where VOCs in soil and groundwater may have the potential to affect the quality of the indoor air of a future residential or commercial building.

A future residential groundwater use scenario has also been included in the quantitative evaluation. Exposure to contaminated groundwater is addressed on a Site-wide basis for the hypothetical future residential population, using data applicable to the center of the plume. Exposures to contaminated groundwater for adult and young child (i.e., 1 to 6 years old) residents are through the routes of ingestion, dermal contact, and inhalation assuming tap water consumption and water contact during showering and bathing, laundry, dish washing and other household activities.

Since changes in land use may occur on the W&L Property and in off-W&L Property areas of the Site, it is reasonable to assume that construction workers may be exposed to contaminants in soil and/or shallow groundwater during the construction of new buildings on the W&L Property or upgrades to existing buildings in off-W&L Property Areas. Future construction workers at the W&L Property may be exposed to upland/floodplain surface and subsurface soils through incidental ingestion, dermal contact, and the inhalation of fugitive dust and VOCs. Future construction worker exposure to shallow groundwater both on the W&L Property as well as in off-W&L Property areas of the Site includes incidental ingestion of, and dermal contact with, contaminated groundwater. Construction workers are likely to contact shallow groundwater only (encountered less than 10 feet bgs). Construction workers may also be exposed to fugitive contaminant vapors that migrate to the air space of a construction trench. Exposure to impacted

trench air attributable to contaminated groundwater is quantitatively evaluated for both the W&L Property and the off-W&L Property areas of the Site.

Ecological

The Baseline Ecological Risk Assessment (BERA; AECOM, 2019b) evaluated the following potential ecological exposure pathways, which is also summarized on **Table G-Eco2** in **Appendix B** of this ROD:

Exposure Media	Receptors	Assessment Endpoint	Exposure Area		
Surface water	Aquatic invertebrates	Survival and growth of aquatic invertebrate communities and local populations of zooplankton	W&L Property & Southern Wetland	Bliss Brook	Mechanics Pond
	Amphibians	Reproduction of amphibian populations			
	Fish	Survival and growth of local populations of fish			
Sediment	Benthic invertebrates	Survival and growth of benthic invertebrate communities			
Surface water, sediment, biota	Wildlife (birds)	Sustainability (survival, growth, reproduction) of local populations of birds			
Wetland/Upland soil, biota	Soil invertebrates	Survival and growth of soil invertebrate communities			
	Wetland/Upland plants	Sustainability (survival, growth, reproduction) of upland/wetland plant communities			
	Wildlife (birds and mammals)	Sustainability (survival, growth, reproduction) of local populations of birds and mammals			

Although inhalation and dermal absorption pathways are possibly complete for some receptors, these pathways are considered to be minor compared to dietary ingestion and were not evaluated.

There is no direct evaluation of groundwater data because it is assumed that the current surface water data reflect potential influences from groundwater discharging to surface water. The major exposure routes to ecological receptors consist of direct contact with surface water and sediment, ingestion of surface water, accidental ingestion of sediment, and food chain transfer. Potential exposures to porewater concentrations of sediment Contaminants of Potential Concern (COPCs) were also considered.

The ecological receptor groups of greatest concern consist of aquatic invertebrates (both water column and benthic), fish, and amphibians, and semi-aquatic wildlife feeding in the aquatic habitats. Ecological receptors of concern in wetland and adjacent upland habitat include soil invertebrates and plants, in addition to birds and mammals exposed to soils through food chain transfer. Although semi-aquatic mammals (e.g., beaver, muskrat, and mink) could also be exposed to COPCs in the aquatic habitats by

feeding on fish and invertebrates, this was not considered an ecological receptor group of primary concern, since the main COPCs in the Site surface water and sediment are metals (primarily chromium) that do not bioaccumulate or biomagnify. The concern for exposure to mammals is addressed through a similar pathway of exposure of small mammals in wetland habitats with similar exposures to COPCs in soil.

Soils were not evaluated in the Mechanics Pond exposure area. The CSM indicates that material deposited downstream toward the Bungay River and Mechanics Pond is predominantly transported through waterways, and the potential for deposition in adjacent wetland and upland habitat is low. Therefore, this pathway was determined to be incomplete and not evaluated.

3. Principal Threat Waste

The NCP at 40 C.F.R. Section 300.430(a)(l)(iii) states that EPA expects to use "treatment to address the principal threats posed by a site, wherever practicable" and "engineering controls, such as containment, for waste that poses a relatively low long-term threat" to achieve protection of human health and the environment. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile, which generally cannot be contained in a reliable manner or would pose significant risks to human health or the environment should exposure occur. Low-level threat wastes are source materials that generally can be reliably contained and that would present only a low risk in the event of exposure.

The concept of principal threat and low-level threat wastes is applied on a site-specific basis when characterizing source material. Source material is defined as material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, air, or acts as a source for direct exposure.

Although EPA has not established a threshold level of toxicity for identifying a principal threat waste, generally where toxicity and mobility of source material combine to pose a potential risk of 10^{-3} or greater, the source material is considered to be a "principal threat waste." No principal threat waste has been identified at the Site.

Low-level threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. Wastes that are generally considered to be low-level threat wastes include non-mobile contaminated source material of low to moderate toxicity, surface soil containing COCs that are relatively immobile in air or groundwater, low leachability contaminants, or low toxicity source material.

Low-level source material threat wastes at the Site are present beneath the existing engineered cover system behind residential properties along Paulette Lane and North Avenue. The selected response actions will address low-level threat wastes at the Site by maintaining the integrity of the engineered cover system through implementation of Institutional Controls and long-term maintenance of the engineered cover.

F. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

The current and reasonably anticipated future land uses of the Site form the basis for the exposure assumptions that are used for the risk assessment, are considered in the development of remedial objectives and remedial alternatives, and are considered in the selection of the appropriate remedial action.

The W&L Property (the location of the former facility at 78 North Avenue and two parcels immediately to the south) is currently zoned industrial/commercial. A portion of the W&L Property is currently leased by a commercial tenant. Several other industrial/commercial properties are to the immediate west and north of the W&L Property. To the south of the W&L Property are wetlands with abutting residential properties along North Avenue and Deanville Road. To the east of North Avenue are residential properties and a recreational use area (Hayward Field). Based on discussions with City of Attleboro officials, EPA concluded the reasonably anticipated future use of the W&L Property is expected to remain industrial/commercial. Future land use of the surrounding areas of the Site is expected to remain unchanged.

Groundwater at the Site and in surrounding areas is not currently used for drinking water purposes, and the City of Attleboro provides potable drinking water to the area. In 2018, MassDEP conducted a Groundwater Use and Value Determination for the Site and surrounding area. The purpose of the Use and Value Determination was to identify whether the aquifer(s) beneath the Site should be considered of "high," "medium," or "low" value. The evaluation was performed in accordance with criteria for groundwater classification promulgated in the MCP.[4] MassDEP concluded that groundwater at the Site is of "low" value, except within the Bungay River Water Resource Protection District, downgradient of the Site, where a "medium" determination has been made and action may potentially be needed to restore groundwater to its beneficial use as a potential future drinking water source, if impacted above drinking water standards. Based upon this determination, the selected remedy provides for additional groundwater investigations to determine if the District is impacted above drinking water standards by the migration of groundwater contamination from the Site, and to implement a contingency remedy to restore any potentially-impacted groundwater within the District.

G. SUMMARY OF SITE RISKS

A baseline risk assessment was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the Site assuming no remedial action was taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. The baseline human health risk assessment followed a four step process: 1) hazard identification, which identified those hazardous substances of significant concern; 2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; 3) toxicity assessment, which considered the types and magnitude of adverse health effects associated to hazardous substances; and 4) risk characterization and uncertainty analysis, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the Site, including carcinogenic and non-carcinogenic risks and a discussion of the uncertainty in the risk

[4] The Groundwater Use and Value Determination is consistent with an EPA-endorsed Massachusetts' Comprehensive State Groundwater Protection Program (CSGWPP).

estimates. A summary of those aspects of the human health risk assessment which support the need for remedial action is discussed below, followed by a summary of the ecological risk assessment findings.

1. Human Health Risk Assessment

A baseline HHRA, conducted pursuant to EPA Risk Assessment Guidance for Superfund (RAGS), was completed for the Site to evaluate the likelihood and magnitude of potential human health effects associated with the current land use of the Site, as well as possible future land uses of the Site. Future residential use of the W&L Property was evaluated to document the need for Institutional Controls to restrict future residential, school, and daycare use, as discussed below.

Hazard Identification

Forty-seven of the approximately 100 chemicals detected at the Site were selected for evaluation in the HHRA as COPCs. The COPCs were selected to represent potential Site-related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment and can be found in Tables 2.1 through 2.6 of the baseline HHRA (AECOM, 2019a). From this, a subset of the chemicals was identified in the HHRA as presenting a significant current or future risk and/or were identified at the Site in excess of the appropriate chemical-specific Applicable or Relevant and Appropriate (ARAR) value and are referred to as the COCs in this ROD. The COCs are summarized in **Tables G-1** through **G-5**. These tables contain the exposure point concentrations used to evaluate the reasonable maximum exposure (RME) scenario in the baseline HHRA for the COCs. Lead results presented in **Table G-2** are based on sieving of soil samples to create a fine fraction (less than 150 micrometers) sample that was then analyzed. Use of fine fraction results represents the RME scenario for soil lead as the fine fraction is more likely to stick to the hands (and other objects that may then be put in the mouth) and be subsequently ingested. Estimates of average or central tendency exposure concentrations for the COCs and all COPCs can be found in Tables 3.1 through 3.14 of the baseline HHRA (AECOM, 2019a). Additional details concerning the lead soil sampling and analysis can be found in Attachment E of the baseline HHRA (AECOM, 2019a).

All of the COCs in **Tables G-1** through **G-5** were identified as presenting a significant risk in the baseline HHRA except for 1,1,1-trichloroethane and total chromium in groundwater. These two compounds are included because their maximum detected concentrations in groundwater exceed a chemical specific-ARAR value (i.e., the MCL).

Exposure Assessment

Exposures to chemicals of concern were estimated quantitatively or qualitatively through the development of several hypothetical exposure scenarios. Exposure scenarios were developed considering the nature and extent of contamination, the location of the Site, current and future potential use of the Site, and identification of potential receptors and exposure pathways.

Presently, the W&L Property, located at the corner of Walton Street and North Avenue in a mixed commercial/industrial area, is fenced and is not in active use; however, a portion of the W&L Property is currently leased for commercial use. It is currently zoned for industrial use and is expected to remain industrial in the future. A wetland (southern wetland) is located to the south of the W&L Property, extending to Deanville Road, and Bliss Brook is located across North Avenue to the east of the Property.

Residences are located along the eastern and western sides of North Avenue, abutting Bliss Brook and the southern wetland, respectively. Current exposures evaluated included recreational exposures to surface water, sediment, and wetland/floodplain soil in the wetland and brook, and residential exposures to indoor air and floodplain surface soil in residential yards. Exposures were also evaluated for a range of possible future land uses, including exposure to soil as part of residential and commercial/industrial use of the W&L Property, construction worker exposure to soil and shallow groundwater during redevelopment of the W&L Property, and continued residential and recreational use of the surrounding properties. Groundwater within the Site is not currently used as drinking water and the State has assigned the aquifer(s) a "low" use and value determination. However, because groundwater downgradient of the Site is classified as "medium" use and value by the State as a potential future drinking water source (the Bungay River Water Resource Protection District), future use of groundwater in the District as drinking water was also evaluated in the HHRA.

The following is a brief summary of the exposure pathways that were found to present a significant risk (Incremental Lifetime Cancer Risk [ILCR] greater than 10^{-4} or a Hazard Index [HI] > 1) at the Site assuming a reasonable maximum exposure scenario. A more thorough description of all exposure pathways evaluated in the risk assessment including estimates for an average exposure scenario, can be found in Section 3 and on Tables 4.1 through 4.9 of the baseline HHRA (AECOM, 2019a).

The following current exposure pathways were found to present a significant risk at the Site. These scenarios apply in the future as well, assuming continued residential and recreational use of the surrounding areas:

- Recreational user (adult and young child) with exposure to Bliss Brook surface water (by dermal contact);[5]
- Resident (young child) with exposure to floodplain surface soil in the yards to the west of North Avenue (evaluated using the Integrated Exposure Uptake Biokinetic (IEUBK) model).[6]

The following future exposure pathways were found to present a significant risk at the Site:

- Resident (adult and young child) with exposure to upland/floodplain surface and subsurface soil at the W&L Property (by ingestion, dermal contact, and inhalation of fugitive dust/VOCs);[7]

[5] For current recreational user surface water exposures, exposure durations of 20 years and 6 years, respectively, were presumed for an adult and young child. Body weights of 80 kg and 15 kg were used for the adult and young child, respectively. Dermal contact was assumed with 6,032 square-centimeters $(cm)^2$ of surface area for the adult and 2,373 cm^2 for the young child, respectively. An exposure frequency of 78 days/year and an exposure time of 3 hours/day were used.

[6] The IEUBK Model is used to evaluate potential childhood risks from exposure to lead in soil. The model predicts the probability that a child under the age of seven will have a target blood lead level of 5 µg/dL, the level associated with adverse health effects. EPA's goal is to limit soil exposure such that a child or group of children would have an estimated risk of no more than five percent of the population exceeding the target blood lead level.

[7] For future resident upland floodplain soil exposures, exposure durations of 20 years and 6 years, respectively, were presumed for an adult and young child. Body weights of 80 kg and 15 kg were used for the adult and young child, respectively. Soil ingestion rates of 100 mg/day and 200 mg/day, respectively, were used for the adult and child. Dermal contact was assumed with 6,032 cm^2 of surface area for the adult and 2,373 cm^2 for the young child, and adherence factors of 0.07 mg/cm^2-event for the adult and 0.2 mg/cm^2-event for the child were used. For inhalation of fugitive dust and vapors, an exposure time of 5 hours/day was used. An exposure frequency of 350 days/year was used.

- Construction worker with exposure to shallow groundwater (by ingestion and dermal contact) at the W&L Property;[8]
- Resident (adult and young child) with exposure to Site-wide groundwater (by ingestion, inhalation, and dermal contact) used as tap water.[9]

In addition, the presence of elevated concentrations of VOCs in soil and groundwater at the W&L Property indicates a need for further evaluation of the future vapor intrusion pathway if any new buildings are constructed at the W&L Property, or if there is a change in conditions to existing buildings overlying the contaminated shallow groundwater plume that may increase the potential for vapor intrusion to occur. Future residential use of the W&L Property is not anticipated. The residential evaluation for the W&L Property was performed to document the need for Institutional Controls for the Property to prevent residential use as part of the remedy.

Toxicity Assessment

Carcinogenic Effects

The potential for exposure to a chemical to result in a carcinogenic effect is generally described by two factors: a statement reflecting the degree of confidence that the compound causes cancer in humans and a potency estimate, indicating how potent the chemical may be at causing cancer, with the general assumption that every exposure has some probability of resulting in cancer. The descriptor reflecting the degree of confidence that the compound causes cancer in humans may be either an alpha-numeric value or a narrative. Both are closely tied to the nature and extent of information available from human and animal studies. The cancer potency estimate is a quantitative measure of a compound's ability to cause cancer, and is generally expressed as either a cancer potency factor or an inhalation unit risk value. Cancer potency estimates and unit risk values are toxicity estimates developed by EPA based on epidemiological and/or animal studies, and they reflect a conservative "upper bound" of the potency of the carcinogenic compound. That is, the true potency is unlikely to be greater than the potency described by EPA. **Table G-6** presents these cancer toxicity values and cancer classifications for the COCs at the Site.

In some cases, however, EPA may conclude that it is not appropriate to generate a cancer potency estimate or unit risk value given the mode of action of the known or suspect carcinogen. Currently, EPA's default procedure for characterizing cancer risk for compounds which may exhibit a threshold for carcinogenic effects, mirrors the process used to describe the potential for adverse non-cancer effects described in the section which follows. A summary of the cancer toxicity data relevant to the COCs at the

[8] For future construction worker shallow groundwater exposures, an exposure frequency of 125 days/year was used, along with an exposure duration of 1 year. A body weight of 80 kg was used. A groundwater ingestion rate of 0.05 liters/day was used. Dermal contact with groundwater was assumed with 3,527 cm^2 of surface area for 1 hour per day.

[9] For future residential exposures to groundwater solely within the Bungay River Water Resource Protection District, drinking water ingestion rates of 2.5 liters/day and 0.78 liters/day for the adult and young child, respectively, were assumed. An exposure frequency of 350 days/year was used for a combined exposure duration of 26 years. Dermal contact was assumed with 19,652 cm^2 of surface area for the adult, and 6,365 cm^2 for the young child. Showers/baths were assumed to occur 350 days/year for 0.71 hour/day for the adult and 0.54 hour/day for the young child. Inhalation during showers/baths evaluated using the Andelman Model with a volatilization factor of 0.5 L/m^3.

Site is presented in **Table G-6**. EPA's Cancer Guidelines and Supplemental Guidance (March 2005) have been used as the basis for analysis of carcinogenicity risk assessment.

Non-Carcinogenic Effects and Non-Linear Carcinogenic Effects

For addressing non-carcinogenic effects and effects of carcinogenic compounds which exhibit a threshold, it is EPA's policy to assume that a safe exposure level exists, which is described by the reference dose (RfD) or reference concentration (RfC). RfDs and RfCs have been developed by EPA as estimates of a daily exposure that is likely to be without an appreciable risk of an adverse health effect when exposure occurs over the duration of a lifetime. RfDs and RfCs are derived from epidemiological and/or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. The RfDs and RfCs relevant to the Site are presented in **Table G-7**.

The toxicity values presented in **Tables G-6** and **G-7** are those used in the baseline HHRA, except for benzo(b)fluoranthene. An incorrect cancer potency factor was used for this compound in the HHRA (AECOM, 2019a). **Table G-6** presents the correct value. Risk estimates presented in this ROD for benzo(b)fluoranthene have been corrected. The correct toxicity values has also been used during development of risk-based cleanup levels (see Section L of this ROD).

Risk Characterization

The risk characterization combines the exposure estimate with the toxicity information to estimate the probability or potential that adverse health effects may occur if no action were to be taken at a site. A separate characterization is generated depending on the nature of the adverse effect. Cancer risks are generally expressed as a probability whereas the potential for adverse non-cancer effects (and carcinogenic effects resulting from non-linear [i.e., exhibiting a threshold of toxicity] mode of action [MOA] compounds) are described in terms what is thought to be a safe exposure level.

For exposure to most known or potentially carcinogenic substances, EPA believes that as the exposure increases, the cancer risk increases. In characterizing risk to these types of carcinogenic compounds, a chemical- specific exposure level is generally multiplied with the cancer potency factor or inhalation unit risk to estimate incremental lifetime cancer risk as a result of exposure to site contaminants. To the extent that EPA has deemed that data are sufficient to apply the provisions of the 2005 Children's Supplemental Cancer Risk Guidelines, special consideration of the increased susceptibility to carcinogenic effects that children may have, was included in the risk characterization. The 2005 Children's Supplemental Cancer Guidelines were used to describe any such heightened susceptibility among potentially exposed children. Typically, the resulting cancer risk estimates are expressed in scientific notation as a probability (e.g., 1 x 10^{-6} or 1E-06 for 1/1,000,000) and indicate (using this example), that an average individual is not likely to have greater that a one in a million chance of developing cancer over 70 years as a result of site-related exposure (as defined) to the compound at the stated concentration.

All risks estimated represent an incremental risk of cancer from exposures to contamination originating from the Site. These are risks above and beyond that which we face from other causes such as from cigarettes or ultra-violet radiation from the sun. The chance of an individual developing cancer from all other (unrelated to the Site) causes has been estimated to be as high as one in three. EPA generally views site related cancer risks in excess of 10^{-4} as unacceptable. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances.

In assessing the potential for adverse non-carcinogenic effects (and carcinogenic effects resulting from non-linear MOA compounds), a hazard quotient (HQ) is calculated by expressing the exposure (or the exposure concentration in the case of air exposures) as a ratio of the reference value (RfD or RfC). A HQ $\leq$ 1 indicates that a receptor's exposure to a single contaminant is less than the safe value and that adverse effects are unlikely. Conversely, a HQ > 1 indicates that adverse effects as a result of exposure to the contaminant are possible. To account for additive effects resulting from exposure to more than one compound, a Hazard Index (HI) is generated by adding the HQs for all chemicals of concern that have the same or a similar mechanism or mode of action. As a conservative measure and a common practice, HQs are often added for all compounds of concern that affect the same organ or system (i.e., liver, nervous system) since the mechanism or mode of action is not always known. A HI < 1 indicates that adverse effects are unlikely whereas a HI > 1 indicates adverse effects are possible. Generally, EPA views HI values based on site-related exposure in excess of unity as unacceptable. It should be noted that the magnitude of the HQ or HI is not proportional to the likelihood that an adverse effect will be observed.

The IEUBK Model was used to evaluate the potential hazards resulting from exposure to lead in soil for young children less than 7 years of age as the most sensitive receptor group. The average soil lead concentration (either total lead or fine fraction lead) was used as the soil concentration in the model, along with model assumptions presented in Attachment E of the baseline HHRA (AECOM, 2019a), including a target blood lead level of 5 µg/dL. For the residential yards west of North Avenue, a site-specific oral bioavailability estimate for lead was also used in the modeling (see Attachment E of the baseline HHRA).

The following is a summary of the media and exposure pathways that were found to present a significant risk exceeding EPA's cancer risk range and non-cancer threshold at the Site. Only those exposure pathways deemed relevant to the remedy being proposed are presented in this ROD. Readers are referred to Section 5.2 and Tables 7, 9 and 10 of the baseline HHRA (AECOM, 2019a) for a more comprehensive risk summary of all exposure pathways evaluated for all COPCs, and for estimates of central tendency risk.

Current/Future Recreational User – Surface Water

Table G-8 depicts the carcinogenic risk summary for the COC in surface water evaluated to reflect potential current and future recreational user dermal exposure corresponding to the RME scenario. For the young child and adult recreational user, carcinogenic risks exceeded the EPA acceptable risk range of 10^{-6} to 10^{-4} for Bliss Brook surface water. The exceedance is due to hexavalent chromium in Bliss Brook surface water.

Current/Future Resident – Floodplain Surface Soil

As presented in the Attachment E of the baseline HHRA (AECOM, 2019a), the IEUBK modeling was performed to evaluate the risk associated with fine fraction lead concentrations in floodplain soil in residential yards west of North Avenue, corresponding to the RME scenario. The outcome of the modeling for the floodplain soil in residential yards west of North Avenue identified lead as a COC.

Future Resident – Upland/Floodplain Surface Soil and Surface/Subsurface Soil

Tables G-9 and G-10 depict the carcinogenic and non-carcinogenic risk summaries for the COCs in surface soil and surface/subsurface soil evaluated to reflect potential future residential ingestion, dermal, and inhalation exposure at the W&L Property corresponding to the RME scenario. For the future resident, carcinogenic and non-carcinogenic risks exceeded the EPA acceptable risk of 10^{-6} to 10^{-4} and/or a target organ HI of 1 for upland/floodplain surface and surface/subsurface soil. The exceedances were due primarily to the presence of carcinogenic PAHs, arsenic, antimony, hexavalent chromium, cobalt, and thallium in soil at the W&L Property.

The IEUBK modeling was performed to evaluate the risk associated with total lead concentrations in upland/floodplain soil at the W&L Property. The outcome of the modeling for the upland/floodplain soil at the W&L Property identified lead as a COC for surface/subsurface soil (see Attachment E of the baseline HHRA).

Future Construction Worker – Shallow Groundwater

Tables G-11 and G-12 depict the depict the carcinogenic and non-carcinogenic risk summaries for the COCs in shallow groundwater evaluated to reflect potential future construction worker ingestion, dermal, and inhalation exposure at the W&L Property corresponding to the RME scenario. For the future adult construction worker, carcinogenic and non-carcinogenic risks exceeded the EPA acceptable risk of 10^{-6} to 10^{-4} and/or a target organ HI of 1 for shallow groundwater. The exceedance was due primarily to the presence of hexavalent chromium in shallow groundwater at the W&L Property.

Future Resident – Groundwater

Tables G-13 and **G-14** depict the carcinogenic and non-carcinogenic risk summaries for the COCs in groundwater evaluated to reflect potential future residential potable water exposure corresponding to the RME scenario (under the assumption that groundwater associated with the Site is used as a source of potable water in the future solely within the Bungay River Water Resource Protection District). For the future resident using untreated groundwater as household water, carcinogenic and non-carcinogenic risks exceeded the EPA acceptable risk of 10^{-6} to 10^{-4} and/or a target organ HI of 1 for groundwater. The exceedances were due primarily to the presence of 1,1-dichloroethane, cis-1,2-dichloroethene, trichloroethylene, vinyl chloride, 1,4-dioxane, arsenic, hexavalent chromium, cobalt, and manganese in Site-wide groundwater. Though not listed on **Tables G-13** and **G-14**, lead was identified as future residential drinking water COC in the baseline HHRA because lead concentrations in groundwater exceed risk-based levels. 1,1,1-Trichloroethane and total chromium are also future residential drinking water COCs because their maximum detected concentrations exceed ARARs, even though the baseline HHRA did not identify them as primary risk contributors.

Uncertainties

Sampling of groundwater for the potential chromium plating-related contaminants perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) was performed as part of investigation activities. Four monitoring wells located in the center of the hexavalent chromium plume were sampled for analysis of PFOA and PFOS: AE-01S, AE-04D, AE-06B, and AE-12B. PFOA and PFOS were not detected at a reporting limit of 0.09 ug/L in October 2015. In May 2016, EPA published a Health Advisory applicable to the sum of the PFOA/PFOS concentrations of 0.07 µg/L. Although the reporting limit slightly exceeds the Health Advisory, the sampling data provide confirmation that perfluorinated compounds were

unlikely to have been used as part of operational activities at the W&L plating facility and were below levels that would result in an unacceptable risk.

The use of the IEUBK Model with EPA-recommended parameters and a target blood lead level of 5 µg/dL provides for an acceptable residential soil concentration of approximately 200 mg/kg. Therefore, even though the IEUBK modeling performed for the W&L Property and Bliss Brook surface soil concluded that there is a slightly greater than 5 percent (approximately 5.2 percent) probability that exposed children will exceed the target blood lead level of 5 µg/dL, these two exposure points have surface soil concentrations (or time-weighted average concentrations for recreational exposure) of less than 200 mg/kg (198 mg/kg and 195 mg/kg, respectively). Taking into account modeling uncertainty, the calculated 5.2% probability is not significantly different from the maximum acceptable probability of 5%, and it was concluded that the risk of lead in surface soil at the W&L Property and Bliss Brook is acceptable.

An additional uncertainty associated with the use of the lead models is that many of the default parameters may not accurately reflect site conditions (e.g., air emissions, dietary lead intake, bioavailability). Specifically, the bioavailability factors used in the model are based on the absolute bioavailability of soluble lead acetate (50 percent) (used for lead in food and water) and the relative bioavailability of lead in soil (60 percent), which yields an absolute bioavailability for soil lead of 30 percent (i.e., 60 percent x 50 percent = 30 percent). Default estimates of bioavailability have significant variability and uncertainty due to many factors related to the site-specific conditions (e.g., lead speciation, mineralogy, soil particle size) and receptor population (complex biological process of gastrointestinal absorption). For the residential yards east and west of North Avenue, Bliss Brook, and the southern wetland, this uncertainty was addressed through site-specific in-vitro bioaccessibility testing that was used in the lead modeling. It should be noted that the site-specific bioaccessibility estimates obtained through collection and analysis of surface soil samples were very close to the default values used in the models.

Cancer risks and HIs for each receptor were not summed across all media. For example, risks from a given medium were not summed across exposure points (e.g., floodplain soil across the residential yards east and west of North Avenue). That is, for any given receptor, risks were calculated assuming that exposure occurs at only one exposure point. This assumption is uncertain since a given recreational receptor may spend half his/her time in one exposure point and half in another. Risks to such an individual would be intermediate between the risks to individuals exposed solely within each exposure point.

2. Supplemental Evaluation Following Risk Assessments

Residential Irrigation Well Evaluation

As noted previously, groundwater in the vicinity of the W&L Property is not utilized as a source of drinking water and there are no known current potable wells on or in the vicinity at the Site; however, in order to determine if additional remedial actions need to be implemented in cases where it may be desired to install wells for uses other than potable water (e.g., irrigation, filling of pools, etc.), an additional risk evaluation of this exposure pathway was performed as part of the July 2019 FS.

The use of an irrigation well to fill a swimming pool was evaluated as potentially the most conservative exposure pathway for the use of groundwater from private wells, exclusive of drinking water. This irrigation well scenario included the evaluation of the incidental ingestion and dermal contact pathways. The following exposure assumptions were used during the irrigation well evaluation:

- Exposure duration – 20 years (adult) and 6 years (child);
- Exposure frequency – 52 days/year (adult) and 65 days/year (child);
- Exposure time – 1 hour/event (adult) and 2 hours/event (child);
- Event frequency – 1 event/day (adult and child);
- Skin surface area – 19,652 cm^2 (adult) and 6,365 cm^2 (child); and
- Water ingestion rate – 0.05 liters/hour (adult) and 0.1 liters/hour (child).

These parameters were utilized in the EPA Regional Screening Level (RSL) online calculator to develop screening levels at a cancer risk level of 1×10^{-6} and a non-cancer HI of 0.1. The recreator surface water scenario in the RSL online calculator was used to calculate screening levels applicable to the irrigation water (swimming pool) scenario. **Table G-15** in **Appendix B** of this ROD presents the screening of maximum detections against the irrigation water screening levels. The screening evaluation was performed on the COPCs from the more-conservative drinking water scenario. Twelve analytes exceeded screening levels, thus becoming COPCs. **Table G-16** presents a cumulative risk estimate using the screening levels from the online calculator and the EPCs developed for Site-wide groundwater in the HHRA for each COPC. For the future resident using untreated groundwater as non-potable water, carcinogenic and non-carcinogenic risks exceeded the EPA acceptable risk of 10^{-6} to 10^{-4} and/or a target organ HI of 1 for groundwater. The cancer and non-cancer risk contributors include TCE, vinyl chloride, and hexavalent chromium.

With respect to evaluating lead for the irrigation water (swimming pool) scenario, the water ingestion rate presented above for the child was applied to the IEUBK model as an alternate source of lead along with default input parameters utilized during the HHRA evaluations. Tables A-3 and A-4 of Appendix A in the July 2019 FS present IEUBK input parameters and model results. The irrigation water scenario does not result in an exceedance of the EPA target blood lead level goal for children (5 µg/dL in more than 5% of the population exposed).

3. Ecological Risk Assessment

The BERA (AECOM, 2019b) was performed to evaluate the risk to ecological receptors potentially affected by the Site. Chemicals identified as potentially Site-related contaminants released to the environment included metals (primarily total chromium, hexavalent chromium, and lead), chlorinated VOCs, and PAHs. The major habitats potentially affected by the Site include a large wetland complex (Southern Wetland) immediately south of the W&L Property, a stream (Bliss Brook) affected by discharge of contaminated groundwater to the east of the W&L Property, and a river/pond system (Mechanics Pond and Bungay River) downstream. In addition, upland and wetland habitat surrounding the southern wetland and Bliss Brook were also investigated.

Identification of Chemicals of Potential Concern

Data used in the BERA were collected in RI Phases 1, 2, 3, and 4. In addition, select historical data were added to the data set for soil and sediment. In support of the BERA, RI Phase 3 data included additional surface water and sediment sample collection, surface water and sediment toxicity testing, Simultaneously Extracted Metals (SEM), Acid Volatile Sulfides (AVS), and Total Organic Carbon (TOC) analyses on sediment samples, and porewater collection and analysis. RI Phase 4 data included collection of upland and wetland soil samples from the W&L Property & Southern Wetland Exposure Area (EA) and the Bliss Brook EA, for the purpose of toxicity testing and chemical analyses. The toxicity testing included earthworm survival tests, earthworm bioaccumulation tests, and seedling germination and growth tests.

Three ecologically relevant EAs were utilized for the purposes of the risk assessment based on habitat types, contaminant fate and transport pathways, and hydrogeology. These exposure areas are:

- W&L Property & Southern Wetland;
- Bliss Brook; and
- Mechanics Pond (including a short segment of Bungay River).

In addition, sample locations were identified to represent background or reference locations for each habitat and media type (surface water, sediment, and soil).

Maximum concentrations in surface water, sediment, and soil (Phase 1, 2 and 3 data) were screened against ecological benchmarks in the SLERA to identify initial COPCs. COPCs having maximum values exceeding ecological benchmarks were also evaluated in screening-level food chain models. Based on evaluation of the initial screening and food chain modeling results, COPCs were retained for evaluation in the BERA.

Further COPC refinement was performed in the BERA (BERA Tables 23-37), including surface water, porewater, sediment and soil for each of the three EAs. To simplify the data presentation, only the habitat and COC that showed significant risk in the BERA has been included in this ROD, which was surface water in Bliss Brook (**Table G-Eco1**).

As part of the COPC screening in the BERA (AECOM, 2019b), COPCs were also selected in the two other EAs: W&L Property & Southern Wetland and Mechanics Pond. Although initial screening identified COPCs in each of these EAs, based on the evaluations in the BERA, no significant ecological risk was determined to be associated with any media in either of these EAs, nor in sediment or soils of the Bliss Brook EA.

Exposure Assessment

The major habitats potentially affected by the Site include a large wetland complex (Southern Wetland) immediately south of the W&L Property, a stream (Bliss Brook) affected by discharge of contaminated groundwater to the east of the W&L Property, and a river/pond system (Mechanics Pond and Bungay River) downstream. In addition, upland and wetland habitat surrounding the Southern Wetland and Bliss Brook were also investigated. The potential receptors evaluated in the BERA included: 1) aquatic receptors (e.g., invertebrates, fish, and amphibians) living in the affected waterways; 2) benthic invertebrates in affected sediments; 3) invertebrates and plants exposed to soils affected by site contaminants; and 4) wildlife receptors (birds and mammals) exposed via the food chain to site-related contamination in the sediments or soils.

Complete exposure pathways identified in the BERA included: the uptake of COPCs from sediment, surface water, and soil through roots (vegetation); ingestion of COPCs bound to soil (terrestrial invertebrates, birds, and mammals); ingestion of COPCs bound to sediment (benthic invertebrates, aquatic and wetland birds, and mammals); absorption or ingestion of dissolved and particulate COPCs in surface water (aquatic invertebrates, semi-aquatic and wetland birds, and mammals); ingestion of COPCs through consumption of contaminated plants (herbivores and omnivores); and ingestion of COPCs through consumption of contaminated prey (all predators). **Table G-Eco2** summarizes the receptor groups, lines of evidence, and endpoints evaluated in the BERA for each of the EAs.

Exposure Point Concentrations (EPCs) for COPCs in surface water, sediment, and prey were calculated in terms of Reasonable Maximum Exposures (RMEs) and Central Tendency Exposures (CTEs). CTE represents the most likely concentration to which a population of receptors would be exposed. CTE EPCs were calculated as the lower of either the maximum concentration or the arithmetic mean. RME EPCs were calculated as the lower of either the 95 percent UCL or the maximum concentration.

Exposure of wildlife (i.e., birds and mammals) to site COPCs was estimated using food chain models. Surface water, sediment, soil, and tissue EPCs were entered into the food chain model to calculate Total Daily Dose (TDD) to herbivorous, insectivorous, and piscivorous wildlife receptors based on exposure to surface water and aquatic (fish) or terrestrial biota (soil invertebrates or plants) and incidental ingestion of soil or sediment. Earthworm bioaccumulation test results for on-site soils were used to estimate the COPC concentrations in invertebrate tissue and then to calculate daily doses to American robin and short-tailed shrew for comparison to wildlife Toxicity Reference Values (TRVs). EPC tissue concentrations for other prey items were either estimated using literature-based biota-sediment accumulation factors (BSAFs), bioaccumulation factors (BAFs) derived from Site-specific earthworm tissue and soil data, or other literature-based BSAFs.

Ecological Effects Assessment

In aquatic habitats, effects assessments included comparison of site surface water and porewater concentrations to published surface water benchmarks which are indicative of potential impairment and to reference concentrations, and comparison of concentrations of COPCs in sediment to published sediment benchmarks and reference concentrations. Effects evaluation for aquatic invertebrates also included performing laboratory toxicity tests to measure survival and growth of the zooplankton, *Ceriodaphnia dubia* (water flea) exposed to surface water collected from the Site and from reference locations.

The effects evaluation for benthic invertebrates also included both an evaluation of the bioavailability of divalent metals by measuring AVS, SEM and TOC in sediments, as well as performing laboratory toxicity tests to measure survival and growth of two species of benthic invertebrates (*Chironomus dilutus* and *Hyalella azteca*) exposed to sediments collected from the Site and from reference sediment.

Food chain models were used to compare the TDDs of piscivorous birds (great blue heron), based on exposure in each EA, to published wildlife TRVs which are indicative of potential impairment and to compare these to reference conditions.

Endpoints used to evaluate potential effects on receptors directly exposed to upland or wetland soil included comparison of concentrations of COPCs in soil to published soil benchmarks and reference

concentrations. Effects evaluation for soils also included measuring the toxicity of soil samples collected at the Site at locations with a range of chromium concentrations using earthworm (*Eisenia fetida*) and plant (*Lolium perenne*) laboratory bioassays.

Food chain models were used to estimate the COPC concentrations in plant tissue, to calculate daily doses to meadow vole and bobwhite quail for comparison to wildlife TRVs and reference concentrations. Earthworm bioaccumulation test results on site soils were used to estimate the COPC concentrations in invertebrate tissue and then use food chain models to calculate daily doses to American robin and short-tailed shrew for comparison to wildlife TRVs and reference concentrations.

Ecological Risk Characterization

The following risk characterization includes a brief summary of the environmental risks associated with the relevant media, the basis of these risks, and how these risks were determined in the BERA. The BERA evaluation consisted of several lines of evidence including comparing site data (exposure point concentrations) to ecotoxicological benchmark values, food chain modeling, assessment of bioavailability of metals and toxicity testing. Each of these lines of evidence was evaluated, giving consideration to how uncertain the results of the evaluation may be relative to site-specific attributes. The conclusions of the BERA are presented below for Bliss Brook surface water, the only EA and media determined in the BERA to have actionable ecological risk. Ecological risk was also evaluated in the BERA, and concluded to be unlikely, for any of the media (surface water, porewater, sediment, or soil) in the W&L Property & Southern Wetland and Mechanics Pond.

Hazard Quotients (HQs) were calculated to determine risk to aquatic receptors directly exposed to surface water, sediment, porewater and soil. HQs were also calculated for wildlife species exposed to contaminated media, plus prey items. An HQ shows how much the concentration of a COPC exceeds its benchmark or TRV. HQs were calculated as follows:

HQ = EPC / benchmark or TRV

The EPC can be based on either an RME or CTE scenario.

The risk characterization also includes an evaluation of incremental risks, which takes into account the contribution of reference concentrations to the overall Site risks:

Residual Risk HQ (RR) = Site HQ – Reference HQ

RRs above 1.0 represented the degree to which the Site exposure, adjusted for reference, exceeded its toxicity benchmark.

Bliss Brook

Each of the lines of evidence indicated potential for ecological risk to aquatic receptors in Bliss Brook including significant risk to aquatic invertebrate (zooplankton), amphibian and fish populations exposed to surface water (**Table G-Eco3**). The evaluation of endpoints for surface water indicated significant risk to invertebrates in toxicity tests due to exposure to surface water in Bliss Brook mainly between locations SD-210 and SD-212. The only two samples showing a significant effect on survival and reproduction on *C. dubia* were samples SW-210 and SW-212 from Bliss Brook. These samples, with elevated

concentrations of both trivalent chromium and hexavalent chromium, showed 100% mortality in the six-day toxicity tests. The refined list of COCs in Bliss Brook, along with recommended protective levels and the basis for each level, are presented in **Table L-Eco1.**

Uncertainties

There is uncertainty associated with estimates of risk in any BERA because the risk estimates are based on a number of assumptions regarding exposure and toxicity. More specifically, there is inherent variability and uncertainty associated with the data collected to characterize exposure concentrations and assumptions about the bioavailability of the selected COPCs. There are also assumptions and limitations inherent in food chain modeling, including selection of exposure and modeling parameters (e.g., dietary intake, body weight, and age), uptake factors, and toxicological data (e.g., TRVs).

The food chain models assumed that 100% of the metals ingested are absorbed. Site-specific tissue collected for the short-tailed shrew and American robin models reduced the uncertainty for the exposures to these receptors by measuring the concentration in tissue under site-specific soil conditions. Overall, the conservative nature of food chain models likely overestimates the risk associated with sediment and soil COPCs; the low risks identified in the models are unlikely to correspond to risk at a population level.

Based on several rounds of surface water data, identification of a limited number of COPCs, using site-specific water quality criteria, and obtaining site-specific toxicity testing data consistent with these results, there is relatively high confidence in the conclusions of risk to aquatic receptors in Bliss Brook and negligible risk from surface water in the other EAs.

4. Basis for Response Action

The HHRA, Supplemental Irrigation Well Evaluation, and BERA determined that current and future residents, future construction workers, current and future recreational users, or ecological receptors potentially exposed to COCs in soil, groundwater, or surface water via direct contact, ingestion, or inhalation may present an unacceptable human health or ecological risk. Unacceptable human health risk was based on cancer risks exceeding the EPA acceptable risk range of 10^{-6} to 10^{-4}, non-carcinogenic hazards exceeding the EPA HI of 1, and/or predicted child blood lead levels greater than 5 µg/dL in more than 5% of the population exposed. Unacceptable ecological risk was based on comparison of COPC levels in surface water samples to acute and chronic benchmarks and toxicity testing to compare toxicity of Site surface water samples to reference locations. Therefore, the current and potential future releases of hazardous substances from the Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment. Remedial actions focused on the following media: surface and subsurface soils at the W&L Property; surface soil at residential yards west of North Avenue; surface water at Bliss Brook; and Site-wide groundwater.

H. REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are media-specific cleanup goals that define the objective of remedial actions to protect human health and the environment. Based on preliminary information relating to types of contaminants, environmental media of concern, and potential exposure pathways, RAOs were

developed to aid in the development and screening of alternatives. These RAOs were developed to mitigate, restore, and/or prevent existing and future potential threats to human health and the environment and to attain ARARs. The COCs are presented in **Table G** (Appendix B) and the cleanup levels are presented in **Tables L1** through **L6** (Appendix B). The RAOs for the selected remedy of the Site are:

- Prevent exposure by current and future residents to surface soil containing lead that would result in estimated risk of greater than 5% of the youth population exceeding a target blood lead level of 5 µg/dL.
- Prevent exposure by future construction workers to W&L Property groundwater containing Site contaminants that would result in a total excess lifetime cancer risk greater than the target risk range of 10^{-6} to 10^{-4}, and/or a non-cancer Hazard Index greater than 1.
- Prevent or minimize further migration of Site contaminants in Source Area soil and overburden groundwater within the W&L Property into the downgradient contaminated groundwater plume, and prevent contaminated groundwater discharge into Bliss Brook.
- Prevent or minimize further migration of Site-wide groundwater containing Site contaminants, located within the compliance boundary for the defined on-Site non-drinking water aquifer, into the downgradient Bungay River Water Resource Protection District to protect its beneficial use as a potential future drinking water source.
- Prevent exposure to Site-wide groundwater containing Site contaminants that would result in a total excess lifetime cancer risk greater than the target risk range of 10^{-6} to 10^{-4}, and/or a non-cancer Hazard Index greater than 1 for non-drinking water scenarios (e.g., irrigation, swimming pools, etc.).
- Prevent exposure by future building occupants to indoor air vapors, via a vapor intrusion pathway, containing Site contaminants that would result in a total excess lifetime cancer risk greater than the target risk range of 10^{-6} to 10^{-4}, and/or a non-cancer Hazard Index greater than 1.
- Prevent exposure by current and future recreational users to Bliss Brook surface water containing Site contaminants that would result in a total excess lifetime cancer risk greater than the target risk range of 10^{-6} to 10^{-4}, and/or a non-cancer Hazard Index greater than 1.
- Prevent exposure by current and future ecological receptors to Bliss Brook surface water containing Site contaminants that would result in potential adverse impacts.

I. DEVELOPMENT AND SCREENING OF ALTERNATIVES

A. Statutory Requirements/Response Objectives

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that EPA's remedial action, when complete, must comply with all federal environmental and more stringent state environmental and facility siting standards, requirements, criteria, or limitations, unless a waiver is invoked; a requirement that EPA select a remedial action that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent

practicable; and a preference for remedies in which treatment which permanently and significantly reduces the toxicity, mobility, or volume of the hazardous substances is a principal element over remedies not involving such treatment. Response alternatives were developed to be consistent with these Congressional mandates.

B. Technology and Alternative Development and Screening

CERCLA and the NCP set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a range of alternatives were developed for the Site.

With respect to source control, residential soil, groundwater, and surface water, the RI/FS developed a range of alternatives in which treatment that reduces the toxicity, mobility, or volume of the hazardous substances is a principal element. This range included an alternative that removes or destroys hazardous substances to the maximum extent feasible, eliminating or minimizing to the degree possible the need for long-term management. This range also included: alternatives that treat the principal threats posed by the Site but vary in the degree of treatment employed and the quantities and characteristics of the treatment residuals and untreated waste that must be managed; alternatives that involve little or no treatment but provide protection through engineering or Institutional Controls; and a no action alternative.

As discussed in Section 2.0 of the FS, soil, overburden groundwater/surface water, and bedrock groundwater treatment technology options were identified, assessed, and screened based on implementability, effectiveness, and cost. Section 3.0 of the FS presents the remedial alternatives developed by combining the technologies identified in the previous screening process in the categories identified in Section 300.430(e)(3) of the NCP. The purpose of the initial screening was to narrow the number of potential remedial actions for further detailed analysis while preserving a range of options. Each alternative was then evaluated in detail in Section 4.0 of the FS.

In summary, of the 72 source control and management of migration remedial alternatives screened in Section 3.0 of the FS for all impacted media including soil, groundwater/surface water, and bedrock groundwater, 27 were retained as possible options for the cleanup of the Site. From this initial screening, remedial options were combined, and 12 source control and management of migration alternatives were selected for detailed analysis. Although the alternatives are media-specific, the media and alternatives are interrelated such that one alternative for a particular medium may impact the remedial alternative options for other media. For example, because the surface water in Bliss Brook is continuously receiving discharge of contaminated groundwater, it is not practical to directly address surface water. Instead, surface water options, and consequently exceedances resulting in unacceptable risks, will be addressed through groundwater options, along with evaluation of surface water to determine achievement of RAOs.

J. DESCRIPTION OF ALTERNATIVES

This section provides a narrative summary of each remedial alternative retained following screening and evaluated in the detailed analysis section of the FS Report. These alternatives were developed by combining response actions and technologies to address the estimated exposure risks to human health and the environment. The alternatives were also developed, to the extent practical, to represent a range of effectiveness, duration of time required to achieve the RAO, and cost to implement.

The descriptions of each remedial alternative are conceptual and are used for costing purposes. The specific design details and costs for the selected remedy will be re-evaluated during the remedial design. The costs are intended to be within the target accuracy of -30 to +50% of the actual cost. All present worth costs associated with O&M and periodic expenditures are based on a 7% discount rate over 30 years. Refer to Section L of this ROD for a breakdown of costs (including capital and O&M), as well as discussion on the time to construct and meet RAOs, for each alternative.

1. Source Control Alternatives Analyzed

The source control alternatives analyzed for the Site include:

Soil in Residential Yards West of North Avenue Alternatives

- SL-1: No Action
- SL-3: Soil Excavation, Off-site Disposal

Groundwater/Surface Water Alternatives

- GW/SW-1: No Action
- GW/SW-2a: Source Area Soil Removal with *In-situ* Soil Treatment and Groundwater Pump and Treat
- GW/SW-2b: Source Area Soil Removal with *In-situ* Soil Treatment and Groundwater Pump and Treat, with Mid-plume Treatment
- GW/SW-3a: Source Area Soil Removal with *In-situ* Soil Treatment and Extension of Permeable Reactive Barrier
- GW/SW-3b: Source Area Soil Removal with *In-situ* Soil Treatment and Extension of Permeable Reactive Barrier, with Mid-plume Treatment

Each of the source control alternatives is summarized below. A more complete, detailed presentation of each alternative are found in Section 4 of the FS.

Soil In Residential Yards West of North Avenue Alternatives

Alternative SL-1: No Action

Alternative SL-1 was developed as a baseline to compare against other alternatives. No further action would be taken to address soil contamination in residential yards west of North Avenue. No construction would take place, and RAOs would not be achieved. The capital cost for this alternative is $0, and the net present value is $0.

Alternative SL-3: Soil Excavation and Off-Site Disposal (*This is EPA's Selected Alternative.*)

Alternative SL-3 includes excavation and off-site disposal at an appropriate permitted facility of approximately 310 cubic yards of lead-contaminated soil with concentrations in excess of risk-based cleanup levels from residential properties. A pre-design investigation will include additional sampling to

refine the extent of soil to be excavated. Excavated areas will be restored with clean, imported backfill to grade and re-vegetated with native vegetation to control erosion and restore any altered wetland/floodplain habitat. Since contaminated soil will be removed from the properties for off-site disposal leaving the area suitable for unrestricted use, no Institutional Controls or five-year reviews are included in this alternative. The estimated capital cost for this alternative is $422,000, and the net present value is $422,000.

Groundwater/Surface Water Alternatives

Alternative GW/SW-1: No Action

Alternative GW/SW-1 was developed as a baseline to compare against other alternatives. No further action would be taken to address groundwater/surface water contamination. No construction would take place, and RAOs would not be achieved. The capital cost for this alternative is $0, and the net present value is $0.

Alternative GW/SW-2a: Source Area Soil Removal with *In-situ* Soil Treatment and Groundwater Pump and Treat

Alternative GW/SW-2a includes: removal and off-site disposal of approximately 730 cubic yards of the remaining building concrete floor slab and cobble-filled "pit" to allow for removal of underlying contamination; excavation of approximately 7,900 cubic yards of significantly-contaminated soil down to a maximum depth of 15 feet bgs within the source area and off-site disposal at a permitted facility; soil blending with reactive media within the open excavation area down to the top of bedrock (approximately 15 to 30 feet bgs); de-watering the portion of the excavation that extends below the water table, and any excavated soils that require de-watering, collect the water in tanks and treat on-site as needed to meet surface water standards for discharge (or as appropriate off-site disposal at a permitted facility); construction and operation of a groundwater pump and treat system in the area just south of the engineered cover system to intercept and treat the overburden groundwater plume to prevent continued discharge of contaminated groundwater to surface water in Bliss Brook; treated groundwater will be discharged into Bliss Brook upstream of the recovery system; restoration with native vegetation of any wetland/floodplain habitat altered by the remedial action; long-term monitoring of the overburden groundwater plume, surface water in Bliss Brook, and existing buildings with SSDSs or which may have the potential for vapor intrusion, to evaluate remedy effectiveness; maintenance of any new and existing remedy infrastructure components, including the existing engineered cover system and PRB, existing SSDSs, and the pump and treat system; Institutional Controls to 1) prohibit future residential use at the W&L Property, 2) prevent future construction worker exposure to groundwater contamination at the W&L Property until groundwater cleanup levels are achieved, 3) prevent contact with contaminated groundwater and the installation of non-drinking water wells (i.e. irrigation wells) across the extent of the site-wide groundwater plume where non-drinking water scenario cleanup levels for residential groundwater are exceeded and/or which may cause migration of the contaminated plume until groundwater cleanup levels are achieved, 4) prevent disturbance to the existing engineered cover system and PRB, and any new remedy infrastructure components, 5) prevent contact with soil beneath the existing engineered cover system adjacent to Bliss Brook, and 6) require either a vapor intrusion evaluation or vapor mitigation system be installed if a new building is constructed over the shallow groundwater VOC plume (within or to the downgradient area of the former building on the W&L

Property) until groundwater cleanup levels are achieved; and periodic five-year reviews to assess remedy protectiveness. The estimated capital cost for this alternative is approximately $9,168,000, and the estimated net present value is approximately $18,479,000.

Alternative GW/SW-2b: Source Area Soil Removal with *In-situ* Soil Treatment and Groundwater Pump and Treat, with Mid-plume Treatment

The GW/SW-2b Alternative includes all of the components described above in the GW/SW-2a Alternative, with the addition of the following component: mid-plume *in-situ* treatment via a series of injection wells along the west side of North Avenue. The estimated capital cost for this alternative is approximately $9,881,000, and the estimated net present value is approximately $19,193,000.

Alternative GW/SW-3a: Source Area Soil Removal with *In-situ* Soil Treatment and Extension of Permeable Reactive Barrier

Alternative GW/SW-3b includes: removal and off-site disposal of approximately 730 cubic yards of the remaining building concrete floor slab and cobble-filled "pit" to allow for removal of underlying contamination; excavation of approximately 7,900 cubic yards of significantly-contaminated soil down to a maximum depth of 15 feet bgs within the source area and off-site disposal at a permitted facility; soil blending with reactive media within the open excavation area down to the top of bedrock (approximately 15 to 30 feet bgs); de-watering the portion of the excavation that extends below the water table, and any excavated soils that require de-watering, collect the water in tanks and treat on-site as needed to meet surface water standards for discharge (or as appropriate off-site disposal at a permitted facility); construction of a new PRB filled with reactive media to extend the existing PRB intercepting the overburden groundwater plume prior to discharge into Bliss Brook; excavation of approximately 4,400 cubic yards of soil in order to construct the PRB and off-site disposal at a permitted facility; restoration with native vegetation of any wetland/floodplain habitat altered by the remedial action; long-term monitoring of the overburden groundwater plume, surface water in Bliss Brook, and existing buildings with SSDSs or which may have the potential for vapor intrusion, to evaluate remedy effectiveness; maintenance of any new and existing remedy infrastructure components, including the engineered cover system and PRB, existing SSDSs, and periodic replacement/regeneration of reactive media in the PRB; Institutional Controls to 1) prohibit future residential use at the W&L Property, 2) prevent future construction worker exposure to groundwater contamination at the W&L Property until groundwater cleanup levels are achieved, 3) prevent contact with contaminated groundwater and the installation of non-drinking water wells (i.e. irrigation wells) across the extent of the site-wide groundwater plume where non-drinking water scenario cleanup levels for residential groundwater are exceeded and/or which may cause migration of the contaminated plume until groundwater cleanup levels are achieved, 4) prevent disturbance to the existing engineered cover system and PRB, and any new remedy infrastructure components, 5) prevent contact with soil beneath the existing engineered cover system adjacent to Bliss Brook, and 6) require either a vapor intrusion evaluation or vapor mitigation system be installed if a new building is constructed over the shallow groundwater VOC plume (within or to the downgradient area of the former building on the W&L Property) until groundwater cleanup levels are achieved; and periodic five-year reviews to assess remedy protectiveness. The estimated capital cost for this alternative is approximately $11,085,000, and the estimated net present value is approximately $15,535,000.

Alternative GW/SW-3b: Source Area Soil Removal with *In-situ* Soil Treatment and Extension of Permeable Reactive Barrier, with Mid-plume Treatment (*This is EPA's Selected Alternative.*)

The GW/SW-3b Alternative includes all of the components described above in the GW/SW-3a Alternative, with the addition of the following component: mid-plume *in-situ* treatment via a series of injection wells along the west side of North Avenue. The estimated capital cost for this alternative is approximately $11,991,000, and the estimated net present value is approximately $16,441,000.

2. Management of Migration Alternatives Analyzed

Management of migration (MM) alternatives address contaminants that have migrated into and with the groundwater from the original source of contamination. At the Site, contaminants have migrated from surface and subsurface releases at former W&L Property into the Site-wide groundwater. Specifically, the bedrock groundwater alternatives evaluated options to prevent further migration of Site-wide groundwater (non-drinking water aquifer) into the downgradient potential future drinking water aquifer (the Bungay River Water Resource Protection District), with a contingency remedy to restore groundwater within the impacted portion of the District if there are exceedances of COC concentrations above drinking water standards.

Bedrock Groundwater Alternatives

- BR-1: No Action
- BR-2: Institutional Controls
- BR-3: Institutional Controls and Contingency Remedy of Focused *In-situ* Injections (West of North Avenue)
- BR-4: Institutional Controls and Contingency Remedy of Pump and Treat
- BR-5: Institutional Controls and Contingency Remedy of Enhanced (Deeper) Permeable Reactive Barrier

Each of the five MM alternatives is summarized below. A more complete, detailed presentation of each alternative are found in Section 4 of the FS.

Bedrock Groundwater Alternatives

Alternative BR-1: No Action

Alternative BR-1 was developed as a baseline to compare against other alternatives. No further action would be taken to addressed bedrock groundwater contamination. No construction would take place, and RAOs would not be achieved. The capital cost for this alternative is $0, and the net present value is $0.

Alternative BR-2: Institutional Controls

Alternative BR-2 includes: 1) Institutional Controls to prevent contact with contaminated groundwater and the installation of non-drinking water (i.e. irrigation) wells within the bedrock groundwater plume boundary until groundwater cleanup levels are achieved and to prevent the installation of wells within the

potentially impacted portion of the Bungay River Water Resource Protection District to prevent plume migration from the contaminated non-drinking water area into the District; 2) pre-design investigation sampling to further refine the horizontal and vertical extent of the contaminated bedrock groundwater plume so that the area potentially requiring additional remedial action can be defined; 3) monitoring of the site-wide bedrock groundwater plume to evaluate the attenuation of contaminants until groundwater cleanup levels are achieved; 4) periodic five-year reviews to assess remedy protectiveness; and 5) a contingency to prevent migration and restore groundwater to drinking water standards solely within the Bungay River Water Resource Protection District, if groundwater contaminants are found to exceed federal and state drinking water standards upon further investigations. If standards are exceeded, the following components will be implemented: monitoring of the bedrock groundwater plume until groundwater cleanup standards are achieved; and Institutional Controls to prevent contact with and consumption of groundwater within the contaminated areas of the District until groundwater cleanup levels are achieved and maintain the integrity of any new remedy infrastructure components. There will be a well restriction zone established that extends to the border of the non-drinking water aquifer and the District to prevent the installation of wells that might draw contaminated groundwater into the District until groundwater cleanup levels are achieved. The estimated capital cost for this alternative is approximately $963,000, and the net present value is approximately $4,379,000.

Alternative BR-3: Institutional Controls and Contingency Remedy of Focused *In-situ* Injections (West of North Avenue) (*This is EPA's Selected Alternative.*)

The BR-3 Alternative includes the first four components described above in the BR-2 Alternative, with the addition of the following contingency components to prevent groundwater migration from the contaminated non-drinking water area into the Bungay River Water Resource Protection District and restore groundwater to drinking water standards solely within the District, if groundwater contaminants are found to exceed federal and state drinking water standards upon further investigations: focused *in-situ* bedrock treatment line along the west side of North Avenue via a series of injection wells installed into bedrock; monitoring of the bedrock groundwater plume until groundwater cleanup standards are achieved; and Institutional Controls to prevent contact with and consumption of groundwater within the contaminated areas of the District until groundwater cleanup levels are achieved and maintain the integrity of any new remedy infrastructure components. There will be a well restriction zone established that extends to the border of the non-drinking water aquifer and the District to prevent the installation of wells that might draw groundwater into the District until groundwater cleanup levels are achieved. The estimated capital cost for this alternative is $963,000, and the estimated net present value is $4,379,000. If the contingency remedy is implemented, the additional capital cost is approximately $608,000, and the overall net present value is $5,306,000.

Alternative BR-4: Institutional Controls and Contingency Remedy of Pump and Treat

The BR-4 Alternative includes the first four components described above in the BR-2 Alternative, with the addition of the following contingency components to prevent groundwater migration from the contaminated non-drinking water area into the Bungay River Water Resource Protection District and restore groundwater to drinking water standards solely within the District, if groundwater contaminants are found to exceed federal and state drinking water standards upon further investigations: construction and O&M of a groundwater pump and treat system along Bliss Brook to intercept and treat the bedrock groundwater plume; treated groundwater will be discharged into Bliss Brook upstream of the recovery

system; monitoring of the bedrock groundwater plume until groundwater cleanup standards achieved; and Institutional Controls to prevent contact with and consumption of groundwater within the contaminated areas of the District until groundwater cleanup levels are achieved and maintain the integrity of any new remedy infrastructure components. There will be a well restriction zone established that extends to the border of the non-drinking water aquifer and the District to prevent the installation of wells that might draw groundwater into the District until groundwater cleanup levels are achieved. The estimated capital cost for this alternative is $963,000, and the estimated net present value is $4,379,000. If the contingency remedy is implemented, the additional capital cost is approximately $569,000, and the overall net present value is $7,576,000.

Alternative BR-5: Institutional Controls and Contingency Remedy of Enhanced (Deeper) Permeable Reactive Barrier

The BR-5 Alternative includes the first four components described above in the BR-2 Alternative, with the addition of the following contingency components to prevent groundwater migration from the contaminated non-drinking water area into the Bungay River Water Resource Protection District and restore groundwater to drinking water standards solely within the District, if groundwater contaminants are found to exceed federal and state drinking water standards upon further investigations: construction of an enhanced (deeper) PRB over a distance of approximately 300 feet along Bliss Brook via a series of injection wells installed into bedrock; monitoring of the bedrock groundwater plume until groundwater cleanup standards achieved; and Institutional Controls to prevent contact with and consumption of groundwater within the contaminated areas of the District until groundwater cleanup levels are achieved and maintain the integrity of any new remedy infrastructure components. There will be a well restriction zone established that extends to the border of the non-drinking water aquifer and the District to prevent the installation of wells that might draw groundwater into the District until groundwater cleanup levels are achieved. The estimated capital cost for this alternative is $963,000, and the estimated net present value is $4,379,000. If the contingency remedy is implemented, the additional capital cost is approximately $700,000, and the overall net present value is $5,398,000.

K. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that, at a minimum, EPA is required to consider in its assessment of remedial alternatives. Building upon these specific statutory mandates, the NCP articulates nine evaluation criteria to be used in assessing the individual remedial alternatives.

A detailed analysis was performed on the soil in residential yards west of North Avenue, groundwater/surface water and bedrock groundwater alternatives using the nine evaluation criteria in order to select a site remedy. The comparative analysis of alternatives was presented in Section 5.0 of the FS. The following is a summary of the comparison of each alternative's strength and weakness with respect to the nine evaluation criteria. These criteria are summarized as follows:

Threshold Criteria

The two threshold criteria described below must be met in order for the alternatives to be eligible for selection in accordance with the NCP.

1. **Overall protection of human health and the environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. **Compliance with applicable or relevant and appropriate requirements (ARARs)** addresses whether or not a remedy will meet all Federal environmental and more stringent State environmental and facility siting standards, requirements, criteria, or limitations, unless a waiver is invoked.

Primary Balancing Criteria

The following five criteria are utilized to compare and evaluate the elements of one alternative to another that meet the threshold criteria:

3. **Long-term effectiveness and permanence** addresses the criteria that are utilized to assess alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.

4. **Reduction of toxicity, mobility, or volume through treatment** addresses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site.

5. **Short term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.

6. **Implementability** addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7. **Cost** includes estimated capital and O&M costs, as well as present-worth costs.

Modifying Criteria

The modifying two modifying criteria are used as the final evaluation of remedial alternatives, generally after EPA has received public comment on the RI/FS and Proposed Plan:

8. **State acceptance** addresses the State's position and key concerns related to the preferred alternative and other alternatives described in the Proposed Plan and RI/FS, and the State's comments on ARARs or the proposed use of waivers.

9. **Community acceptance** addresses the public's general response to the alternatives described in the Proposed Plan and RI/FS.

Following the detailed analysis of each individual alternative, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted. This comparative analysis can be found in Tables 5-1 and 5-2 of the July 2019 FS, and attached to this ROD as **Table 1**.

This section below presents the nine criteria and a brief narrative summary of the alternatives and the strengths and weaknesses to the detailed and comparative analysis. A summary of the modifying criteria for Alternatives SL-3, GW/SW-3b, and BR-3 can be found at the end of this section.

Comparative Analysis of Soil in Residential Yards West of North Avenue Alternatives

Overall Protection of Human Health and the Environment

The No Action Alternative (SL-1) provides no protection of human health or the environment. Risks to current and future residents from direct exposure to contaminated soil will remain.

Alternative SL-3 provides protection of human health and the environment by eliminating risks from direct exposure to lead since no soil with Site-related lead in excess of cleanup levels will remain.

Compliance with ARARs

The No Action Alternative (SL-1) will not meet chemical-specific ARARs since it does not prevent exposure to contaminated soil. No activities will be performed under SL-1, thus action-specific and location-specific ARARs do not apply to this alternative.

Alternative SL-3 will comply with the chemical-specific, action-specific, and location-specific ARARs. Remedial activities may impact the wetlands during excavation of contaminated soil. However, EPA has determined that Alternative SL-3 is the least environmentally damaging practicable alternative under the federal Clean Water Act for protecting the wetland areas because it will permanently remove contamination from wetland areas and then will restore the areas with native wetland vegetation. Work in the 100- and 500-year floodplains will occur with Alternative SL-3 and will result in temporary occupancy and modification of the floodplain. However, upon completion of the excavation work, the area will be backfilled to the original grade to avoid loss of flood storage capacity. As required by federal wetland and floodplain regulations, EPA has determined that there was no other practicable alternative to address contamination within the wetlands and floodplain before selecting this alternative as the preferred remedy. Any impacts to wetlands and floodplain resources will be minimized and any damage mitigated.

Long-term Effectiveness and Permanence

Alternative SL-3 permanently removes all soil with Site-related lead above the cleanup levels allowing for unrestricted use, while contaminated soil will remain under Alternative SL-1. SL-1 does not provide permanent protection from contaminants in soil and is not effective.

Reduction in Contaminant Toxicity, Mobility, or Volume through Treatment

No treatment is provided for in Alternatives SL-1 and SL-3, and thus no reduction in toxicity, mobility, or volume (TMV) through treatment is provided.

Short-term Effectiveness

The No Action Alternative (SL-1) will not be effective in the short-term in protecting human health or the environment, but because no remedial activities will occur, there will be no adverse impacts to the public or workers performing the cleanup. There are no short-term impacts to natural habitats under SL-1.

Alternative SL-3 includes short-term risks to workers and the community during excavation activities. These risks will be mitigated with the use of appropriate personal protective equipment (PPE) during remedial activities, including dust control and proper handling and management of contaminated soil. SL-3 will result in temporary removal of existing vegetation and possibly some trees. Work will be designed to minimize impacts to wetland and floodplain areas; however, short-term impacts are possible that will be addressed through mitigation measures, as necessary.

Alternative SL-1 will not meet RAOs, while Alternative SL-3 will meet RAOs. It is anticipated to take approximately six months to implement Alternative SL-3.

Implementability

The No Action Alternative (SL-1) is the easiest to implement because no remedial activities are required. Alternative SL-3, the only other alternative considered for remediation of residential soil, is not considered highly complex and has been frequently and readily implemented at similar environmental restoration sites. SL-3, which involves soil excavation and off-site disposal, employs a technically reliable, proven technology. With adequate planning, it is anticipated that this alternative will be completed quickly and without technical problems.

Costs

Except for the cost of five-year reviews, there is no cost estimated as part of the No Action SL-1 Alternative. SL-3, the only other alternative considered for remediation of residential soil, has a higher cost in comparison to SL-1 due to the volume of soil to be excavated and disposed of. The costs are presented in **Table 1** of the ROD.

Comparative Analysis of Groundwater/Surface Water Alternatives

Overall Protection of Human Health and the Environment

The No Action Alternative (GW/SW-1) provides no protection of human health or the environment. Risks to construction workers, ecological receptors, and recreational users will remain.

Alternatives GW/SW-2a and GW/SW-2b are protective of human health and environment because the full extent of impacted overburden groundwater will be either contained and treated by the pump and treat extraction wells or access will be restricted by Institutional Controls, in addition to the source removal on the W&L Property. They are also protective of human health and the ecosystem of Bliss Brook because the pump and treat technology will intercept and treat the hexavalent chromium groundwater plume prior to discharge into Bliss Brook and the existing engineered cover system and PRB, which also addressed Bliss Brook discharges, will also be maintained.

Alternatives GW/SW-3a and GW/SW-3b are protective of human health and the environment because the existing engineered cover system will be maintained and the existing PRB will be extended further south

to fully capture the hexavalent chromium groundwater plume and reduce it to trivalent chromium before discharge into Bliss Brook, in addition to the source removal on the W&L Property. They are also protective of human health and the ecosystem of Bliss Brook because the PRB technology will intercept and treat the hexavalent chromium groundwater plume prior to discharge into Bliss Brook.

For Alternatives GW/SW-2a and -2b and GW/SW-3a and -3b, Institutional Controls will be established to prevent exposure to contaminated groundwater, protect the respective remedy components of each alternative, and address the potential for future vapor intrusion until groundwater cleanup levels are achieved.

Compliance with ARARs

The No Action GW/SW-1 Alternative will not meet chemical-specific ARARs since it does not prevent exposure to contaminated soil, groundwater, or surface water. No activities will be performed under GW/SW-1, thus action-specific and location-specific ARARs do not apply to this alternative. Alternatives GW/SW-2a, GW/SW-2b, GW/SW-3a, and GW/SW-3b will comply with all ARARs.

Alternatives GW/SW-2a, GW/SW-2b, GW/SW-3a, and GW/SW-3b all need to meet specific wetland and floodplain ARAR requirements due to each having impacts to wetland and floodplain resources. Alternatives GW/SW-3a and GW/SW-3b have slightly more impacts to the wetlands and floodplains due to each including installation of the PRB extension through wetlands and floodplain, while impacts from Alternatives GW/SW-2a and GW/SW-2b involve primarily maintenance of existing remedy infrastructure (the engineered cover system and the existing PRB). Work in floodplains will result in temporary occupancy and modification of the floodplain; upon completion, the area will be backfilled to the original grade to avoid loss of flood storage capacity. EPA has made a final determination that Alternative GW/SW-3b is the least environmentally damaging practicable alternative under the federal Clean Water Act for protecting the wetland areas because it will permanently remove contamination from wetland areas and then will restore the areas with native wetland vegetation. Work in the 100- and 500-year floodplains will occur with Alternative GW/SW-3b and will result in temporary occupancy and modification of the floodplain. However, upon completion of the excavation work, the area will be backfilled to the original grade to avoid loss of flood storage capacity. As required by federal wetland and floodplain regulations, EPA has made a final determination that there was no other practicable alternative to address contamination within the wetland and floodplain before selecting this alternative as the preferred remedy. Any impacts to wetland and floodplain resources will be minimized and any damage mitigated.

Any wastes generated by remedial activities for the alternatives (except GW/SW-1) will be managed on-site in compliance with ARARs until disposed of at a permitted off-site disposal facility. Any water generated during soil excavation (all alternatives except GW/SW-1) and de-watering activities will be treated prior to discharge to surface waters or disposed of off-site as appropriate.

Long-term Effectiveness and Permanence

The No Action GW/SW-1 Alternative is the least effective alternative for long-term effectiveness and permanence because the risks identified in the baseline HHRA and BERA are not addressed. For alternatives GW/SW-2a, GW/SW-2b, GW/SW-3a, and GW/SW-3b, soil above the water table containing hexavalent chromium is permanently removed from the Site; soil below the water table containing

hexavalent chromium will be converted to the less toxic and less mobile trivalent chromium by *in-situ* soil blending with reactive media. For Alternatives GW/SW-2a and GW/SW-2b, the pump and treat system near Bliss Brook will permanently remove and treat groundwater impacted with hexavalent chromium that will enter Bliss Brook. However, in order for the pump and treat alternatives to have long-term effectiveness, a continuous effort to operate the system is required. For Alternatives GW/SW-3a and GW/SW-3b, the PRB extension will convert hexavalent chromium to the less toxic and less mobile trivalent chromium. The PRB does not require any day-to-day operation or maintenance; however, over time the reactive media within the barrier may become spent and require replacement or regeneration. Overall, because Alternatives GW/SW-2a and GW/SW-2b rely on the effective day-to-day operations of the pump and treat system, these alternatives receive a lower rating compared to Alternatives GW/SW-3a and GW/SW-3b, which retain long-term effectiveness without day-to-day operational requirements.

Residual risks for all the alternatives (except GW/SW-1) will be low because incremental risks from COCs in groundwater and surface water will be mitigated through institutional controls to prevent exposure to contaminated groundwater and groundwater contaminant levels will decline over time as a result of the source control measures on the W&L Property and the respective pump and treat or PRB treatment processes until groundwater cleanup standards are achieved. Alternatives GW/SW-2b and GW/SW-3b include the mid-plume *in-situ* treatment component, which will provide a degree of additional treatment of hexavalent chromium and TCE and would require minimal O&M.

Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment

Alternative GW/SW-1 does not include any treatment, and thus provides no reduction in TMV through treatment. For Alternatives GW/SW-2a, GW/SW-2b, GW/SW-3a, and GW/SW-3b, TMV would be reduced by greater than 95% on the W&L Property due to the introduction of a soil amendment into the source area excavation, which will reduce hexavalent chromium to the less toxic and less mobile trivalent chromium. The existing PRB will also continue to treat groundwater contamination before it reaches the Brook. For alternatives GW/SW-2b and GW/SW-3b, TMV will be further reduced due to the mid-plume *in-situ* treatment component. Alternatives GW/SW-3a and GW/SW-3b will treat all overburden groundwater before it discharges into the Brook through the existing and extended PRB. Alternatives GW/SW-2b and GW/SW-3b receive the same rating as the other alternatives (GW/SW-2a and GW/SW-3a).

Short-term Effectiveness

The No Action GW/SW-1 Alternative will not be effective in the short-term in protecting human health or the environment, but because no remedial activities will occur, there will be no adverse impacts to the public or workers performing the cleanup. Alternatives GW/SW-2a, GW/SW-2b, GW/SW-3a, and GW/SW-3b include short-term risks to workers and to the community during remedial activities but these risks will be mitigated via dust control, proper traffic planning, and engineering controls. The short-term worker risks associated with these alternatives can be mitigated with the use of appropriate PPE during remedial activities, dust control, and proper handling and management (i.e., engineering controls and contingency measures) of contaminated soil and groundwater. Transfer lines for impacted and treated water as well as electrical service will be required as part of the pump and treat alternatives (GW/SW-2a and GW/SW-2b). Installation of these utilities may create temporary inconvenience to the community. Failure of the transfer lines or groundwater containment systems, although rare, creates a potential for impact to the community. Alternatives GW/SW-3a and GW/SW-3b include more extensive work adjacent to and in Bliss Brook and its associated wetlands and floodplain. The ecosystem of Bliss Brook

will be impacted during construction, but wetland and floodplain habitat restoration will be conducted and will take approximately one year for the Brook to become re-established. The addition of the mid-plume *in-situ* treatment line in Alternatives GW/SW-2b and GW/SW-3b will work to reduce the time to achieve cleanup levels. The pump and treat alternatives present a slightly greater impact to the community during construction and the PRB wall alternatives present a slightly greater impact to the ecosystem of Bliss Brook. Thus, the short-term impacts are rated equally.

Alternative GW/SW-1 will not achieve RAOs. Surface water in Bliss Brook is expected to reach cleanup levels within one to two years upon construction of the pump and treat system (GW/SW-2a and -2b) or the PRB extension (GW/SW-3a and -3b), which would take approximately six months and two months, respectively to construct. Groundwater use restrictions in the non-drinking water area are expected to be in place for over 100 years, until cleanup levels are achieved.

Implementability

The No Action GW/SW-1 Alternative is the easiest to implement because no remedial activities are required. Alternatives GW/SW-2a, GW/SW-2b, GW/SW-3a, and GW/SW-3b all employ technically reliable, proven technologies. With adequate planning, it is anticipated that these remedies can be completed quickly without technical problems that will result in delays. Alternatives GW/SW-2a, GW/SW-2b, GW/SW-3a, and GW/SW-3b all rely, in part, on Institutional Controls, which is a proven, technically feasible technology. Although Institutional Controls can be administratively challenging, they can be implemented and completed quickly with adequate planning. These alternatives (except GW/SW-1) require off-site disposal of soil; however, all services and materials required to implement the alternatives will be relatively easy to obtain. Equipment and trained personnel are readily available for the pump and treat portion of the GW/SW-2a and GW/SW-2b alternatives, and the reactive media ZVI is offered by several vendors and is considered easy to obtain. Alternatives GW/SW-2a and GW/SW-2b are slightly easier to implement compared to GW/SW-3a and GW/SW-3b, however, the difference does not justify a different rating.

Costs

Except for the cost of five-year reviews, there is no cost estimated as part of the No Action GW/SW-1 Alternative. Alternatives GW/SW-3a and GW/SW-3b, while requiring higher capital costs, have the lowest total cost (except GW/SW-1). Alternatives GW/SW-2a and GW/SW-2b, while having lower capital costs compared to GW/SW-3a and GW/SW-3b, have higher associated operation and maintenance costs, thus resulting in higher total costs. Alternatives GW/SW-2b and GW/SW-3b have slightly higher capital costs to alternatives GW/SW-2a and GW/SW-3a, respectively, due to the addition of the mid-plume *in-situ* treatment component. The costs for the alternatives are presented in **Table 1** of this ROD.

Comparative Analysis for Bedrock Groundwater Alternatives

Overall Protection of Human Health and the Environment

The No Action BR-1 Alternative provides no protection of human health or the environment. Alternatives BR-2, BR-3, BR-4, and BR-5 are expected to provide protection of human health and the environment with proper implementation of Institutional Controls to prevent exposure to contaminated non-potable groundwater until non-potable groundwater cleanup levels are achieved. Institutional

Controls will also prevent future use of groundwater within any potentially impacted areas of the Bungay River Water Resource Protection District until contaminant migration from the upgradient non-potable groundwater areas is controlled. If the contingency provided in Alternatives BR-3 through BR-5 is implemented, added groundwater treatment will clean up any exceedances of drinking water levels within the District.

Compliance with ARARs

The No Action BR-1 Alternative will not meet chemical-specific ARARs since it does not prevent exposure to contaminated groundwater. No activities will be performed under Alternative BR-1, therefore action-specific and location-specific ARARs do not apply. With proper implementation, it is anticipated that Alternatives BR-2, BR-3, BR-4, and BR-5 will meet chemical-specific, action-specific, and location-specific ARARs. Activities under Alternatives BR-2, BR-3, BR-4, and BR-5 may impact wetlands during well installation and potential active treatment (Alternatives BR-3, BR-4, and BR-5) if the contingency is implemented. EPA has made a final determination that Alternative BR-3 is the least environmentally damaging practicable alternative under the federal Clean Water Act for protecting the wetland areas because it will include only limited disturbance of wetland areas (there may be more extensive disturbance in the event the contingency remedy is implemented) and then will restore any altered areas with native wetland vegetation. Limited work in the 100- and 500-year floodplains may occur with Alternative BR-3 (with more extensive potential impacts if the contingent remedy is implemented) and will result in temporary occupancy and modification of the floodplain. However, upon completion of any work in floodplain, the area will be backfilled to the original grade to avoid loss of flood storage capacity. As required by federal wetland and floodplain regulations, EPA has made a final determination that there was no other practicable alternative to address contamination within the wetlands and floodplain before selecting this alternative as the preferred remedy. Any impacts to wetlands and floodplains will be minimized and damage mitigated.

Wastes or water generated by well installation and groundwater monitoring, or the contingency components in alternatives BR-2, BR-3, BR-4, and BR-5, will be characterized and disposed of appropriately (with treatment, if required prior to disposal at a permitted facility).

Long-term Effectiveness and Permanence

The No Action BR-1 Alternative is the least effective alternative for long-term effectiveness and permanence because the risks identified in the baseline HHRA are not addressed. Alternatives BR-2, BR-3, BR-4, and BR-5 rely on Institutional Controls to prevent exposure to contaminated bedrock groundwater and monitoring of any attenuation processes to determine if non-potable groundwater cleanup levels and management of migration standards can be achieved. The active bedrock treatment contingency for Alternatives BR-3, BR-4, and BR-5 will provide additional long-term effectiveness and permanence to any contaminant threat to the potable groundwater in the Bungay River Water Resource Protection District by either permanently removing and treating the groundwater (BR-4) or intercepting the plume and reducing contaminant toxicity and mobility (BR-3 and BR-5). BR-2 will rely solely on monitoring natural processes to reduce contaminant toxicity and mobility. With the exception of BR-1, the alternatives will provide a similar degree of initial long-term effectiveness and permanence within the non-potable areas of the Site. Any potential threat to the drinking water aquifer in the Bungay River Water Resource Protection District still needs to be assessed to fully determine the long-term effectiveness and permanence of the alternatives.

Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment

No treatment is provided under any of the alternatives for groundwater within the non-potable areas of the Site. If a contingent remedy needs to be implemented to protect groundwater within the Bungay River Water Resource Protection District, neither Alternative BR-1 nor BR-2 include treatment. The contingent remedies for Alternatives BR-3, BR-4, and BR-5 rely on active bedrock treatment to be either pumped and treated (BR-4) or intercept and treat groundwater contamination to reduce toxicity and mobility (BR-3 and BR-5). However, the challenges and uncertainties for the active treatment components in Alternatives BR-3, BR-4, and BR-5 will result in a similar rating.

Short-term Effectiveness

Since no construction activities or remedial actions are proposed under Alternative BR-1, there are no additional short-term risks to the community or workers. Initial construction activities associated with Alternatives BR-2, BR-3, BR-4, and BR-5 (i.e., installing and sampling of monitoring wells) would present minimal risk or impact to the community and environmental receptors. The active bedrock treatment contingency components for Alternatives BR-3, BR-4, and BR-5 include more extensive site work compared to BR-2 and present short-term risks to workers, the community, and potentially environmental receptors during remedial activities. These risks will be easily mitigated via dust control, proper traffic planning, and engineering controls. Alternative BR-2 will have the least detrimental effects in the short-term when compared to the active remedy components of Alternatives BR-3, BR-4, and BR-5.

Alternative BR-1 will not achieve RAOs. Alternatives BR-2, BR-3, BR-4, and BR-5, in conjunction with components of the GW/SW alternatives directed at the source area soil removal and overburden groundwater, will work toward reducing bedrock groundwater concentrations to below non-drinking water cleanup levels, reducing concentrations in bedrock groundwater within the potentially impacted Bungay River Water Resource Protection District to below drinking water levels, and/or preventing potential further plume migration into the District. Groundwater use restrictions in the non-drinking water area are expected to be in place for over 100 years, until cleanup levels are achieved.

Implementability

The No Action Alternative (BR-1) is the easiest to implement because no remedial activities are required. Alternatives BR-2, BR-3, BR-4, and BR-5 rely on Institutional Controls, which is a proven, technically feasible technology. Institutional Controls can be administratively challenging, however, they can be implemented and completed quickly with adequate planning. The active bedrock treatment contingency components for Alternatives BR-3, BR-4, and BR-5 pose some technical challenges, with BR-3 and BR-5 being more difficult to design, construct, and implement. The active remedy component in Alternative BR-4 (pump and treat system) is routinely implemented for bedrock.

Costs

Except for the cost of five-year reviews, there is no cost estimated as part of the No Action BR-1 Alternative. For Alternatives BR-2, BR-3, BR-4, and BR-5, the capital costs are essentially equal because they contain the same initial remedy components. However, the contingency bedrock treatment

components for Alternatives BR-3, BR-4, and BR-5 will increase the total capital cost and particularly the total net present value. Excluding Alternative BR-1, Alternative BR-4 will have the overall greatest total net present value, while Alternative BR-2 will have the least. Alternatives BR-3 and BR-5 would be similar in total net present value. The costs for the alternatives are presented in **Table 1** of this ROD (note the total capital and total net present value for Alternatives BR-2, BR-3, BR-4, and BR-5 include the contingency components).

Modifying Criteria with Respect to Alternatives SL-3, GW/SW-3b, and BR-3

State Acceptance

The Commonwealth of Massachusetts, through its lead agency, MassDEP, has expressed its support for EPA's preferred alternatives presented in the July 2019 Proposed Plan and concurs with the selected remedy outlined in this ROD (see Appendix A of this ROD for the State concurrence letter).

Community Acceptance

EPA's extensive community engagement efforts at the Site included the publication of a Proposed Plan in July 2019, and the occurrence of multiple public meetings which are described in further detail above in Section C of this ROD. A public informational meeting was held at the Attleboro Public Library in Attleboro, MA, on July 31, 2019, and was immediately followed with a Public Hearing. A transcript was created for this hearing and has been made part of the Administrative Record for this ROD. In addition to the oral comment received at the hearing, one written comment was also provided. A summary of the comments specific to the proposed alternatives for the Site and EPA's responses to the comments are included in the Responsiveness Summary, Part 3 of this ROD.

L. THE SELECTED REMEDY

1. Summary of the Rationale for the Selected Remedy

The selected remedy for the Site is a comprehensive remedy which utilizes source control and management of migration components to address risk from contamination at the Site. Source control measures are required to address soil and groundwater/surface water that presents unacceptable risks to human health and/or environmental receptors. The management of migration component addresses contaminants in groundwater in the bedrock aquifers that present unacceptable risks to human health. Of all the alternatives, the selected remedy best satisfies the statutory criteria for remedy selection.

The major components of the remedy are as follows:

1. Excavation and off-site disposal of approximately 310 cubic yards of soil at residential yards west of North Avenue. Excavated areas will be backfilled and re-graded with clean soil to existing conditions;
2. Excavation and off-site disposal of approximately 7,900 cubic yards of significantly-contaminated soil down to approximately 15 feet bgs at the W&L Property. Excavation and off-site disposal of approximately 730 cubic yards of remaining W&L facility features (e.g., concrete

floor slab and cobble-filled "pit") in order to access the underlying areas of contamination. *In-situ* soil blending with reactive media from approximately 15 feet bgs to the top of bedrock, and backfill to the water table with additional reactive media, and re-vegetate/re-grade with clean soil to existing conditions;

3. Mid-plume *in-situ* treatment along the west side of North Avenue via a series of injections wells;
4. Extension of the existing PRB along Bliss Brook. Approximately 4,400 cubic yards of soil will be excavated and disposed of off-site at a permitted facility in order to construct the PRB;
5. Excavated areas within or adjacent to wetlands/floodplains will be restored to existing conditions;
6. Operation and Maintenance of any existing or new remedy infrastructure components, including the existing SSDSs;
7. Long-term monitoring of groundwater, surface water, and the vapor intrusion pathway;
8. Periodic Five-Year Reviews;
9. Contingency remedy to prevent migration of the contaminated non-drinking water aquifer into the downgradient District and restore groundwater to drinking water standards solely within the District, if groundwater contaminants are found to exceed federal and state drinking water standards; and
10. Institutional Controls to: prohibit future residential use at the W&L Property; prevent future construction worker exposure to groundwater contamination at the W&L Property until groundwater cleanup levels are achieved; prevent contact with contaminated groundwater and the installation of non-drinking water wells (i.e. irrigation wells) across the extent of the Site-wide groundwater plume where non-drinking water scenario cleanup levels for residential groundwater are exceeded and/or which may cause migration of the contaminated plume until groundwater cleanup levels are achieved; prevent the installation of wells within the potentially impacted portion of the Bungay River Water Resource Protection District to prevent plume migration from the contaminated non-drinking water area into the District; prevent disturbance to the existing engineered cover system and PRB and any new remedy infrastructure components; prevent contact with soil beneath the existing engineered cover system adjacent to Bliss Brook; and require either a vapor intrusion evaluation or vapor mitigation system be installed if a new building is constructed over the shallow groundwater VOC plume (within or to the downgradient area of the former building on the W&L Property) until groundwater cleanup levels are achieved.

The estimated present value of total cost of the selected remedy is approximately $22 million. The cost analyses include an estimation of the capital costs and annual operation and maintenance costs. In addition, the cost estimate is based on a present worth analysis by discounting to a base year or current year using a 7 percent discount rate. The selected remedy is anticipated to take three to four years to construct. Groundwater restrictions in the non-drinking water areas are expected to be in place for over 100 years, until cleanup levels are achieved. Well restrictions to prevent the migration of contaminated groundwater from the non-drinking water areas of the Site into the downgradient Bungay River Water Resource Protection District are expected to remain until groundwater cleanup levels are achieved.

2. Description of Remedial Components

The following is a detailed description of the components of the selected remedy. The final selected source control and management of migration remedy for the Site is consistent with EPA's preferred alternatives outlined in the July 2019 Proposed Plan.

Soil in Residential Yards West of North Avenue

The selected remedy for Alternative SL-3: Soil Excavation on Residential Properties and Off-site Disposal, includes the following components:

- Excavation and off-site disposal at an appropriate permitted facility of approximately 310 cubic yards of lead-contaminated soil with concentrations in excess of risk-based cleanup levels from six residential properties.
- A pre-design investigation will include additional sampling to refine the extent of soil to be excavated.
- Excavated areas will be restored with clean, imported backfill to grade and re-vegetated with native vegetation to control erosion and restore any altered wetland/floodplain habitat.

Soil excavation and off-site disposal to remove all soil in excess of the soil cleanup goal for lead will occur at the residential properties north of Deanville Road between the southern wetland and FEMA flood zone AE (100-year flood zone), located at Map No. 59, Lot No. 228; Map No. 49, Lot No. 227; Map No. 59, Lot No. 225; and Map No. 59, Lot No. 220; and isolated areas of soil contamination on two properties south of Deanville Road located at Map No. 49, Lot No. 113 and at Map No. 49, Lot No. 114B. The entire FEMA flood zone AE is not proposed for excavation on these two properties because the remaining samples (once the two "hot spots" are removed) have an average concentration below the cleanup goal. A pre-design investigation will be conducted to further refine the extent of soil to be excavated. The current estimated extent of surface soil impacts above cleanup levels covers approximately 8,310 square feet, and the excavation depth is anticipated to be approximately 1 foot bgs and not to exceed a maximum depth of 3 feet bgs. The total impacted volume of soil is estimated to be approximately 310 cubic yards. It is estimated that soil samples will be collected from each property and will be analyzed at an off-site laboratory for fine fraction lead. The pre-design sampling will also eliminate the need for post-excavation confirmation samples, because the excavation area will have been clearly defined before any excavation takes place. Prior to excavation, erosion control measures will be installed around the excavation areas. During the excavation, dust control and air monitoring will be performed, as necessary. All excavated soil will be stockpiled at an approved location. Prior to disposal, waste characterization samples will be collected from the stockpiled soil, and the excavated soil will be transported and disposed of at an off-site permitted facility. Once the contaminated soil has been removed, the excavation will be backfilled with clean soil, compacted, and graded to achieve existing elevations and grades. Topsoil will be placed and each of the residential properties will be re-vegetated with native vegetation to conform with pre-remedial conditions to the extent practicable. Potential harmful temporary or permanent impacts to wetlands and/or floodplain resources will be minimized to the extent practicable and mitigated as necessary. **Figure 2** in **Appendix C** of this ROD shows the Site FEMA flood zone designations, and **Figure 4** of this ROD provides a conceptual layout of the soil remedy, including the areas to be excavated at each property. No Institutional Controls are expected to be necessary for this alternative, because the soil excavation and off-site disposal will remove all impacted soil exceeding soil cleanup levels and will allow for unrestricted exposure and use (residential).

Groundwater/Surface Water

The selected remedy for Alternative GW/SW-3b: Source Area Soil Removal with *In-Situ* Soil Treatment and Extension of the Permeable Reactive Barrier with Mid-Plume Treatment, includes the following components:

- Removal and off-site disposal of approximately 730 cubic yards of the remaining building concrete floor slab and cobble-filled "pit" to allow for removal of underlying contamination;
- Excavation of approximately 7,900 cubic yards of significantly-contaminated soil down to a maximum depth of 15 feet bgs within the source area and off-site disposal at a permitted facility;
- Soil blending with reactive media within the open excavation area down to the top of bedrock (approximately 15 to 30 feet bgs);
- De-watering the portion of the excavation that extends below the water table, and any excavated soils that require de-watering, collect the water in tanks and treat on-site as needed to meet surface water standards for discharge (or as appropriate off-site disposal at a permitted facility);
- Mid-plume *in-situ* treatment with reactive media via a series of injection wells along the west side of North Avenue;
- Construction of a new PRB filled with reactive media to extend the existing PRB intercepting the overburden groundwater plume prior to discharge into Bliss Brook;
- Excavation of approximately 4,400 cubic yards of soil in order to construct the PRB and off-site disposal of the soil at a permitted facility;
- Restoration with native vegetation of any wetland/floodplain habitat altered by the remedial action;
- Long-term monitoring of the overburden groundwater plume, surface water in Bliss Brook, and existing buildings with SSDSs or which may have the potential for vapor intrusion, to evaluate remedy effectiveness;
- Operation and Maintenance of any new and existing remedy infrastructure components, including the engineered cover system and PRB, existing SSDSs, and periodic replacement/regeneration of reactive media in the PRB;
- Institutional Controls to 1) prohibit future residential use at the W&L Property; 2) prevent future construction worker exposure to groundwater contamination at the W&L Property until groundwater cleanup levels are achieved; 3) prevent contact with contaminated groundwater and the installation of non-drinking water wells (i.e. irrigation wells) across the extent of the site-wide groundwater plume where non-drinking water scenario cleanup levels for residential groundwater are exceeded and/or which may cause migration of the contaminated plume until groundwater cleanup levels are achieved; 4) prevent disturbance to the existing engineered cover system and PRB, and any new remedy infrastructure components; 5) prevent contact with soil beneath the existing engineered cover system adjacent to Bliss Brook; and 6) require either a vapor intrusion evaluation or vapor mitigation system be installed if a new building is constructed over the shallow groundwater VOC plume (within or to the downgradient area of the former building on the W&L Property) until groundwater cleanup levels are achieved; and
- Periodic five-year reviews to assess remedy protectiveness.

Pre-design investigations will be conducted for several components of the GW/SW-3b alternative. For the source area soil removal, sampling will be conducted to further refine the horizontal extent of soil that will be addressed with a combination of soil excavation and *in-situ* and *ex-situ* soil blending down to

bedrock in the area of the former building footprint and just to the south. It is estimated that soil samples will be collected and analyzed at an off-site laboratory for hexavalent chromium, with a goal of delineating locations where soil is a continuing source of contamination to groundwater. The pre-design sampling will also be conducted to determine if the excavation and soil blending area has to be extended to also address TCE in groundwater. Waste characterization sampling (including TCLP analysis) will be conducted at a subset of locations within the top 10 feet to assess whether portions of the soil to be excavated and disposed off-site may be classified as State-regulated characteristic hazardous waste.

In preparation for soil excavation and soil blending, the remaining concrete floor slab and walls and the cobble-filled "pit" where plating tanks were formerly located will be removed for off-site disposal at a permitted facility. The demolished concrete will be stockpiled for full waste characterization and any visibly-contaminated concrete (e.g., green staining for chromium) will be segregated from potential non-impacted concrete and managed separately. It is estimated that approximately 730 cubic yards of concrete and rock debris will require off-site disposal and that approximately 20% of the debris will be characterized and disposed of as State-regulated characteristic hazardous waste.

The soil excavation and *in-situ* treatment footprint (**Figure 3-8** of this ROD) covers an area of approximately 14,000 square feet, and the area and depth of excavation is intended to encompass soil with hexavalent chromium concentrations that are a significant continuing source to groundwater and will include the plating tank area. The top of bedrock is expected to be encountered between 25-30 feet bgs, and the water table varies from approximately 6 to 10 feet bgs in the area of the building foundation. Soil, along with any remaining debris, will be excavated to a depth approximately 15 feet bgs. Soil from the ground surface to a depth of 15 feet bgs (estimated in-place volume of approximately 7,900 cubic yards) will be temporarily stockpiled for off-site disposal. Within the open excavation area (from approximately 15 to 30 feet bgs), soil blending with reactive media will be conducted *in-situ* down to bedrock. The excavation will be backfilled to 7.5 feet bgs or to the water table (whichever is higher) with reactive media and clean sand blend, and the remaining excavation will be backfilled with clean sand and graded with clean topsoil from an off-site source. Based on treatability tests with soil and groundwater from the Site, ZVI was shown to be effective in treating both hexavalent chromium and TCE and is a likely choice for the reactive media. A pre-design study will determine the type and dosage of reactive media for soil blending. Prior to the excavation, erosion control measures will be installed around the excavation area. During the excavation, dust control and air monitoring will be performed, as necessary. Temporary shoring will also be installed during the excavation, blending, and backfilling.

De-watering will be needed during soil excavation, *in-situ* soil blending, and backfilling below the water table. Any water generated during excavation/treatment and de-watering activities will be collected in frac tanks and treated on-site as needed to meet surface water standards for discharge to surface water. Alternately, water may be collected and shipped off-site to a permitted disposal facility. Details regarding stockpile management will be developed during the remedial design phase. It is estimated that approximately half of the soil generated will be classified as State-regulated characteristic hazardous waste, while the remainder will be non-hazardous.

The mid-plume treatment involves the addition of an *in-situ* saturated soil treatment, consisting of reactive media, along the middle of the hexavalent chromium plume. *In-situ* treatment will be conducted along the west side of North Avenue, in a line that runs north-south along the road and is approximately centered on the AE-04 well cluster to intercept the most contaminated portion of the overburden plume. The conceptual location of the mid-plume treatment area is shown on **Figure 3-8**. A series of boreholes

will be drilled down to the top of bedrock and filled with reactive media and sand mixture. Maintenance activities will be minimal but may require periodic replacement/regeneration of the reactive media, and monitoring wells in the area will be periodically tested to confirm treatment effectiveness.

A new PRB will be constructed to extend the existing PRB along Bliss Brook. A pre-design investigation may be required ahead of the extension, which will involve a bench test to finalize the type of dosage of the reactive media used in the barrier, and a pre-design study may be needed to confirm the dimensions of the PRB based on groundwater impacts and concentrations reaching Bliss Brook. Additional flow modeling will also be required as part of this pre-design study. A conceptual site model of the groundwater-surface water interactions that are taking place where the hexavalent chromium plume is discharging to Bliss Brook is shown on **Figure 5** of this ROD. Construction of the PRB will require excavation and off-site disposal of approximately 4,400 cubic yards of soil. During excavation, temporary shoring and de-watering are expected to be necessary. Other options for construction of the barrier (e.g., narrow trenching and blending existing soils in place with reactive media) will be evaluated as part of the remedial design. The new/extended PRB will not damage or otherwise impact the existing PRB. It may be necessary to install the extended PRB through wetlands and floodplain. Wetland and floodplain areas disturbed will be restored with native vegetation and surface elevations in the floodplain will be maintained so there is no loss of flood storage capacity along Bliss Brook.

Long-term monitoring of surface water in Bliss Brook will include sampling to evaluate compliance with the cleanup goal for hexavalent chromium. It is anticipated that surface water sampling will be performed twice per year post remedy construction from a total of five locations, with analysis for hexavalent chromium. After five years, the frequency of sampling could be reduced. The overburden groundwater will need to be monitored to evaluate the progress of the remedy and to determine whether the PRB is effectively preventing the overburden hexavalent chromium plume from discharging to Bliss Brook at levels causing an exceedance of surface water cleanup levels. The monitoring will also be used to determine if chlorinated VOC concentrations in groundwater are attenuating due to source area soil removal and treatment efforts at the W&L Property and the mid-plume *in-situ* treatment. The overburden monitoring network will consist of a combination of existing overburden wells throughout the Site and shallow piezometers along the western edge of Bliss Brook in the plume discharge area. Samples will be analyzed for hexavalent chromium and/or chlorinated VOCs. It is estimated that 20 existing shallow overburden and deep overburden and five piezometers will be sampled periodically post remedy construction.

Periodic monitoring is recommended for the three residential properties with existing SSDSs that address potential vapor intrusion risk in order to determine whether the systems are functioning properly and to document a negative pressure beneath the floor slabs. At some point, as VOC concentrations in the groundwater decline over time and approach the groundwater VISLs, indoor air sampling could be performed and a risk screening conducted on the resulting data to evaluate whether the SSDSs are still needed. Inspections are also recommended for those existing buildings with sub-slab soil gas or groundwater exceedances above the VISLs, but no SSDS installed because indoor sampling did not indicate a risk. The inspections will evaluate whether building conditions may have changed in a manner that could cause an increase potential for vapor intrusion.

Maintenance of the existing SSDSs will be needed to ensure they are functioning as designed, and to check the system fan and piping for signs of wear. The existing engineered cover system and permeable reactive barrier will need to be maintained by regular mowing to prevent growth of trees and shrubs, and

annual inspections to identify any animal burrows and areas of erosion so that repairs can be made. The ZVI in the existing PRB is expected to require replacement at some future date, since the reductive capacity of the ZVI will eventually be exhausted.

Institutional Controls, including limitations on land and groundwater uses and activities, are necessary in order to protect human health by controlling potential exposures to contaminated soil, groundwater, and indoor air. Institutional Controls are also necessary for the protection of remedy components, including limitations on uses and activities that interfere with or disturb components of the remedy. Institutional Controls will be necessary to: 1) prevent future residential uses of the current industrial/commercial portion of the W&L Property (78 North Avenue and the two parcels immediately south); 2) prevent future construction worker exposure to groundwater contamination at the W&L Property until groundwater cleanup levels are achieved; 3) prevent contact with contaminated groundwater and the installation of non-drinking water wells (i.e. irrigation wells) across the extent of the site-wide groundwater plume where non-drinking water scenario cleanup levels for residential groundwater are exceeded and/or which may cause migration of the contaminated plume until groundwater cleanup levels are achieved; 4) prevent disturbance to and maintain the integrity of the existing engineered cover system and PRB, and any new remedy infrastructure components; 5) prevent contact with soil beneath the existing engineered cover system adjacent to Bliss Brook; and 6) require either a vapor intrusion evaluation or vapor mitigation system be installed if a new building is constructed over the shallow groundwater VOC plume (within or to the downgradient area of the former building on the W&L Property) until groundwater cleanup levels are achieved.

Institutional Controls will be necessary at the following locations: the W&L Property and the two parcels immediately south (Map No. 89, Lot Nos. 1, 2D, and 3) to prohibit future residential use, prevent exposure by construction workers to shallow groundwater, address the potential for vapor intrusion, and/or maintain the integrity of proposed new remedy infrastructure; six residential properties along Paulette Lane (Map No. 59, Lot No. 240; Map No. 59, Lot No. 241; and Map No. 59, Lot No. 242) and North Avenue (Map No. 59, Lot No. 244; Map. No. 49, Lot No. 109; and Map No. 49, Lot No. 111) to prevent contact with soil beneath the existing engineered cover system and/or maintain the integrity of existing and/or proposed new remedy infrastructure; and one additional parcel (the Massachusetts Department of Transportation parcel immediately south of Map No. 89, Lot No. 1) along North Avenue to maintain the integrity of proposed new remedy infrastructure. A groundwater restriction zone will be established as a basis to prevent contact with contaminated groundwater and the installation of non-drinking water wells across the extent of the Site-wide groundwater plume where non-drinking water scenario cleanup levels for residential groundwater are exceeded and/or which may cause migration of the contaminated plume (see **Figure 9** of this ROD). The details of Institutional Controls will be resolved during the remedial design phase in coordination with the impacted landowners, local officials, and MassDEP. Institutional Controls may be implemented through measures that may include, but are not limited to, a local City ordinance or a Notice of Activity and Use Limitation (NAUL).[10]

At the conclusion of remedy construction, hazardous substances, pollutants, or contaminants will remain at the Site. Therefore, as required by law, EPA will review the Site remedy to ensure that the remedial action continues to protect human health and the environment at least once every five years. These five-

[10] NAULs are notices of activities and uses that are consistent and inconsistent with a particular remedy established under the MCP and may be available for use at federal sites with the approval of EPA and MassDEP in accordance with any applicable MCP requirements.

year reviews will evaluate the components of the remedy for as long as contaminated media above CERCLA risk levels remain in place. The purpose of the five-year review is to evaluate the implementation and performance of the remedy in order to determine if the remedy is or will be protective of human health and the environment. The five-year review will document recommendations and follow-up actions as necessary to ensure long-term protectiveness of the remedy or bring about protectiveness of a remedy that is not protective. These recommendations could include providing additional response actions, improving O&M activities, optimizing the remedy, enforcing access controls and Institutional Controls, and conducting additional studies and investigations.

Bedrock Groundwater

The selected remedy for Alternative BR-3: Institutional Controls and Contingency Remedy of Focused *in-situ* Injections (West of North Avenue), includes the following components:

- Institutional Controls to prevent contact with contaminated groundwater and the installation of non-drinking water (i.e. irrigation) wells within the bedrock groundwater plume boundary until groundwater cleanup levels are achieved and prevent the installation of wells within the potentially impacted portion of the Bungay River Water Resource Protection District to prevent plume migration from the contaminated non-drinking water area into the District;
- Pre-design investigations to further refine the horizontal and vertical extent of the contaminated bedrock groundwater plume so that the area potentially requiring additional remedial action can be defined;
- Long-term monitoring of the site-wide bedrock groundwater plume to evaluate the attenuation of contaminants until groundwater cleanup levels are achieved;
- Periodic five-year reviews to assess remedy protectiveness;
- Contingency remedy to prevent groundwater migration from the contaminated non-drinking water area into the Bungay River Water Resource Protection District and restore groundwater to drinking water standards solely within the District, if groundwater contaminants within the District are found to exceed federal and state drinking water standards upon further investigations, which includes:
    - Focused *in-situ* bedrock treatment line along the west side of North Avenue to inject reactive media into the groundwater via a series of injection wells installed into bedrock;
    - Monitoring of the bedrock groundwater plume until groundwater cleanup standards are achieved; and
    - Institutional Controls to 1) prevent contact with Site groundwater until non-potable groundwater cleanup levels are achieved; 2) prevent consumption of groundwater within the contaminated areas of the District until groundwater cleanup levels are achieved; and 3) maintain the integrity of any new remedy infrastructure components. There will be a well restriction zone established that extends to the border of the non-drinking water aquifer and the District to prevent the installation of wells that might draw groundwater into the District until groundwater cleanup levels are achieved.

Institutional Controls will be required to prevent contact with contaminated groundwater and the installation of non-drinking water (i.e. irrigation) wells within the bedrock groundwater plume boundary until groundwater cleanup levels are achieved; and 2) prevent the installation of wells within the

potentially impacted portion of the Bungay River Water Resource Protection District to prevent plume migration from the contaminated non-drinking water area into the District. Until additional bedrock wells are installed and sampled, it is not possible to confirm or determine the potential boundaries of an Institutional Control to prevent installation of drinking water wells. **Figure 8** of this ROD depicts the estimated current potential impacts within the District. However, if the contingency remedy is implemented, the extent of Institutional Controls will be expanded to prevent the installation of drinking water wells within the confirmed impacted portions of the District and to prevent further plume migration. Institutional Controls are also necessary to maintain the integrity of any new remedy infrastructure components included in the BR-3 Alternative.

A groundwater restriction zone will be established as a basis to prevent contact with contaminated groundwater and the installation of non-drinking water wells across the extent of the Site-wide groundwater plume where non-drinking water scenario cleanup levels for residential groundwater are exceeded and/or which may cause migration of the contaminated plume (see **Figure 9** of this ROD), and to prevent the installation of drinking water wells within the extent of the estimated potentially contaminated portion of the Bungay River Water Resource Protection District to prevent plume migration from the contaminated non-drinking water area into the District. The groundwater restriction zone may be expanded, and additional Institutional Controls required, if the contingency remedy is implemented. The details of Institutional Controls will be resolved during the remedial design phase in coordination with the impacted landowners, local officials, and MassDEP. Institutional Controls may be implemented through measures that may include, but are not limited to, a local City ordinance or a Notice of Activity and Use Limitation.

Long-term monitoring of the bedrock groundwater will be needed to evaluate the attenuation of the hexavalent chromium plume, especially near the Bungay River Water Resource Protection District. The monitoring may also be used to determine if chlorinated VOC concentrations in groundwater are attenuating naturally. The bedrock monitoring network and monitoring program may consist of a combination of existing shallow and deep bedrock wells throughout the Site and any new wells installed as a part of a PDI. Samples may be analyzed annually for the duration of remedy operation for hexavalent chromium and chlorinated VOCs. Monitoring within the impacted portion of the District will be included if the contingency components are implemented.

If it is confirmed through additional sampling that the Bungay River Water Resource Protection District is impacted with Site contaminants exceeding drinking water standards, a contingency remedy of focused *in-situ* injections with reactive media (west of North Avenue) will be implemented to restore groundwater within the impacted area of the District to its beneficial use as a potential future drinking water source. The location of the *in-situ* treatment zone will be conducted along the west side of North Avenue and is approximately centered on the AE-04 well cluster. The conceptual plan is shown on **Figure 7** of this ROD. It is assumed that a series of open borehole wells will be installed at least 10 feet into competent bedrock and injected with reactive media once every five years for 30 years. A pre-design investigation consisting of a pilot study will be needed to determine the type, dose, depth of injection, and injection rate of reactive media into the bedrock. Alternative reagents that travel with the groundwater and could provide more rapid treatment of groundwater downgradient will be considered in the design phase. As part of the detailed design, a pilot study involving the installation of one or more wells and testing reagents and installation methods is anticipated to be necessary, and monitoring wells in the area will be periodically tested to confirm treatment effectiveness.

At the conclusion of remedy construction, hazardous substances, pollutants, or contaminants will remain at the Site. Therefore, as required by law, EPA will review the Site remedy to ensure that the remedial action continues to protect human health and the environment at least once every five years. These five-year reviews will evaluate the components of the remedy for as long as contaminated media above CERCLA risk levels remain in place. The purpose of the five-year review is to evaluate the implementation and performance of the remedy in order to determine if the remedy is or will be protective of human health and the environment. The five-year review will document recommendations and follow-up actions as necessary to ensure long-term protectiveness of the remedy or bring about protectiveness of a remedy that is not protective. These recommendations could include providing additional response actions, improving O&M activities, optimizing the remedy, enforcing access controls and Institutional Controls, and conducting additional studies and investigations.

Remedy Modifications

The selected remedy may change somewhat as a result of the remedial design and construction processes. More specifically, pre-design investigations at the W&L Property will include additional soil sampling to refine the vertical and horizontal extent of soil contamination and will determine the volume of hazardous waste to be disposed of off-site at a permitted facility. Pre-design investigations also include additional groundwater sampling to refine the horizontal extent of groundwater contamination potentially impacting the downgradient Bungay River Water Resource Protection District, which may result in implementation of a contingency remedy to prevent migration from the contaminated non-drinking water aquifer into the District and restore groundwater to drinking water standards solely within the District, if groundwater contaminants are found to exceed federal and state drinking water standards. Changes to the remedy described in this ROD will be documented using a technical memorandum in the Administrative Record, an Explanation of Significant Differences (ESD), or ROD amendment, as appropriate.

3. Summary of the Estimated Remedy Costs

The estimated total cost of the selected remedy is approximately $22 million. A summary tables of the major capital and annual O&M cost elements for each component of the selected remedy are shown below and in **Table 1** in **Appendix B** of this ROD. The discount rate used for calculating total present worth costs was 7%. The timeframe estimated in the FS over which cost expenditures are calculated is 30 years.

Component of Remedy	Capital Cost	O&M – Present Value (30 years)[11]	Total Cost – Present Value[12]
SL-3	$422,000	$0	$422,000
GW/SW-3b	$11,991,000	$161,000	$16,441,000
BR-3	$963,000	$124,000	$4,379,000
BR-3 Contingency[13]	$608,000	$0	$927,000

[11] Annual O&M costs presented is total O&M for one year, not total present value.
[12] Total Cost – Present Value presented is the sum of capital cost, net present value of periodic cost (separate from O&M) for 30 years, and net present value of annual O&M for 30 years.
[13] The costs for the BR-3 Contingency Remedy (*in-situ* injections west of North Avenue) are the additional costs to construct the remedy and does not account for costs already included (e.g., PDI, Monitoring, ICs, etc.).

2019 ROD Totals	**$13,984,000**	**$285,000**	**$22,169,000**

Potential sources of uncertainty that are associated with the cost estimate, and in particular with Alternative GW/SW-3b, include additional volume/additional extent of soil contamination, and/or encountering additional soil at concentrations that would classify it has State-regulated hazardous waste.[14] EPA will mitigate these uncertainties by developing and conducting additional sampling and verification that will be part of pre-design investigations, before implementing the remedial design.

Changes in the cost elements are likely to occur as a result of new information and data collected during remedial design investigations. Major changes may be documented in the form of a memorandum in the Administrative Record file, an ESD, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

4. Expected Outcomes of the Selected Remedy

An expected outcome of the selected remedy is that contaminated overburden groundwater will no longer act as a source of surface water contamination at Bliss Brook and will no longer present an unacceptable risk to human health via direct contact for a recreational scenario and to ecological receptors. Another expected outcome of the selected remedy is that soil in residential yards west of North Avenue will no longer present an unacceptable risk to human health via direct contact. Groundwater contamination underlying the Site will be treated *in-situ* soil blending at the W&L Property, mid-plume *in-situ* treatment west of North Avenue, and along Bliss Brook via the PRB. Groundwater restrictions in the non-drinking water areas are expected to remain in place for over 100 years, and well restrictions to prevent the migration of contaminated groundwater from the non-drinking water areas of the Site to the downgradient drinking water aquifer (Bungay River Water Resource Protection District) are expected to remain until groundwater cleanup levels are achieved. It is anticipated that the selected remedy will also provide socioeconomic and community revitalization impacts such as increased property values and enhanced human uses of ecological receptors.

The effectiveness of the remedy will be determined based upon attainment of the cleanup levels (performance standards) outlined in **Table L-Eco1** and **Tables L-1** to **L-6**, as well as any additional Site-related COCs added through subsequent decision documents. A monitoring program will be implemented in order to evaluate remedy performance and progress towards attainment. The details of the monitoring program will be established during the remedial design phase and will include preparation of a long-term monitoring plan. Monitoring scope and frequency could change over time based on technical analysis of the remedy, optimization studies, revised conceptual site model, or other information, as determined by EPA.

After all soil, groundwater, and surface water cleanup levels (as shown in **Table L-Eco1** and **Tables L-1** to **L-6)** have been met, EPA will perform a risk evaluation which considers additive risk from remaining COCs considering all potential routes of exposure to document the residual risk based on exposure to soil, groundwater, and/or surface water. The residual risk evaluation will document the potential risk

[14] Approximately 50% of the soil to be excavated at the W&L Property is estimated to be State-regulated characteristic hazardous waste, and 50% of the soil as non-hazardous waste.

associated with the concentrations of the COCs remaining in soil, groundwater, and/or surface water at the Site (if detected).

Cleanup Levels

Cleanup levels were developed for the COCs identified in the human health and ecological risk assessments. COCs are the chemicals found at the Site that, based on the results of the risk assessment, were determined to pose an ILCR greater than 1 in 1 million or an HI greater than 1. COCs were identified for exposure areas that posed a) a cancer risk in excess of an ILCR of 10^{-4}, b) an HI greater than 1, c) a child blood lead level greater than 5 µg/dL in more than 5% of the population exposed, or d) a significant ecological risk.

a) Soil Cleanup Levels

Human health risk-based soil cleanup levels were developed in Appendix B of the FS (AECOM, 2019d) for a residential exposure scenario, based on risks presented earlier in Section G of this ROD for the residential yards west of North Avenue and the W&L Property. EPA has determined that Institutional Controls will be used to prevent future residential use of the W&L Property and allow for commercial/industrial use.

Cleanup levels for COCs in surface and surface/subsurface soil exhibiting an unacceptable cancer or non-cancer risk have been established such that they are protective of human health. Risk-based remediation goals (RGs) were developed for soil associated with potential future cumulative cancer risks greater than 10^{-4} or target organ HIs greater than 1 considering the ingestion, dermal contact, and inhalation exposure pathways in a residential exposure scenario. For those soils, risk-based RG development was required for each chemical with an individual cancer risk above 10^{-6} or with an HQ above 1 (see Appendix B of the 2019 FS Report). These contaminants include lead in surface soil at the residential yards west of North Avenue and carcinogenic PAHs, antimony, arsenic, hexavalent chromium, cobalt, lead, and thallium for surface and surface/subsurface soil at the W&L Property.

The human health risk-based PRGs provided in Appendix B of the 2019 FS Report and adopted as the final RGs identified in this ROD correspond to target cancer risk levels of 10^{-6}, 10^{-5}, and 10^{-4} and a target non-cancer HQ of 1. For each of the contaminants, risk-based RGs were calculated using equations and exposure assumptions presented in baseline HHRA. Toxicity values used in the calculation of the risk-based RGs are presented in Section G of this ROD, while Appendix B of the 2019 FS Report presents the dermal absorption factors used during PRG development. An oral relative bioavailability factor of 0.6, recommended by EPA for evaluation of risks and calculation of RGs for arsenic in soil, has been applied for RG development.

Risk-based cleanup levels for soil correspond to a cancer risk level of 10^{-5} for carcinogenic PAHs, arsenic, and hexavalent chromium and a noncarcinogenic HQ of 1 for antimony, cobalt, and thallium. For lead, the IEUBK model was used to develop a cleanup level applicable for young children less than 7 years of age as the most sensitive receptor group. The lead cleanup level is protective of 95% of the sensitive population against blood lead levels in excess of 5 µg/dL. See Appendix B of the 2019 FS Report for further details concerning the model assumptions applied for the lead modeling.

The human health risk-based soil cleanup levels for each contaminant are summarized in **Tables L-2 and L-3** of this ROD. The cleanup levels are selected by considering risk-based PRGs and reference/background data.

The risk-based cleanup level for lead (**Table L-2**) must be met at the completion of the remedial action for surface soil at the residential yards west of North Avenue. Compliance with the cleanup level will be demonstrated through the collection and analysis of the soil for lead. This soil cleanup level attains EPA's risk management goal for remedial actions and has been determined by EPA to be protective of human health. Cleanup levels presented in **Table L-3** for surface and surface/subsurface soil at the W&L Property are for informational purposes only due to the use of Institutional Controls to prevent future residential use of the W&L Property.

b) Groundwater Cleanup Levels

Cleanup levels have been established for groundwater for all COCs identified in the baseline HHRA (for Site-wide residential potable water and construction worker shallow groundwater contact at the W&L Property) and in the 2019 FS (for Site-wide residential non-potable irrigation water) found to pose an unacceptable risk to human health. For the residential potable water scenario in the Bungay River Water Resource Protection District, the cleanup levels for most COCs in groundwater were selected based on federal Maximum Contaminant Levels (MCLs) or risk-based cleanup goals. For those COCs that do not have a federal or state ARAR at the time this ROD was developed, a risk-based cleanup level was calculated. For the Site-wide residential non-potable irrigation water and W&L Property construction worker scenarios, cleanup levels were risk-based. The selected cleanup levels are shown in **Tables L-4 through L-6** (see Appendix B of the 2019 FS Report for cleanup level development).

The cleanup levels in **Table L-4** are based on the residential potable water scenario for the Bungay River Water Resource Protection District evaluated in the baseline HHRA with potential future cumulative cancer risks greater than 10^{-4} or target organ HIs greater than 1 considering the ingestion, dermal contact, and inhalation exposure pathways.[15] Cleanup level development included each chemical with an individual cancer risk above 10^{-6} or with an HQ above 1. These cleanup levels were also developed as compliance monitoring standards for the areas of non-potable groundwater within the Site to assess the management of migration components of the remedy's ability to prevent Site contamination from migration into the downgradient Bungay River Water Resource Protection District.

As part of the 2019 FS, cleanup levels were also developed for a Site-wide non-potable irrigation scenario (**Table L-5**), assuming that groundwater, although not used for potable purposes, could be used in a non-potable manner (filling of swimming pools, watering lawns and gardens, washing cars, etc.) (see Appendix B of the 2019 FS Report for details concerning this scenario). Cleanup levels in **Table L-6** are based on a construction worker scenario evaluated in the baseline HHRA with potential future cumulative cancer risks greater than 10^{-4} or target organ HIs greater than 1 considering the ingestion and dermal contact exposure pathways for shallow groundwater on the W&L Property. For both scenarios, risk-based RG development was required for each chemical with an individual cancer risk above 10^{-6} or with an HQ above 1.

[15] The risk associated with the MCLs for arsenic and vinyl chloride fall outside (above) the Superfund risk range; however, EPA has determined that MCLs are protective values for drinking water.

The human health risk-based PRGs provided in Appendix B of the 2019 FS Report and adopted as the final RGs identified in this ROD correspond to target cancer risk levels of 10^{-6}, 10^{-5}, and 10^{-4} and a target non-cancer HQ of 1. For each of the contaminants, risk-based RGs were calculated using equations and exposure assumptions presented in the baseline HHRA (for the tap water and construction worker scenarios) or in Appendix B of the FS Report (for the irrigation water scenario). Toxicity values used in the calculation of the risk-based RGs are presented in Section G of this ROD.

Consistent with EPA's 1996 Final Ground Water Use and Value Determination Guidance, and EPA's endorsement of the State of Massachusetts' Comprehensive State Groundwater Protection Program (CSGWPP), MassDEP has developed a Use and Value Determination of the groundwater relative to the Site (MassDEP, 2017). The purpose of the Use and Value Determination was to identify whether the aquifer at the Site should be considered of "High," "Medium," or "Low" use and value. In the development of its Determination, MassDEP applied the criteria for groundwater classification as promulgated in the MCP. The classification contained in the MCP considers criteria similar to those recommended in the Use and Value Guidance. MassDEP determined that there is a "low" use and value for the groundwater within the Site. Therefore, EPA has selected risk-based cleanup levels based a non-potable irrigation scenario because Site groundwater is not considered a future potential drinking water source. However, MassDEP determined that groundwater within the downgradient Bungay River Water Resource Protection District was of "medium" use and value. Therefore, EPA has selected cleanup levels for the District based on federal and state drinking water standards.

c) Surface Water Cleanup Levels

<u>Human Health</u>

Surface water cleanup levels were developed in the FS Report (AECOM, 2019d) for a recreational user exposed to hexavalent chromium in Bliss Brook. The cleanup level for hexavalent chromium in surface water has been established such that it is protective of human health. The risk-based cleanup level was developed for surface water associated with potential current and future cumulative cancer risks greater than 10^{-4} considering the dermal contact exposure pathway in a recreational user wading exposure scenario.

The human health risk-based PRGs provided in Appendix B of the 2019 FS Report and adopted as the final RGs identified in this ROD correspond to target cancer risk levels of 10^{-6}, 10^{-5}, and 10^{-4} and a target non-cancer HQ of 1. Risk-based RGs were calculated using equations and exposure assumptions presented in the baseline HHRA. Toxicity values used in the calculation of the risk-based RGs are presented in Section G of this ROD, while the permeability coefficients used during PRG development are presented in Appendix B of the 2019 FS Report.

The human health risk-based surface water cleanup level is summarized in **Table L-1** of this ROD. The cleanup level is selected by considering the ARARs, risk-based RGs, and reference/background data. The human health-based cleanup level for hexavalent chromium in surface water corresponds to an ILCR of 10^{-5}. This cleanup level must be met at the completion of the remedial action in surface water in Bliss Brook. This surface water cleanup level attains EPA's risk management goal for remedial actions and has been determined by EPA to be protective of human health.

<u>Ecological</u>

This section summarizes PRG development, which are adopted as the final RGs identified in this ROD, for aquatic receptor ecological exposures to surface water in Bliss Brook. Supporting information is provided in Attachment B of Appendix B of the 2019 FS (AECOM, 2019d).

The BERA concludes with high confidence there is severe risk to aquatic receptors in Bliss Brook primarily from the exposure to hexavalent chromium in surface water, which represents a significant ecological risk. The evidence in the BERA included comparison of the COPC levels in surface water samples to the National Recommended Water Quality Criteria (NRWQC). The NRWQC include Criterion Continuous Concentration (CCC) and Criterion Maximum Concentration (CMC) values for each chemical, representing concentrations protective of aquatic life under acute and chronic exposures, respectively. In addition, laboratory toxicity testing was conducted to compare toxicity of site surface water samples to reference locations using the water flea (*Ceriodaphnia dubia*).

Both trivalent chromium and hexavalent chromium had exceedances of their reference values and at levels indicating, with high confidence, that adverse effects to aquatic receptors from exposure to Bliss Brook surface water are possible. Therefore, ecological RGs were developed for the Site to prevent exposure to surface water with site-related contaminant concentrations of trivalent chromium and hexavalent chromium that may present risks to ecological receptors.

Basis of Surface Water RGs

The Site-specific RGs were calculated based on the No Observed Effect Concentration (NOEC) and Lowest Observed Effect Concentration (LOEC) from the aquatic toxicity tests performed on samples from the Site. These values were compared with Site-specific water quality criteria (CCC and CMC) calculated using NRWQC methods described in the *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* (USEPA, 1985). The Site-specific values used toxicity studies selected to better represent species likely to be found within Bliss Brook. This comparison was performed to ensure that both lines of evidence used in the BERA for surface water risk were considered in PRG development.

Using the NRWQC methods and Site-appropriate toxicity studies, the following site-specific benchmarks were derived (Appendix D of the BERA; AECOM, 2019b) and are shown in comparison to NRWQC values:

<u>Trivalent Chromium</u>

Site-Specific CCC (chronic) = 10 µg/L	(NRWQC = 74 µg/L at 100 mg/L hardness)
Site-Specific CMC (acute) = 609 µg/L	(NRWQC = 570 µg/L at 100 mg/L hardness)

<u>Hexavalent Chromium</u>

Site-Specific CCC = 2 µg/L	(NRWQC = 11 µg/L)
Site-Specific CMC = 17 µg/L	(NRWQC = 16 µg/L)

These values are generally consistent with the results of the surface water toxicity tests from Bliss Brook. For trivalent chromium, the lower bounded value for the No Observed Effects Concentration (NOEC)

was 39 µg/L in sample SW-205 (the sample-specific hardness at SW-205 was 105 mg/L, which is comparable to the NRWQC-adjusted value). The lowest concentration of trivalent chromium observed in Bliss Brook with significant adverse effects was 174 µg/L; however, the effects observed in this sample are likely associated with the high concentration of hexavalent chromium in the samples. Since one site sample resulted with a NOEC of 39 µg/L, the value of the CCC of 10 µg/L derived from the site-specific calculations appears to be conservative.

For hexavalent chromium, the lower bounded value for the NOEC was 0.5 µg/L; and was observed in all of the samples with no effects. However, the next higher concentration was 132 µg/L; which serves as the Lowest Observed Effect Concentration (LOEC) and had 100% mortality of the test organisms. The gap in observed surface water hexavalent chromium between 0.5 and 132 µg/L results in a wide range in the upper and lower bounded concentrations from which a RG can be derived.

Although there is uncertainty surrounding each of the site NOEC and LOEC, if the geometric mean value is used to calculate a RG, similar values for RGs result from the site CCC and site CMC (see Table 1 of Attachment B in Appendix B of the FS). Therefore, the recommended PRGs for the site, consistent with data presented in the BERA, are represented by the geometric mean of the site NOEC and LOEC and results in surface water RGs for Bliss Brook of 82 µg/L for trivalent chromium, and 8 µg/L for hexavalent chromium (**Table L-Eco1**).

M. STATUTORY DETERMINATIONS

The remedial action selected for implementation at the Walton & Lonsbury Superfund Site is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, will comply will ARARs, and is cost-effective. In addition, the selected remedy utilizes permanent solutions and alternate treatment technologies or resource recovery technologies to the maximum extent practicable, and partially satisfies the statutory preference for treatment that permanently and significantly reduces the mobility, toxicity, or volume of hazardous substances as a principal element to the maximum extent practicable.

1. The Selected Remedy is Protective of Human Health and the Environment

The selected remedy will adequately protect human health and the environment by eliminating, reducing, or controlling exposures to human and environmental receptors through excavation, treatment, engineering controls, long-term monitoring, and institutional controls.

The selected remedy will reduce potential human health risk levels such that they do not exceed EPA's target risk range of a total excess lifetime cancer risk of 10^{-6} to 10^{-4} and/or a non-cancer Hazard Index greater than 1.0, or (for lead only) a target blood lead level greater than 5 µg/dL, and reduce potential adverse impacts to ecological receptors by surface water in Bliss Brook.

More specifically, for the source control component of the remedy, soil excavation at the W&L Property source area and *in-situ* soil blending of remaining contaminated soil with reactive media prior to backfilling with additional reactive media to provide soil and groundwater treatment will be protective of human health and the environment by preventing migration of the ongoing source of contamination to groundwater and eventual discharge to surface water at Bliss Brook. The mid-plume *in-situ* treatment

will treat the contaminated area of groundwater with high chlorinated VOC (e.g., TCE) concentrations in addition to hexavalent chromium. Soil excavation and off-site disposal at residential yards west of North Avenue will eliminate the threat to human health from residential exposure to surface soil contamination. Long-term monitoring of groundwater, surface water, and the vapor intrusion pathway will ensure the remedy remains protective until cleanup levels are met. Institutional Controls are necessary to: prohibit future residential use at the W&L Property; prevent future construction worker exposure to groundwater contamination at the W&L Property until groundwater cleanup levels are achieved; prevent contact with contaminated groundwater and the installation of non-drinking water wells (i.e. irrigation wells) across the extent of the Site-wide groundwater plume where non-drinking water scenario cleanup levels for residential groundwater are exceeded and/or which may cause migration of the contaminated plume until groundwater cleanup levels are achieved; prevent the installation of wells within the potentially impacted portion of the Bungay River Water Resource Protection District to prevent plume migration from the contaminated non-drinking water area into the District; prevent disturbance to the existing engineered cover system and PRB, and any new remedy infrastructure components; prevent contact with soil beneath the existing engineered cover system adjacent to Bliss Brook; and require either a vapor intrusion evaluation or vapor mitigation system be installed if a new building is constructed over the shallow groundwater VOC plume (within or to the downgradient area of the former building on the W&L Property) until groundwater cleanup levels are achieved.

2. The Selected Remedy Complies with ARARs

The selected remedy will comply will all federal and any more stringent state ARARs identified for the Site. The selected remedy will also incorporate procedures and processes identified by a number of policies, advisories, criteria, and guidance documents (To Be Considered). A detailed list of ARARs/To Be Considered requirements for the selected remedy is included in Appendix D of this ROD. A discussion of the more significant ARAR issues is include below.

Wetlands Impacts

Issuance of the ROD embodies specific ARARs determinations made by EPA, pursuant to federal regulatory standards. More specifically, as defined by Section 404(b) of the Clean Water Act and regulations promulgated under the Act at 40 C.F.R. Parts 230, 231, and 33 C.F.R. Parts 320-323, EPA has determined, with issuance of this ROD, that the selected remedial action is the Least Environmentally Damaging Practicable Alternative for protecting federal jurisdictional wetlands and aquatic ecosystems at the Site under these standards. The selected remedy provides the best balance of addressing contaminated soil adjacent to wetlands and waterways with minimizing both temporary and permanent alteration of wetlands. EPA will minimize potential harm and avoid adverse impacts to wetlands by using Best Management Practices (BMPs) during excavation to minimize harmful impacts on the wetlands, wildlife, or habitat, and by restoring these areas consistent with federal and state wetlands protections laws. Any wetlands affected by remedial work will be restored to its original condition as a wetland area if practicable, or a new wetland area created within the same vicinity and any restoration or replacement efforts will be monitored over time. Mitigation measures will be used to protect wildlife and aquatic life during remediation, as necessary.

In compliance with standards with relevant and appropriate Wetland Protection and Floodplain Management regulations (44 C.F.R. Part 9), EPA solicited public comment through the Proposed Plan on the proposed cleanup's impacts on wetland resources within the Proposed Plan. EPA's responses to

general comments regarding wetland issues are located in Part 3, The Responsiveness Summary, of this ROD.

Floodplain Impacts

Further, EPA solicited public comment, under 44 C.F.R. Part 9, through the Proposed Plan, on its determination that there is no practicable alternative to temporarily occupy and/or temporarily modify portions of the floodplains within the Site in order to implement the proposed cleanup plan. To address remedial measures that may affect floodplain resources, waste located within the floodplain will be excavated and backfilled with clean fill and then restored to its original grade so that the current flood storage capacity of these areas and any adjacent wetlands will not be diminished after completion of the proposed remedial actions. BMPs will be used during construction, which include erosion control measures, proper re-grading, and restoration and monitoring of impacted areas. EPA's responses to general comments regarding floodplain issues are located in Part 3, The Responsiveness Summary, of this ROD.

National Historic Preservation Act, Section 106

The National Historic Preservation Act, and the state equivalent law, require that prior to work taking place, a federal agency consider the effects of its undertaking on historic properties. EPA must consult with the state historic preservation officer (SHPO) as well as any interested tribal historic preservation officers (THPO) in making determinations and findings concerning the effects of its undertakings on historic property.

EPA initiated consultation with the Massachusetts Historical Commission (SHPO); the Mashpee Wampanoag Tribe (THPO); and the Wampanoag Tribe of Gay Head (Aquinnah) (THPO), in 2014. At that time, EPA identified one property at the Site, the Capron House, as having historic significance and was added to the National Register of Historic Places in 1978. EPA is not currently aware of any other historic or potentially historic properties or cultural resources that could be on or in close proximity to the Site. EPA will continue to consult with the SHPO and THPOs during the remedial design to determine whether implementation of the remedy will adversely impact historic or cultural resources eligible for, or already listed on, the National Register of Historic Places. If any such adverse impacts cannot be avoided, EPA will work with the SHPO and THPOs to develop a set of activities to mitigate those impacts, which will be memorialized in a Memorandum of Agreement between the parties.

3. The Selected Remedy is Cost-Effective

In EPA's judgement, the selected remedy is cost-effective because the remedy costs are proportional to its overall effectiveness (see 40 C.F.R. 300.430(f)(1)(ii)(D)). This determination was made by evaluating the overall effectiveness of those alternatives that satisfied the threshold criteria (i.e., that are protective of human health and the environment and comply with all federal and any more stringent ARARs, or as appropriate, waive ARARs). Overall effectiveness was evaluated by assessing three of the five balancing criteria—long-term effectiveness and permanence; reduction in toxicity, mobility, or volume through treatment; and short-term effectiveness, in combination. The overall effectiveness of each alternative then was compared to the alternative's cost to determine cost-effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence represents a reasonable value for the money to be spent.

The estimated present worth cost of the three components that comprise the selected remedy is approximately $22 million. The range in estimated cost for the two soil in residential yards alternatives is $0 (SL-1: No Action) to $422,000 (SL-3: Soil Excavation and Off-site Disposal). The range in estimated cost for the five groundwater/surface alternatives is $0 (GW/SW-1: No Action) to $19.4 million (GW/SW-2b). Although the GW/SW-3b alternative has the highest estimated capital costs of the five GW/SW alternatives evaluated, both the estimated annual O&M and the estimated total net present worth costs are less than the GW/SW-2a and -2b alternatives (pump and treat). The added cost (approximately $0.9 million) associated with the mid-plume treatment component of the GW/SW-3b alternative overall is relatively low compared to the total GW/SW alternative costs, and will provide additional treatment at the most heavily-contaminated area within the hexavalent chromium and chlorinated VOC groundwater plumes. The range in estimated cost for the five bedrock groundwater alternatives is $0 (BR-1: No Action) to $4.4 million (BR-2, BR-3, BR-4, and BR-5 all cost the same). However, if the contingency remedy is implemented, BR-4 (Pump and Treat contingency) is approximately $7.5 million.

Table 1 helps demonstrate the cost-effectiveness of the selected soil, groundwater/surface water, and bedrock groundwater remedies.

4. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable

Once the Agency identified those alternatives that attain or, as appropriate, waive ARARs and that are protective of human health and the environment, EPA identified which alternative utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination was made by deciding which one of the identified alternatives provides the best balance of trade-offs among alternatives in terms of: 1) long-term effectiveness and permanence; 2) reduction of toxicity, mobility, or volume through treatment; 3) short-term effectiveness; 4) implementability; 5) cost. The balancing test emphasized long-term effectiveness and permanence and the reduction of toxicity, mobility, or volume through treatment; and considered the preference for treatment as a principal element, the bias against off-site land disposal of untreated waste, and community and state acceptance. The selected remedy provides the best balance of trade-offs among the alternatives.

The selected remedy is protective of human health and the environment, uses proven cleanup technologies such as excavation, off-site disposal, treatment, and institutional controls, and is cost-effective, while achieving the Site-specific cleanup objectives in a reasonable timeframe. This cleanup approach provides both short- and long-term protection of human health and the environment; attains all applicable or relevant and appropriate federal and state environmental laws and regulations; reduces the toxicity, mobility, or volume of contaminated soil, groundwater, and surface water through treatment, to the maximum extent practicable; utilizes permanent solutions and uses land use restrictions to prevent unacceptable exposures in the future to the contaminants that will remain at the Site.

5. The Selected Remedy Partially Satisfies the Preference for Treatment Which Permanently and Significantly Reduces the Toxicity, Mobility, or Volume of the Hazardous Substances as a Principal Element

The principal elements of the selected remedy are source control and management migration. The remedy includes groundwater treatment through *in-situ treatment* with reactive media and through the use

of an extended PRB to intercept and treat contaminated groundwater before it discharges to Bliss Brook. If the bedrock contingency remedy is implemented, additional bedrock groundwater *in-situ* treatment with reactive media will be added to the remedy to prevent migration of groundwater contaminants into the Bungay River Water Resource Protection District.

6. Five-Year Reviews of the Selected Remedy are Required

At the conclusion of the remedy construction, hazardous substances, pollutants or contaminants will remain at the Site. Therefore, as required by law, EPA will review the Site remedy to ensure that the remedial action continues to protect human health and the environment at least once every five years as part of the Agency's five-year reviews for the entire Site. These five-year reviews will evaluate the components of the Site remedy for as long as contaminated media above CERCLA risk levels remain in place.

N. DOCUMENTATION OF NO SIGNIFICANT CHANGES

EPA presented the Walton & Lonsbury Proposed Plan for remediation of the Site to the public for review and comment on July 31, 2019. The Plan described the alternatives considered and EPA's preferred alternatives for the selected remedy.

The preferred alternatives included: soil excavation and off-site disposal at residential yards west of North Avenue; soil excavation and off-site disposal at the W&L Property; *in-situ* soil treatment at the W&L Property; mid-plume *in-situ* treatment; extension of the existing PRB; long-term monitoring of groundwater, surface water, and the vapor intrusion pathway; operation and maintenance of existing SSDSs, the existing engineered cover system and PRB, and any new remedy infrastructure components; wetland/floodplain habitat restoration or replication if necessary; Institutional Controls to: prohibit future residential use at the W&L Property, prevent future construction worker exposure to groundwater contamination at the W&L Property until groundwater cleanup levels are achieved, prevent contact with contaminated groundwater and the installation of non-drinking water wells (i.e. irrigation wells) across the extent of the Site-wide groundwater plume where non-drinking water scenario cleanup levels for residential groundwater are exceeded and/or which may cause migration of the contaminated plume until groundwater cleanup levels are achieved, prevent the installation of wells within the potentially impacted portion of the Bungay River Water Resource Protection District to prevent plume migration from the contaminated non-drinking water area into the District, prevent disturbance to the existing engineered cover system and PRB, and any new remedy infrastructure components, prevent contact with soil beneath the existing engineered cover system adjacent to Bliss Brook, and require either a vapor intrusion evaluation or vapor mitigation system be installed if a new building is constructed over the shallow groundwater VOC plume (within or to the downgradient area of the former building on the W&L Property) until groundwater cleanup levels are achieved; and five-year reviews to ensure the remedy remains protective of human health and the environment.

EPA reviewed all hand-delivered, written, and verbal comments submitted during the public comment period, which began on July 26, 2019, and ended on August 26, 2019. Based upon a review of the comments, EPA determined that no significant changes to the remedy, as originally identified in the July 2019 Proposed Plan, were necessary.

On September 3, 2019, after the Proposed Plan was issued, EPA approved a Request for Removal Action (Action Memorandum) which authorized EPA's CERCLA Emergency Planning and Response Branch ("Removal Program") to conduct a cleanup of the lead-impacted residential yards, also addressed by this ROD. This action was taken, in parallel to the remedial measures developed to address the soil in residential yards through this ROD, as a means to expedite the removal of lead contamination from the residential yards. EPA's Removal Program will excavate and dispose off-site contaminated soil exceeding the remediation goal for lead as adopted in this ROD at seven residential properties. The Removal Action at the residential yards will be conducted consistent with the remedial measures selected in this ROD and will, to the maximum extent practicable considering the exigencies of the situation, attain ARARs. Once the removal action is completed, EPA will document that all remedial measures for the area required by this ROD have been achieved.

EPA is clarifying the change of the selected irrigation well groundwater PRG developed in the July 2019 FS and proposed in the July 2019 Proposed Plan from 100 µg/L hexavalent chromium to the adopted and final RG in this ROD of 31 µg/L hexavalent chromium. This RG is based on an ILCR on the order of 10^{-4} and is within the EPA acceptable cancer risk range of 10^{-6} to 10^{-4}.

EPA is also clarifying the determination in the July 2019 Proposed Plan that significantly-contaminated soil within the source area (the former W&L facility footprint and area just to the south) acting as a continuing source of contamination to groundwater does not constitute as principal threat waste. In addition, EPA has determined that low-level threat waste exists beneath the existing engineered cover system located behind residential properties along Paulette Lane and North Avenue.

O. STATE ROLE

The Commonwealth of Massachusetts, through MassDEP concurs with the selected remedy for the Site. A copy of the declaration of MassDEP's concurrence is attached as Appendix A of this ROD.

PART 3 – THE RESPONSIVENESS SUMMARY

A. PUBLIC COMMENTS AND EPA RESPONSES

EPA published the notice of availability of the Proposed Plan and Administrative Record in the Attleboro Sun Chronicle on July 25, 2019, and released the Proposed Plan to the public by posting a publicly accessible link on EPA's website. In addition, EPA provided the Proposed Plan to the Attleboro Public Library located at 74 North Main Street, Attleboro, MA.

From July 26, 2019 through August 26, 2019, EPA held a thirty-day public comment period to accept public comments on the alternatives presented in the Feasibility Study and Proposed Plan, and on any other documents previously released to the public. On July 31, 2019, EPA held a public informational meeting, immediately followed by a Public Hearing, to describe EPA's Proposed Plan and to accept any oral or written comments. The meeting was held at the Attleboro Public Library, 74 North Main Street, Attleboro, MA.

One comment was received during the Public Hearing from a local elected official and one comment was received from an Attleboro resident in writing during the public comment period. The full text of both the written and oral comments received during the comment period has been included in the Administrative Record for the Site.

Comment Received at the July 31, 2019 Public Hearing

Comment #1:

Attleboro City Official Comment:

During the July 31, 2019 Public Hearing, an Attleboro City Official asked that EPA consider preparing a communication plan as a component of the proposed plan, whereby EPA would communicate to the residents affected and inform them in advance of new information being posted on a website. The commenter also stated that residents should be informed at an equal level as the Attleboro Health Department and local officials and that he realizes that there may be additional costs for the communication plan.

EPA Response:

EPA considers community involvement to be an important component of the Superfund cleanup process and site-specific community involvement plans are developed and implemented for each site, including the Walton & Lonsbury Site. EPA typically tailors the scope of the community involvement plans to the level of community interest in the site and the stage of the cleanup process. The community involvement plans are also considered "living" documents and are updated or reviewed as site conditions and community needs and concerns change. EPA will take into consideration this request for enhanced communication by providing timely and periodic updates as part of the community involvement plan for the Walton & Lonsbury Site.

Comment Received in Writing during the Public Comment Period

Comment #2

Local Resident Comment:

A local resident of Attleboro commented that he thinks the best use for the Walton & Lonsbury Property after the cleanup is for it to become an apartment and possibly also a retail complex and asked that EPA consider the suggestion along with input from the mayor and city council. The commenter cited the need for reasonably-priced, subsidized housing. The commenter also stated that some efforts are being made to bring back or have new businesses in the area, which had vanished with opening of the Emerald Square shopping mall.

EPA Response:

The Baseline Human Health Risk Assessment for the Walton & Lonsbury Site determined that an unacceptable risk to hypothetical future residents at the Walton & Lonsbury Property exists from direct exposure to certain contaminants in soil and groundwater. The Walton & Lonsbury Property is current zoned for industrial use based on zoning information from the City of Attleboro. Based on EPA discussions with the City during the development of cleanup alternatives, the City indicated that there are currently no plans to change the zoning designation. Further, a portion of the Walton & Lonsbury Property is leased to a tenant and is actively used for commercial purposes. Since residential use was not a current or reasonably anticipated future use of the Walton & Lonsbury Property, alternatives that would remediate the Property to allow for residential use were eliminated from consideration in the Feasibility Study following initial cleanup alternative development. The proposed cleanup plan and the final selected remedy documented in this ROD will allow for future industrial/commercial use of the Walton & Lonsbury Property but also includes Institutional Controls to prohibit future residential use of the Property.

It is expected that a Notice of Activity and Use Limitation, pursuant to Massachusetts regulatory standards, will be placed on the Walton & Lonsbury Property that will restrict residential use of the Site, but establishes procedures for an applicant to apply to the State and EPA for a change in use if contaminant risk is assessed and addressed by the project proponent, consistent with CERCLA.

Appendices

Appendix A

Massachusetts Department of Environmental Protection

Letter of Concurrence

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
One Winter Street Boston, MA 02108 • 617-292-5500

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Kathleen A. Theoharides
Secretary

Martin Suuberg
Commissioner

September 30, 2019

Mr. Bryan Olson
Superfund and Emergency Management Division
Office of Site Remediation and Restoration
U.S. Environmental Protection Agency
5 Post Office Square
Boston, MA 02109

Re: State Concurrence Determination
Record of Decision – Walton & Lonsbury Superfund Site
Attleboro, MA

Dear Mr. Olson:

The Massachusetts Department of Environmental Protection (MassDEP) has reviewed the final Record of Decision dated September, 2019 (ROD) for the Walton & Lonsbury Superfund Site in Attleboro, MA. The U.S. Environmental Protection Agency (EPA) is requesting state concurrence with the selected remedy as presented in the ROD.

Walton & Lonsbury conducted electroplating operations from 1940s to 2007. During this period wastes products were discharged to the environment by direct discharge to wetlands, to the ground surface and subsurface, and to the air through ventilation emissions. As a result, site contaminants are present in soils, sediments, surface water, and groundwater.

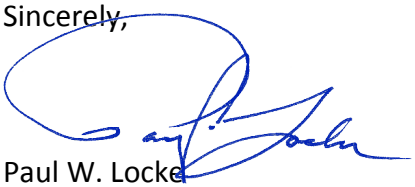
EPA completed a human health and an ecological risk assessment in 2019 and determined that actionable risks are present for current and future populations exposed to contaminated soils, surface water, and groundwater. EPA also completed a feasibility study in 2019 that evaluated remedial alternatives to reduce the identified risks. In summary, the selected remedy includes a combination of source soil removal, in-situ groundwater treatment, institutional controls, monitoring and maintenance, and periodic evaluations of the effectiveness of the selected remedy every five years.

The ROD includes a contingency plan for the bedrock groundwater remedy (BR-3). Existing data suggests that site contaminants in the bedrock aquifer have migrated southeast beyond Bliss Brook toward the Bungay River Water Resource Protection District. However, there is no clear evidence the groundwater in the protection district is impacted. The protection district was identified by MassDEP as a potential future water supply in the Groundwater Use and Value Determination. Under this remedy, EPA will initiate a pre-design investigation to determine the horizontal extent of site contaminants beyond Bliss Brook. Depending on the results, the contingency may be implemented. The ROD appropriately does not specify in detail what will trigger the contingency plan as that decision will be multifaceted. Since the protection district is an important resource of the Commonwealth, MassDEP anticipates EPA will consult it when deciding whether implement the contingency plan.

The Department has determined that the selected remedy is a comprehensive approach to address the actionable risks identified in the human health and ecological risks assessments and will be protection of human health and the environment. The Massachusetts Department of Environmental Protection concurs with the selected remedy.

Please direct any questions you may have regarding this concurrence to David Buckley, Project Manager at 617-556-1184.

Sincerely,



Paul W. Locke
Assistant Commissioner
MassDEP Bureau of Waste Site Cleanup

Cc. David Buckley, MassDEP
Diane Baxter, MassDEP
Ethan Finkel, USEPA

Appendix B

Tables

Table 1
Comparative Analysis of Remedial Alternatives

ALTERNATIVES BY MEDIUM	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness	Implementability	COSTS[1]			
							Capital Cost	Periodic Cost	Annual O&M Cost	Total (Net Present Value)
SOIL IN RESIDENTIAL YARDS										
Alternative SL-1: No Action	□	□	♦	N/A	♦♦♦	♦♦♦	$0	$0	$0	$0
Alternative SL-3: Soil Excavation on Residential Yards with Off-Site Disposal	■	■	♦♦♦	♦♦♦	♦♦	♦♦	$422,000	$0	$0	$422,000
OVERBURDEN GROUNDWATER AND SURFACE WATER										
Alternative GW/SW-1: No Action	□	□	♦	N/A	♦♦♦	♦♦♦	$0	$0	$0	$0
Alternative GW/SW-2a: Source Area Soil Removal with In-Situ Soil Treatment and Groundwater Pump and Treat	■	■	♦♦	♦♦♦	♦♦	♦♦	$9,234,000	$177,000	$342,000	$18,611,000
Alternative GW/SW-2b: Source Area Soil Removal with In- Situ Soil Treatment and Groundwater Pump and Treat with Mid-Plume Treatment	■	■	♦♦	♦♦♦	♦♦	♦♦	$9,947,000	$177,000	$342,000	$19,325,000
Alternative GW/SW-3a: Source Area Soil Removal with In- Situ Soil Treatment and Extension of Permeable Reactive Barrier	■	■	♦♦♦	♦♦♦	♦♦	♦♦	$11,151,000	$177,000	$161,000	$15,667,000
Alternative GW/SW-3b: Source Area Soil Removal with In- Situ Soil Treatment and Extension of Permeable Reactive Barrier with Mid-Plume Treatment	■	■	♦♦♦	♦♦♦	♦♦	♦♦	$12,572,000	$177,000	$161,000	$16,573,000
BEDROCK GROUNDWATER										
Alternative BR-1: No Action	□	□	♦	N/A	♦♦♦	♦♦♦	$0	$0	$0	$0
Alternative BR-2: Institutional Controls	■	■	♦♦	♦	♦♦♦	♦♦♦	$963,000	$74,000	$124,000	$4,379,000
Alternative BR-3: Institutional Controls (with Contingency for Focused In-Situ Injections West of North Avenue)[2]	■	■	♦♦	♦♦♦	♦♦	♦	$963,000	$74,000	$124,000	$4,379,000
							$608,000	$360,000	$0	$927,000
Alternative BR-4: Institutional Controls (with Contingency for Pump and Treat)[2]	■	■	♦♦	♦♦♦	♦♦	♦♦	$963,000	$74,000	$124,000	$4,379,000
							$569,000	$0	$97,000	$3,197,000
Alternative BR-5: Institutional Controls (with Contingency for Enhanced [Deeper] Permeable Reactive Barrier)[2]	■	■	♦♦	♦♦♦	♦♦	♦	$963,000	$74,000	$124,000	$4,379,000
							$700,000	$360,000	$0	$1,019,000

Notes:

□ Fails ♦ Lowest (least favorable) ♦♦ Medium ♦♦♦ Highest (most favorable)

■ Passes

[1] Rounded to the nearest $1,000. Periodic cost presented is total, not Net Present Value (NPV). Annual O&M cost presented is total O&M cost for one year, not NPV. Total cost presented is the sum of capital cost, NPV of periodic cost for 30 years, and NPV of annual O&M cost for 30 years.

[2] Costs for the initial and contingency portions of Alternatives BR-3, BR-4, and BR-5 are presented separately.

Table G-1

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure (1)
		Minimum	Maximum					
Bliss Brook								
	Chromium, Hexavalent	3.7E-01	2.2E+02	µg/L	24/28	9.9E+01	µg/L	95% UCL

Key

(1) Statistics: Maximum Detected Value (Max); 95% UCL (95% UCL); Arithmetic Mean (Mean)

ug/L - microgram per liter

The table represents the current/future chemical of concern (COC) and exposure point concentration (EPC) for the COC detected in surface water at Bliss Brook (i.e., the concentration that will be used to estimate the exposure and risk for the COC in surface water). The table includes the range of concentrations detected for the COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC, and how the EPC was derived. This table indicates that hexavalent chromium is the only COC in surface water at Bliss Brook. The 95% UCL on the arithmetic mean was used as the EPC for the COC.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-2

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Current/Future

Medium: Soil

Exposure Medium: Floodplain Surface Soil (0-2 ft)

Exposure Point	Chemical of Concern	Concentration Detected (2)		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure (1)
		Minimum	Maximum					
Residential Yards West of North Avenue								
	Lead	5.6E+01	7.1E+02	mg/kg	12/12	2.7E+02	mg/kg	Mean

Key

(1) Statistics: Maximum Detected Value (Max); 95% UCL (95% UCL); Arithmetic Mean (Mean)

(2) Soil samples were sieved to create a fine fraction (less than 150 micrometer particle size). The analytical results presented are the lead concentrations in the fine fraction.

The table represents the current/future chemical of concern (COC) and exposure point concentration (EPC) for each of the COCs detected in surface soil in the Residential Yards west of North Avenue (i.e., the concentration that will be used to estimate the exposure and risk for the COC in surface soil). The table includes the range of concentrations detected for the COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC, and how the EPC was derived. This table indicates that lead is the only COC in surface soil in the Residential Yards west of North Avenue. The arithmetic mean concentration was used as the EPC for lead.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-3

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future

Medium: Soil

Exposure Medium: Upland/Floodplain Surface Soil (0-2 ft)

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum	Maximum					(1)
W&L Property								
	Benzo(a)pyrene	1.3E-02	9.7E+00	mg/kg	27/71	1.4E+00	mg/kg	95% UCL
	Antimony	1.2E-01	1.5E+03	mg/kg	23/72	1.3E+02	mg/kg	95% UCL
	Arsenic	4.7E-01	9.4E+00	mg/kg	70/72	3.1E+00	mg/kg	95% UCL
	Chromium, Hexavalent	2.5E-01	3.3E+02	mg/kg	30/46	5.9E+01	mg/kg	95% UCL
	Thallium	2.1E+00	2.1E+00	mg/kg	1/72	2.1E+00	mg/kg	Max

Key

(1) Statistics: Maximum Detected Value (Max); 95% UCL (95% UCL); Arithmetic Mean (Mean)

The table represents the future chemicals of concern (COCs) and exposure point concentrations (EPCs) for each of the COCs detected in surface soil at the W&L Property (i.e., the concentrations that will be used to estimate the exposure and risk for each COC in surface soil). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC, and how the EPC was derived. This table indicates that: benzo(a)pyrene, antimony, arsenic, hexavalent chromium, and thallium are the only COCs in surface soil at the W&L Property. The 95% UCL on the arithmetic mean was used as the EPC for all COCs except for thallium, for which the maximum detected concentration was used as EPC. Note that the baseline human health risk assessment (HHRA) showed benzo(b)fluoranthene as a COC for surface soil. However, the toxicity value used in the baseline HHRA was incorrect and benzo(b)fluoranthene is no longer listed as a COC for surface soil.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-4

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future

Medium: Soil

Exposure Medium: Upland/Floodplain Surface/Subsurface Soil (0-10 ft)

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure (1)
		Minimum	Maximum					
W&L Property								
	Benzo(a)anthracene	1.2E-02	4.1E+01	mg/kg	34/106	2.8E+00	mg/kg	95% UCL
	Benzo(a)pyrene	1.3E-02	3.4E+01	mg/kg	35/106	2.3E+00	mg/kg	95% UCL
	Benzo(b)fluoranthene	1.9E-03	3.6E+01	mg/kg	34/106	2.4E+00	mg/kg	95% UCL
	Dibenz(a,h)anthracene	3.9E-02	1.0E+01	mg/kg	12/106	5.8E-01	mg/kg	95% UCL
	Antimony	1.20E-01	1.5E+03	mg/kg	27/107	8.5E+01	mg/kg	95% UCL
	Arsenic	4.70E-01	9.4E+00	mg/kg	93/107	3.2E+00	mg/kg	95% UCL
	Chromium, Hexavalent	1.30E-01	4.7E+02	mg/kg	58/81	1.0E+02	mg/kg	95% UCL
	Cobalt	1.4E+00	2.7E+03	mg/kg	104/107	1.5E+02	mg/kg	95% UCL
	Lead	2.7E+00	3.1E+03	mg/kg	107/107	2.1E+02	mg/kg	Mean

Key

(1) Statistics: Maximum Detected Value (Max); 95% UCL (95% UCL); Arithmetic Mean (Mean)

The table represents the future chemicals of concern (COCs) and exposure point concentrations (EPCs) for the COCs detected in surface/subsurface soil at the W&L Property (i.e., the concentrations that will be used to estimate the exposure and risk for each COC in surface/subsurface soil). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC, and how the EPC was derived. This table indicates that benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, antimony, arsenic, hexavalent chromium, cobalt and lead are the only COCs in surface/subsurface soil at the W&L Property. The 95% UCL on the arithmetic mean was used as the EPC for all COCs except lead, for which the mean concentration was used as the EPC.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-5

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future

Medium: Groundwater

Exposure Medium: Tap Water

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum	Maximum					(1)
Site-Wide (center of the plume)								
	Dichloroethane, 1,1-	1.3E-01	1.7E+03	µg/L	21/23	4.7E+02	µg/L	95% UCL
	Dichloroethene, cis-1,2-	7.9E-01	7.9E+02	µg/L	23/23	3.1E+02	µg/L	95% UCL
	Trichloroethylene	5.5E+00	1.3E+03	µg/L	23/23	4.0E+02	µg/L	95% UCL
	Vinyl Chloride	3.8E-02	3.3E+01	µg/L	21/23	1.1E+01	µg/L	95% UCL
	1,4-Dioxane	3.7E-02	2.3E+01	µg/L	12/12	1.3E+01	µg/L	95% UCL
	Arsenic	1.1E-01	1.3E+01	µg/L	17/28	3.8E+00	µg/L	95% UCL
	Chromium, Hexavalent	1.4E+01	8.3E+04	µg/L	27/27	2.6E+04	µg/L	95% UCL
	Cobalt	1.4E-01	3.9E+01	µg/L	22/28	1.2E+01	µg/L	95% UCL
	Lead [(2)]	1.3E-01	1.1E+02	µg/L	85/128		µg/L	
	Manganese	1.7E+01	2.1E+03	µg/L	28/28	7.3E+02	µg/L	95% UCL
W&L Property Shallow Groundwater								
	Chromium, Hexavalent	6.0E-01	3.7E+04	µg/L	9/13	3.7E+04	µg/L	Max

Key

(1) Statistics: Maximum Detected Value (Max); 95% UCL (95% UCL); Arithmetic Mean (Mean)

Multiple results from each on-site monitoring well were treated as discrete samples.

MCL - Maximum contaminant level.

(2) Though not quantitatively evaluated in the baseline HHRA, lead was identified as a potential future risk due to MCL exceedances.

The table represents the future chemicals of concern (COCs) and exposure point concentrations (EPCs) for each of the COCs detected in site-wide groundwater and W&L Property shallow groundwater (i.e., the concentrations that will be used to estimate the exposure and risk for each COC in site-wide and W&L Property shallow groundwater). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected), the EPC, and how the EPC was derived. This table indicates that the inorganic chemicals, arsenic, hexavalent chromium, cobalt, lead, and manganese, and the organic chemicals, 1,1-dichloroethane, cis-1,2-dichloroethene, trichloroethylene, vinyl chloride, and 1,4-dioxane are the most frequently detected COCs in site-wide and shallow groundwater. The 95% UCL concentration, identified assuming multiple results from each monitoring well were treated as discrete samples, was used as the EPC for each of the COCs detected in groundwater, except for hexavalent chromium in shallow groundwater, for which the maximum detected concentration was used.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-6

Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal

Chemical of Concern	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/Cancer Guideline Description	Source	Date (1) (MM/DD/YYYY)
Dichloroethane, 1,1-	5.7E-03	5.7E-03	$(mg/kg\text{-}day)^{-1}$	C	CalEPA	07/24/19
Dichloroethene, cis-1,2-	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	IRIS	07/24/19
Trichloroethylene	4.6E-02	4.6E-02	$(mg/kg\text{-}day)^{-1}$	Carcinogenic to humans	IRIS	07/24/19
Vinyl Chloride	7.2E-01	7.2E-01	$(mg/kg\text{-}day)^{-1}$	A	IRIS	07/24/19
Dioxane, 1,4-	1.0E-01	1.0E-01	$(mg/kg\text{-}day)^{-1}$	Likely	IRIS	07/24/19
Benzo(a)anthracene	1.0E-01	1.0E-01	$(mg/kg\text{-}day)^{-1}$	Carcinogenic to humans	IRIS	07/24/19
Benzo(a)pyrene	1.0E+00	1.0E+00	$(mg/kg\text{-}day)^{-1}$	Carcinogenic to humans	IRIS	07/24/19
Benzo(b)fluoranthene	1.0E-01	1.0E-01	$(mg/kg\text{-}day)^{-1}$	Carcinogenic to humans	IRIS	07/24/19
Dibenz(a,h)anthracene	1.0E+00	1.0E+00	$(mg/kg\text{-}day)^{-1}$	Carcinogenic to humans	IRIS	07/24/19
Antimony	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	PPRTV	07/24/19
Arsenic	1.5E+00	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	07/24/19
Chromium, Hexavalent	5.0E-01	2.0E+01	$(mg/kg\text{-}day)^{-1}$	N/A	NJDEP	07/24/19
Cobalt	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	Likely	PPRTV	07/24/19
Lead	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	07/24/19
Manganese	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	D	IRIS	07/24/19
Thallium	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	IRIS	07/24/19

Pathway: Inhalation

Chemical of Concern	Unit Risk	Units	Inhalation Cancer Slope Factor	Units	Weight of Evidence/Cancer Guideline Description	Source	Date (1) (MM/DD/YYYY)
Dichloroethane, 1,1-	1.6E-06	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	C	CalEPA	07/24/19
Dichloroethene, cis-1,2-	N/A	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	IRIS	07/24/19
Trichloroethylene	4.1E-06	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Carcinogenic to humans	IRIS	07/24/19
Vinyl Chloride	4.4E-06	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	A	IRIS	07/24/19
Dioxane, 1,4-	5.0E-06	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Likely to be carcinogenic to humans	IRIS	07/24/19
Benzo(a)anthracene	6.0E-05	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Carcinogenic to humans	IRIS	07/24/19
Benzo(a)pyrene	6.0E-04	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Carcinogenic to humans	IRIS	07/24/19
Benzo(b)fluoranthene	6.0E-05	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Carcinogenic to humans	IRIS	07/24/19
Dibenz(a,h)anthracene	6.0E-04	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Carcinogenic to humans	IRIS	07/24/19
Antimony	N/A	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	PPRTV	07/24/19
Arsenic	4.3E-03	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	A	IRIS	07/24/19
Chromium, Hexavalent	8.4E-02	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	N/A	NJDEP	07/24/19
Cobalt	9.0E-03	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Likely to be carcinogenic to humans	PPRTV	07/24/19
Lead	N/A	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	07/24/19
Manganese	N/A	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	D	IRIS	07/24/19
Thallium	N/A	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	IRIS	07/24/19

Key

N/A - No information available

IRIS: Integrated Risk Information System, U.S. EPA

PPRTV = Provisional Peer Reviewed Toxicity Value developed by STSC

NJDEP = New Jersey Department of Environmental Protection

CalEPA = California Environmental Protection Agency, Office of Environmental

EPA Group

A - Human carcinogen

B1 - Probable human carcinogen - Indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

Table G-6

Cancer Toxicity Data Summary

Health Hazard Assessment	D - Not classifiable as a human carcinogen
	E - Evidence of noncarcinogenicity

(1) Date indicates when source was last reviewed.

(2) The slope factor presented for trichloroethene is the adult-based value. For early-life exposures, tumor-specific slope factor values of 9.3E-03 $(mg/kg\text{-}day)^{-1}$ for kidney tumors and 3.7E-02 $(mg/kg\text{-}day)^{-1}$ for combined liver tumors and non-Hodgkins lymphoma (NHL) are used in conjunction with age-dependent adjustment factors, as appropriate.

The unit risk presented for trichloroethene is the adult-based value. For early-life exposures, tumor-specific unit risk values of 1E-06 $(\mu g/m^3)^{-1}$ for kidney tumors and 3.1E-06 $(\mu g/m^3)^{-1}$ for combined liver tumors and non-Hodgkins lymphoma (NHL) are used in conjunction with age-dependent adjustment factors, as appropriate.

Age-dependent adjustment factors are used in conjunction with toxicity values, as appropriate, for carcinogenic PAHs, hexavalent chromium, trichloroethene, and vinyl chloride.

This table provides the carcinogenic risk information which is relevant to the contaminants of concern in soil, surface water, and groundwater. At this time, slope factors are not available for the dermal route of exposure. Thus, the dermal slope factors used in this assessment have been extrapolated from oral values. An adjustment factor is sometimes applied, and is dependent upon how well the chemical is absorbed via the oral route. Adjustments are particularly important for chemicals with less than 50% absorption via the ingestion route. However, adjustment is not necessary for the chemicals evaluated at this site, except for hexavalent chromium which has an adjustment factor of 0.025. For the remaining chemicals, the same oral slope factors as presented above were used as the dermal carcinogenic slope factors for these contaminants. Eleven of the COCs considered carcinogenic via the inhalation route were determined to be primary risk drivers for at least one exposure pathway evaluated at the site. Note that the baseline human health risk assessment (HHRA) used an incorrect oral slope factor for benzo(b)fluoranthene. The correct oral slope factor is listed above.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-7

Non-Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal

Chemical of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Dermal RfD	Dermal RfD Units	Primary Target Organ	Combined Uncertainty / Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ [1] (MM/DD/YYYY)
Dichloroethane, 1,1-	Chronic	2.0E-01	mg/kg-day	2.0E-01	mg/kg-day	Kidney	3000	PPRTV	07/24/19
Dichloroethene, cis-1,2-	Chronic	2.0E-03	mg/kg-day	2.0E-03	mg/kg-day	Kidney	3000	IRIS	07/24/19
Trichloroethylene	Chronic	5.0E-04	mg/kg-day	5.0E-04	mg/kg-day	Cardiovascular/Developmental/Immune System	10 to 1000	IRIS	07/24/19
Vinyl Chloride	Chronic	3.0E-03	mg/kg-day	3.0E-03	mg/kg-day	Liver	30	IRIS	07/24/19
Dioxane, 1,4-	Chronic	3.0E-02	mg/kg-day	3.0E-02	mg/kg-day	Kidney/Liver	300	IRIS	07/24/19
Benzo(a)anthracene	Chronic	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A	07/24/19
Benzo(a)pyrene	Chronic	3.0E-04	mg/kg-day	3.0E-04	mg/kg-day	Developmental	3000	IRIS	07/24/19
Benzo(b)fluoranthene	Chronic	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A	07/24/19
Dibenz(a,h)anthracene	Chronic	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A	07/24/19
Antimony	Chronic	4.0E-04	mg/kg-day	6.0E-05	mg/kg-day	Blood	1000	IRIS	07/24/19
Arsenic	Chronic	3.0E-04	mg/kg-day	3.0E-04	mg/kg-day	Skin	3	IRIS	07/24/19
Chromium, Hexavalent	Chronic	3.0E-03	mg/kg-day	7.5E-05	mg/kg-day	Gastrointestinal	900	IRIS	07/24/19
Chromium, Hexavalent	Subchronic	5.0E-03	mg/kg-day	1.3E-04	mg/kg-day	Blood	100	ATSDR	07/24/19
Cobalt	Chronic	3.0E-04	mg/kg-day	3.0E-04	mg/kg-day	Endocrine System	3000	PPRTV	07/24/19
Lead	Chronic	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A	07/24/19
Manganese	Chronic	2.4E-02	mg/kg-day	9.6E-04	mg/kg-day	Nervous System	3	IRIS	07/24/19
Thallium	Chronic	1.0E-05	mg/kg-day	1.0E-05	mg/kg-day	Skin	3000	PPRTV	07/24/19

Table G-7

Non-Cancer Toxicity Data Summary

Pathway: Inhalation

Chemical of Concern	Chronic/ Subchronic	Inhalation RfC	Inhalation RfC Units	Inhalation RfD	Inhalation RfD Units	Primary Target Organ	Combined Uncertainty / Modifying Factors	Sources of RfC: RfD: Target Organ	Dates (MM/DD/YYYY)
Dichloroethane, 1,1-	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	07/24/19
Dichloroethene, cis-1,2-	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	07/24/19
Trichloroethylene	Chronic	2.0E-03	mg/m^3	N/A	N/A	Cardiovascular/Endocrine System	10 to 1000	IRIS	07/24/19
Vinyl Chloride	Chronic	1.0E-01	mg/m^3	N/A	N/A	Liver	30	IRIS	07/24/19
Dioxane, 1,4-	Chronic	3.0E-02	mg/m^3	N/A	N/A	Respiratory	1000	IRIS	07/24/19
Benzo(a)anthracene	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	07/24/19
Benzo(a)pyrene	Chronic	2.0E-06	mg/m^3	N/A	N/A	Developmental	3000	IRIS	07/24/19
Benzo(b)fluoranthene	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	07/24/19
Dibenz(a,h)anthracene	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	07/24/19
Antimony	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	07/24/19
Arsenic	Chronic	1.5E-05	mg/m^3	N/A	N/A	Developmental	30	CalEPA	07/24/19
Chromium, Hexavalent	Chronic	1.0E-04	mg/m^3	N/A	N/A	Respiratory	300	IRIS	07/24/19
Chromium, Hexavalent	Subchronic	3.0E-04	mg/m^3	N/A	N/A	Respiratory	30	ATSDR	07/24/19
Cobalt	Chronic	6.0E-06	mg/m^3	N/A	N/A	Respiratory	300	PPRTV	07/24/19
Lead	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	07/24/19
Manganese	Chronic	5.0E-05	mg/m^3	N/A	N/A	Nervous System	1000	IRIS	07/24/19
Thallium	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	07/24/19

Key

N/A - No information available

IRIS: Integrated Risk Information System, U.S. EPA

PPRTV = Provisional Peer Reviewed Toxicity Value developed by STSC

HEAST = Health Effects Assessment Summary Tables

CalEPA = California Environmental Protection Agency, Office of Environmental Health Hazard Assessment

ATSDR = Agency for Toxic Substances and Disease Registry

(1) Date indicates when source was last reviewed.

This table provides non-carcinogenic risk information which is relevant to the contaminants of concern in soil, surface water, and groundwater. Thirteen of the COCs have oral toxicity data (or surrogate toxicity data) indicating their potential for adverse non-carcinogenic health effects in humans. Chronic toxicity data available for the thirteen COCs for oral exposures have been used to develop chronic oral reference doses (RfDs), provided in this table. The available chronic toxicity data indicate that trichloroethene affects the immune system, 1,4-dioxane and vinyl chloride affect the liver, 1,1-dichloroethane, cis-1,2-dichloroethene, and 1,4-dioxane affect the kidney, manganese affects the central nervous system, trichloroethene and benzo(a)pyrene are developmental toxicants, hexavalent chromium affects the gastrointestinal system, antimony and hexavalent chromium affect the blood, cobalt affects the endocrine system, trichloroethylene affects the cardiovascular system, and arsenic and thallium affect the skin. Dermal RfDs are not available for any of the COCs. As was the case for the carcinogenic data, dermal RfDs can be extrapolated from oral RfDs by applying an adjustment factor as appropriate. Oral RfDs were adjusted for COCs with less than 50% absorption via the ingestion route (antimony, hexavalent chromium and manganese) to derive dermal RfDs for these COCs. Inhalation reference concentrations (RfCs) are available for nine COCs evaluated for the inhalation pathway.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-8

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Current/Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk					
				Ingestion	Inhalation	Dermal	External (Radiation)	Produce Ingestion	Exposure Routes Total
Surface Water	Surface Water	Bliss Brook	Chromium, Hexavalent	- -	- -	3E-04	- -	- - - -	3E-04
								Surface Water Risk Total =	3E-04
								Total Risk =	3E-04

Key

-- Route of exposure is not applicable to this medium.

This table provides risk estimates for the significant routes of exposure for the current/future young child and adult recreational user exposed to surface water at Bliss Brook. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about exposure to surface water by a young child and adult recreational user, as well as the toxicity of the COC (hexavalent chromium). The total risk from exposure to surface water for a future recreational user is estimated to be 3×10^{-4} (Bliss Brook surface water). The COC contributing to this risk level is hexavalaent chromium. This risk level indicates that if no clean-up action is taken, a young child and adult recreational user would have an increased probability of 3 in 10,000 (Bliss Brook surface water) of developing cancer as a result of site-related exposure to the COC in surface water. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-9

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Soil	Upland/Floodplain Surface Soil (0-2 ft)	W&L Property	Benzo(a)pyrene	9E-06	1E-10	3E-06	- -	1E-05
			Arsenic	4E-06	7E-10	6E-07	- -	5E-06
			Chromium, Hexavalent	2E-04	7E-07	N/A	- -	2E-04
							Surface Soil Risk Total =	2E-04
							Total Risk =	2E-04
Soil	Upland/Floodplain Surface/Subsurface Soil (0-10 ft)	Waton & Lonsbury Property	Benzo(a)anthracene	2E-06	2E-11	6E-07	- -	2E-06
			Benzo(a)pyrene	1E-05	2E-10	5E-06	- -	2E-05
			Benzo(b)fluoranthene	2E-06	2E-11	5E-07	- -	2E-06
			Dibenz(a,h)anthracene	4E-06	5E-11	1E-06	- -	5E-06
			Arsenic	4E-06	7E-10	6E-07	- -	5E-06
			Chromium, Hexavalent	3E-04	1E-06	N/A	- -	3E-04
							Surface/Subsurface Soil Risk Total =	4E-04
							Total Risk =	4E-04

Key

-- Route of exposure is not applicable to this medium.

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

This table provides risk estimates for the significant routes of exposure for the future young child and adult resident exposed to soil at the W&L Property. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of a young child's and adult's exposure to surface soil and surface/subsurface soil, as well as the toxicity of the COCs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, arsenic, and hexavalent chromium). The total risks from direct exposure to contaminated surface soil and surface/subsurface soil to a future resident at the W&L Property are estimated to be 2×10^{-4} and 4×10^{-4}, respectively. The COC contributing the most to this risk level is hexavalent chromium in surface soil and surface/subsurface soil. These risk levels indicate that if no clean-up action is taken, a future child/adult resident would have an increased probability between 2 in 10,000 and 4 in 10,000 of developing cancer as a result of site-related exposure to the COCs in surface soil and surface/subsurface soil. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA. Note that the baseline human health risk assessment (HHRA) showed benzo(b)fluoranthene as a primary risk driver for surface soil. However, the toxicity value used in the baseline HHRA was incorrect and benzo(b)fluoranthene is no longer listed as a COC for surface soil. The corrected toxicity value also changes the risk in surface/subsurface soil for benzo(b)fluoranthene from that presented in the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-10

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Upland/Floodplain Surface Soil (0-2 ft)	W&L Property	Antimony	Blood	4E+00	N/A	N/A	4E+00
			Thallium	Skin	3E+00	N/A	N/A	3E+00
							Surface Soil Hazard Index Total =	7E+00
							Blood Hazard Index =	4E+00
							Skin Hazard Index =	3E+00
Soil	Upland/Floodplain Surface/Subsurface Soil (0-10 ft)	Walton & Lonsbury Property	Antimony	Blood	3E+00	N/A	N/A	3E+00
			Cobalt	Endocrine System	6E+00	4E-03	N/A	6E+00
							Surface/Subsurface Soil Hazard Index Total =	9E+00
							Blood Hazard Index =	3E+00
							Endocrine System Hazard Index =	6E+00

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

-- Route of exposure is not applicable to this medium.

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for future young child and adult resident exposed to surface and surface/subsurface soil at the W&L Property. The Risk Assessment Guidance for Superfund (RAGS) states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects. The estimated target organ HIs between 3 and 6 indicate that the potential for adverse effects could occur from exposure to contaminated soil containing antimony, cobalt, and thallium. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-11

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Groundwater	Shallow Groundwater	W&L Property	Chromium, Hexavalent	6E-05	- -	3E-04	- -	4E-04
							Shallow Groundwater Risk Total =	4E-04
							Total Risk =	4E-04

Key

-- Route of exposure is not applicable to this medium.

This table provides risk estimates for the significant routes of exposure for the future construction worker exposed to shallow groundwater at the W&L Property. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of a construction worker's exposure to groundwater, as well as the toxicity of the COC (hexavalent chromium). The total risk from direct exposure to contaminated shallow groundwater to a future construction worker is estimated to be 4×10^{-4}. The COC contributing to this risk level is hexavalent chromium. This risk level indicates that if no clean-up action is taken, a future construction worker would have an increased probability of 4 in 10,000 of developing cancer as a result of site-related exposure to the COC in shallow groundwater at the W&L Property. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-12

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future

Receptor Population: Construction Worker

Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Shallow Groundwater	W&L Property	Chromium, Hexavalent	Blood/Respiratory	2E+00	- -	9E+00	1E+01
							Shallow Groundwater Hazard Index Total =	1E+01
							Blood Hazard Index =	1E+01
							Respiratory Hazard Index =	1E+01

Key

-- Route of exposure is not applicable to this medium.

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for the future adult construction worker exposed to shallow groundwater at the W&L Property. The Risk Assessment Guidance for Superfund (RAGS) states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects. The estimated target organ HI of 10 indicates that the potential for adverse effects could occur from exposure to contaminated groundwater containing hexavalent chromium. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-13

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Groundwater	Tap Water	Site-Wide (center of the plume)						
			Dichloroethane, 1,1-	3E-05	1E-04	N/A	- -	2E-04
			Trichloroethylene	3E-04	4E-04	5E-05	- -	8E-04
			Vinyl Chloride	5E-04	3E-05	N/A	- -	6E-04
			Dioxane, 1,4-	2E-05	1E-05	N/A	- -	3E-05
			Arsenic	7E-05	N/A	N/A	- -	7E-05
			Chromium, Hexavalent	5E-01	N/A	2E-01	- -	7E-01
							Groundwater Risk Total =	7E-01
							Total Risk =	7E-01

Key

-- Route of exposure is not applicable to this medium.

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

This table provides risk estimates for the significant routes of exposure for the future young child and adult resident exposed to groundwater used as tap (household) water. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of a young child's and adult's exposure to groundwater, as well as the toxicity of the COCs (1,1-dichloroethane, 1,4-dioxane, trichloroethylene, vinyl chloride, arsenic, and hexavalent chromium). The total risk from direct exposure to contaminated groundwater to a future resident, in the event that groundwater is used as a potable source, is estimated to be 7×10^{-1}. The COCs contributing most to these risk levels are 1,1-dichloroethane, trichloroethylene, vinyl chloride, and hexavalent chromium in groundwater. This risk level indicates that if no clean-up action is taken, a future child/adult resident would have an increased probability of 7 in 10 of developing cancer as a result of site-related exposure to the COCs in groundwater. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-14

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Tap Water	Site-Wide (center of the plume)	Dichloroethene, cis-1,2-	Kidney	8E+00	N/A	1E+00	9E+00
			Trichloroethylene	Cardiovascular/Developmental/ Immune System	4E+01	1E+02	6E+00	1E+02
			Chromium, Hexavalent	Gastrointestinal	4E+02	N/A	2E+02	6E+02
			Cobalt	Endocrine	2E+00	N/A	N/A	2E+00
			Manganese	Nervous System	2E+00	N/A	2E-01	2E+00
							Groundwater Hazard Index Total =	7E+02
							Immune System Hazard Index =	1E+02
							Developmental Hazard Index =	1E+02
							Kidney Hazard Index =	9E+00
							Endocrine Hazard Index =	2E+00
							Cardiovascular Hazard Index =	1E+02
							Gastrointestinal Hazard Index =	6E+02
							Nervous System Hazard Index =	2E+00

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

-- Route of exposure is not applicable to this medium.

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for the future young child and adult resident exposed to groundwater used as tap (household) water. The Risk Assessment Guidance for Superfund (RAGS) states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects. The estimated target organ HIs between 2 and 600 indicate that the potential for adverse effects could occur from exposure to contaminated groundwater containing cis-1,2-dichloroethene, trichloroethylene, hexavalent chromium, cobalt, and manganese. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

TABLE 15
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
WALTON & LONSBURY SUPERFUND SITE

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
All Samples Combined															
	71-55-6	1,1,1-Trichloroethane	0.11 J	2600	ug/L	MW-5S (Ph. 1)	58 / 129	0.5	2600	N/A	37300 N	N/A	N/A	N	BSL
	79-00-5	1,1,2-Trichloroethane	0.52	0.52	ug/L	MW-9S (Ph. 2)	1 / 129	0.5 - 10	0.52	N/A	41.400 N	N/A	N/A	N	BSL
	75-34-3	1,1-Dichloroethane	0.11 J	1700	ug/L	MW-5S (Ph. 1)	77 / 128	0.5	1700	N/A	391.0 C	N/A	N/A	Y	ASL
	75-35-4	1,1-Dichloroethene	0.25 J	450	ug/L	MW-5S (Ph. 1)	51 / 128	0.5 - 0.96	450	N/A	1050 N	N/A	N/A	N	BSL
	96-12-8	1,2-Dibromo-3-chloropropane	0.11 J	0.11 J	ug/L	AE-04B (Ph. 1)	1 / 127	0.5 - 10	0.11	N/A	0.44000 C	N/A	N/A	N	BSL
	107-06-2	1,2-Dichloroethane	0.38 J	0.38 J	ug/L	AE-08D (Ph. 3)	1 / 127	0.5 - 10	0.38	N/A	30.00 C	N/A	N/A	N	BSL
	71-43-2	Benzene	0.10 J	0.49 J	ug/L	MW-102D (Ph. 1)	10 / 129	0.5 - 10	0.49	N/A	27.30 C	N/A	N/A	N	BSL
	75-27-4	Bromodichloromethane	0.55	0.55	ug/L	MW-14 (Ph. 3)	1 / 116	0.5 - 10	0.55	N/A	38.60 C	N/A	N/A	N	BSL
	67-66-3	Chloroform	1.0	4.9	ug/L	DEP-4S (Ph. 2)	3 / 128	0.5 - 10	4.9	N/A	67.60 C	N/A	N/A	N	BSL
	156-59-2	cis-1,2-Dichloroethene	0.12 J	790	ug/L	MW-5S (Ph. 1)	76 / 128	0.5	790	N/A	43.4 N	N/A	N/A	Y	ASL
	127-18-4	Tetrachloroethene	0.10 J	19	ug/L	MW-5S (Ph. 1)	46 / 129	0.5	19	N/A	51.3 N	N/A	N/A	N	BSL
	79-01-6	Trichloroethene	0.069 J	1300	ug/L	MW-5S (Ph. 1)	91 / 129	0.15 - 0.5	1300	N/A	9.81 N	N/A	N/A	Y	ASL
	75-01-4	Vinyl chloride	0.0077 J	33 J	ug/L	MW-12S (Ph. 1)	61 / 129	0.015 - 0.5	33	N/A	0.070 C	N/A	N/A	Y	ASL
	123-91-1	1,4-Dioxane	0.026 J	23	ug/L	AE-06B (Ph. 1)	49 / 65	0.1 - 0.23	23	N/A	41.80 C	N/A	N/A	N	BSL
	7429-90-5	Aluminum	21	26400	ug/L	AE-09S (Ph. 2)	115 / 128	20 - 65.8	26400	N/A	39600 N	N/A	N/A	N	BSL
	7440-36-0	Antimony	0.070 J	2.7	ug/L	DEP-5S (Ph. 3)	16 / 128	2 - 4	2.7	N/A	11.80 N	N/A	N/A	N	BSL
	7440-38-2	Arsenic	0.076 J	13	ug/L	MW-102D (Ph. 1)	97 / 128	1	13	N/A	2.670 C	N/A	N/A	Y	ASL
	7440-39-3	Barium	8.6 J	552	ug/L	DEP-4D (Ph. 1)	122 / 128	10	552	N/A	4410 N	N/A	N/A	N	BSL
	7440-43-9	Cadmium	0.011 J	2.9	ug/L	MW-5S (Ph. 2)	68 / 128	0.04 - 1	2.9	N/A	9.26 N	N/A	N/A	N	BSL
	7440-47-3	Chromium	0.14 J-	86400	ug/L	AE-04D (Ph. 1)	103 / 128	2 - 7.4	86400	N/A	10700 N	N/A	N/A	Y	ASL
	18540-29-9	Chromium, Hexavalent	0.60	83000	ug/L	AE-04D (Ph. 1)	72 / 127	0.5	83000	N/A	0.307 C	N/A	N/A	Y	ASL
	7440-48-4	Cobalt	0.140 J	635 J	ug/L	MW-9S (Ph. 2)	99 / 128	1	635	N/A	12.30 N	N/A	N/A	Y	ASL
	7440-50-8	Copper	0.16 J	777	ug/L	AE-04D (Ph. 1)	69 / 128	2	777	N/A	1580 N	N/A	N/A	N	BSL
	57-12-5	Cyanide	1.4 J	36	ug/L	MW-5S (Ph. 2)	89 / 128	2.5 - 10	36	N/A	23.80 N	N/A	N/A	Y	ASL
	7439-89-6	Iron	66 J	48700	ug/L	MW-5S (Ph. 2)	115 / 128	200	48700	N/A	27700 N	N/A	N/A	Y	ASL
	7439-96-5	Manganese	3.0 J	21000	ug/L	DEP-4S (Ph. 1)	128 / 128	N/A	21000	N/A	390 N	N/A	N/A	Y	ASL
	7439-97-6	Mercury	0.023 J	0.33	ug/L	DEP-4D (Ph. 2)	11 / 128	0.2	0.33	N/A	6.620 N	N/A	N/A	N	BSL
	7440-02-0	Nickel	0.63 J	42	ug/L	AE-04D (Ph. 1)	124 / 128	1	42	N/A	639 N	N/A	N/A	N	BSL
	7440-62-2	Vanadium	0.50 J-	68	ug/L	DEP-3D (Ph. 2)	18 / 118	5	68	N/A	61.6 N	N/A	N/A	Y	ASL

TABLE 15
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
WALTON & LONSBURY SUPERFUND SITE

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)

Notes:
Refer to Attachment A of HHRA for samples included in data set. Only analytes which were COPCs resulting from the HHRA tapwater screening have been included in this evaluation. Lead exposures have been evaluated separately.
COPCs - Chemicals of Potential Concern
N/A = Not Applicable or Not Available

[1] **Organic Data Qualifiers**
J = The compound was positively identified; however, the associated numerical value is an estimated concentration only.
Inorganic Data Qualifiers
J = The compound was positively identified; however, the associated numerical value is an estimated concentration only.

[2] The maximum detected concentration was used. Duplicate samples were averaged prior to the identification of maxima.

[3] Background values were not used for COPC screening purposes.

[4] Screening toxicity values are the USEPA (May 2018) Regional Screening Levels (RSLs) for irrigation well exposures (see FS text for details) using the online RSL calculator (see attached calculator output).
C = Carcinogen
N = Noncarcinogen (adjusted to a hazard quotient of 0.1)
L = Lead
The RSL values for noted analytes are as follows:
RSL for chromium (III), Insoluble Salts used for chromium.
RSL for mercuric chloride used for mercury.

[5] Codes used for rationale are as follows:
Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Below Screening Level (BSL)

Table G-16. Risk Estimate for Irrigation Well Scenario

CAS number	Chemical of Potential Concern [1]	EPC (ug/L) [2]	Cancer RSL (ug/L) [3]	Non-cancer RSL (ug/L) [3]	Cancer Risk [4]	Non-cancer Hazard [4]	Target Organ [5]
75-34-3	1,1-Dichloroethane	467.5	391	5310	1E-06	9E-03	Kidney
156-59-2	cis-1,2-Dichloroethene	306.1	-	43.4	-	7E-01	Kidney
79-01-6	Trichloroethene	398.9	20.4	9.81	2E-05	4E+00	Cardiovascular/ Developmental/ Immune System
75-01-4	Vinyl chloride	11.1	0.0702	76.6	2E-04	1E-02	Liver
7440-38-2	Arsenic	3.793	2.67	11.9	1E-06	3E-02	Skin
7440-47-3	Chromium	26068	-	10700	-	2E-01	Liver
18540-29-9	Chromium, Hexavalent	25874	0.307	20.7	8E-02	1E+02	Gastrointestinal
7440-48-4	Cobalt	12.34	-	12.3	-	1E-01	Endocrine
57-12-5	Cyanide	3.669	-	23.8	-	2E-02	Reproductive
7439-89-6	Iron	9085	-	27700	-	3E-02	Gastrointestinal
7439-96-5	Manganese	729.9	-	390	-	2E-01	Nervous System
7440-62-2	Vanadium	ND	-	61.6	-		Skin
				Total Risk/Hazard:	8E-02	1E+02	

Notes

1. See Table A-1
2. Exposure Point Concentrations (EPCs) taken from HHRA, Site-Wide (center of plume) groundwater.
3. See RSL calculator output attached. Cancer RSL at risk level of 1E-06; non-cancer RSL set at a hazard quotient of 0.1.
4. Determined proportionally using the maximum detection and the appropriate RSL.
5. See HHRA

RSL - Regional Screening Level

HI - Hazard Index

ND - Not Detected in center of plume

Total Cardiovascular HI =	4E+00
Total Developmental HI =	4E+00
Total Endocrine HI =	1E-01
Total Gastrointestinal HI =	1E+02
Total Immune System HI =	4E+00
Total Kidney HI =	7E-01
Total Liver HI =	3E-01
Total Nervous System HI =	2E-01
Total Reproductive HI =	2E-02
Total Skin HI =	3E-02

Table G-Eco1. Occurrence, Distribution, and Selection of Chemicals of Potential Concern (COCs)

Exposure Area: Bliss Brook
Medium: Surface Water

COC		Frequency of Detection	Maximum Detected Concentration (µg/L)	Arithmetic Mean[2] (µg/L)	95% UCL of mean[3] (µg/L)	Surface Water Benchmark Chronic (µg/L)	Surface Water Benchmark Chronic Source	Chronic HQ[4] CTE[5]	Chronic HQ[4] RME[6]
Inorganics (Dissolved)									
Chromium	(1)	22 / 24	259	100	146	10.0	Site CCC	**10**	**15**
Chromium, Hexavalent	(1)	22 / 24	238	73	115	2	Site CCC	**37**	**57**

Notes:

(1) Chromium HQs based on site-specific criteria
(2) Arithmetic Mean calculated using one-half the reporting limit for non-detect values
(3) USEPA's ProUCL Version 5.0.00 software (updated 9/19/13) was used to calculate the 95% UCL
(4) HQ is the ratio of the EPC and the corresponding benchmark
(5) The CTE EPC is the arithmetic mean
(6) The RME Exposure EPC is the lower of the 95% UCL and the maximum detected concentration

CCC - Criterion Continuous Concentration
COC - Chemical of Concern
EPC - Exposure Point Concentration
HQ - Hazard Quotient
RME - Resasonable Maximum Exposure (95% UCL unless otherwise indicated)
CTE - Central Tendancy Exposure (Arithmetic mean unless otherwise indicated)

TABLE G-Eco2. Ecological Exposure Pathways and Endpoints

Exposure Media	Receptors	Endangered/ Threatened Species Flag Y or N	Assessment Endpoints	Measurement Endpoint
PROPERTY & SOUTHERN WETLAND				
Surface water	Aquatic invertebrates	N	Survival and growth of aquatic invertebrate communities	- Comparison of dissolved surface water COPC concentrations to acute and chronic benchmarks
			Survival and growth of local populations of zooplankton	- Comparison of toxicity of surface water samples from the Southern Wetland to reference locations using the water flea (*Ceriodaphnia dubia*) laboratory bioassays
	Amphibians	N	Reproduction of amphbian populations	- Comparison of surface water COPC concentrations to acute and chronic benchmarks
	Fish	N	Survival and growth of local populations of fish	- Comparison of surface water COPC concentrations to acute and chronic benchmarks
Sediment	Benthic Invertebrates	N	Survival and growth of benthic invertebrate communities	- Comparison of sediment COPC concentrations to no effect and effect benchmarks
			Survival and growth of benthic invertebrate communities	- Comparison of porewater COPC concentrations to acute and chronic surface water benchmarks
			Survival and growth of benthic invertebrate communities	- Assessment of the bioavailbility of divalent metals in sediment by evaluating AVS, SEM and TOC
			Survival and growth of benthic invertebrate communities	- Comparison of toxicity of sediment samples from the Southern Wetland to reference locations using *Hyalella azteca* and *Chironomus dilutus* laboratory bioassays
Wetland/Upland Soil, biota	Soil Invertebrates		Survival and growth of soil invertebrate communities	- Comparison of soil COPC concentrations to no effect benchmarks
			Survival and growth of soil invertebrate communities	- Assessment of the bioavailbility of divalent metals in soil by evaluating AVS, SEM and TOC
			Survival of soil invertebrate communities	- Assessment of toxicity of soil samples collected at the site at locations with a range of chromium concentrations using *Eisenia fetida* laboratory bioassays.
	Wetland/Upland Plants	N	Survival and growth of upland and wetland plant communities	- Comparison of soil COPC concentrations to no effect benchmarks
			Survival, germination and growth of upland and wetland plant communities	- Assessment of toxicity of soil samples collected at the site at locations with a range of chromium concentrations using *Lolium perenne* (perennial rye grass) laboratory bioassays.

TABLE G-Eco2. Ecological Exposure Pathways and Endpoints

Exposure Media	Receptors	Endangered/ Threatened Species Flag Y or N	Assessment Endpoints	Measurement Endpoint
PROPERTY & SOUTHERN WETLAND				
	Herbivorous birds	N	Sustainability (survival, growth, reproduction) of local populations of birds	- Quantify the average and maximum daily exposures to COPCs in bobwhite quail via the consumption of plants; compare these modeled exposures to published values which are indicative of potential impairment
	Insectivorous birds	N	Sustainability (survival, growth, reproduction) of local populations of birds	- Quantify the average and maximum daily exposures to COPCs in American robin via the consumption of earthworms; compare these modeled exposures to published values which are indicative of potential impairment
	Herbivorous mammals	N	Sustainability (survival, growth, reproduction) of local populations of mammals	- Quantify the average and maximum daily exposures to COPCs in meadow vole via the consumption of plants; compare these modeled exposures to published values which are indicative of potential impairment
	Insectivorous mammals		Sustainability (survival, growth, reproduction) of local populations of mammals	- Quantify the average and maximum daily exposures to COPCs in short-tailed shrew via the consumption of earthworms; compare these modeled exposures to published values which are indicative of potential impairment
Surface water, sediment, biota	Piscivorous birds		Sustainability (survival, growth, reproduction) of local populations of piscivorous birds	- Quantify the average and maximum daily exposures to COPCs in the great blue heron via the consumption of animal prey (100% fish); compare these modeled exposures to published values which are indicative of potential impairment
BLISS BROOK				
Surface water	Aquatic invertebrates	N	Survival and growth of aquatic invertebrate communities	- Comparison of dissolved surface water COPC concentrations to acute and chronic benchmarks
			Survival and growth of local populations of zooplankton	- Comparison of toxicity of surface water samples from Bliss Brook to reference locations using the water flea (*Ceriodaphnia dubia*) laboratory bioassays
	Amphibians	N	Reproduction of amphbian populations	- Comparison of surface water COPC concentrations to acute and chronic benchmarks
	Fish	N	Survival and growth of local populations of fish	- Comparison of surface water COPC concentrations to acute and chronic benchmarks

TABLE G-Eco2. Ecological Exposure Pathways and Endpoints

Exposure Media	Receptors	Endangered/ Threatened Species Flag Y or N	Assessment Endpoints	Measurement Endpoint
PROPERTY & SOUTHERN WETLAND				
Sediment	Benthic Invertebrates	N	Survival and growth of benthic invertebrate communities	- Comparison of sediment COPC concentrations to no effect and effect benchmarks
			Survival and growth of benthic invertebrate communities	- Comparison of porewater COPC concentrations to acute and chronic surface water benchmarks
			Survival and growth of benthic invertebrate communities	- Assessment of the bioavailbility of divalent metals in sediment by evaluating AVS, SEM and TOC
			Survival and growth of benthic invertebrate communities	- Comparison of toxicity of sediment samples from Bliss Brook to reference locations using *Hyalella azteca* and *Chironomus dilutus* laboratory bioassays
Wetland/Upland Soil, biota	Soil Invertebrates	N	Survival and growth of soil invertebrate communities	- Comparison of soil COPC concentrations to no effect benchmarks
			Survival and growth of soil invertebrate communities	- Assessment of the bioavailbility of divalent metals in soil by evaluating AVS, SEM and TOC
			Survival of soil invertebrate communities	- Assessment of toxicity of soil samples collected at the site at locations with a range of chromium concentrations using *Eisenia fetida* laboratory bioassays.
	Wetland/Upland Plants	N	Survival and growth of upland and wetland plant communities	- Comparison of soil COPC concentrations to no effect benchmarks
			Survival, germination and growth of upland and wetland plant communities	- Assessment of toxicity of soil samples collected at the site at locations with a range of chromium concentrations using *Lolium perenne* (perennial rye grass) laboratory bioassays.
	Herbivorous birds	N	Sustainability (survival, growth, reproduction) of local populations of birds	- Quantify the average and maximum daily exposures to COPCs in bobwhite quail via the consumption of plants; compare these modeled exposures to published values which are indicative of potential impairment
	Insectivorous birds		Sustainability (survival, growth, reproduction) of local populations of birds	- Quantify the average and maximum daily exposures to COPCs in American robin via the consumption of earthworms; compare these modeled exposures to published values which are indicative of potential impairment

TABLE G-Eco2. Ecological Exposure Pathways and Endpoints

Exposure Media	Receptors	Endangered/ Threatened Species Flag Y or N	Assessment Endpoints	Measurement Endpoint
PROPERTY & SOUTHERN WETLAND				
	Herbivorous mammals	N	Sustainability (survival, growth, reproduction) of local populations of mammals	- Quantify the average and maximum daily exposures to COPCs in meadow vole via the consumption of plants; compare these modeled exposures to published values which are indicative of potential impairment
	Insectivorous mammals	N	Sustainability (survival, growth, reproduction) of local populations of mammals	- Quantify the average and maximum daily exposures to COPCs in short-tailed shrew via the consumption of earthworms; compare these modeled exposures to published values which are indicative of potential impairment
Surface water, sediment, biota	Piscivorous birds	N	Sustainability (survival, growth, reproduction) of local populations of piscivorous birds	- Quantify the average and maximum daily exposures to COPCs in the great blue heron via the consumption of animal prey (100% fish); compare these modeled exposures to published values which are indicative of potential impairment
MECHANICS POND				
Surface water	Aquatic invertebrates	N	Survival and growth of aquatic invertebrate communities	- Comparison of dissolved surface water COPC concentrations to acute and chronic benchmarks
			Survival and growth of local populations of zooplankton	- Comparison of toxicity of surface water samples from Mechanics Pond to reference locations using the water flea (*Ceriodaphnia dubia*) laboratory bioassays
	Amphibians	N	Reproduction of amphbian populations	- Comparison of surface water COPC concentrations to acute and chronic benchmarks
	Fish	N	Survival and growth of local populations of fish	- Comparison of surface water COPC concentrations to acute and chronic benchmarks

TABLE G-Eco2. Ecological Exposure Pathways and Endpoints

Exposure Media	Receptors	Endangered/ Threatened Species Flag Y or N	Assessment Endpoints	Measurement Endpoint
PROPERTY & SOUTHERN WETLAND				
Sediment	Benthic Invertebrates	N	Survival and growth of benthic invertebrate communities	- Comparison of sediment COPC concentrations to no effect and effect benchmarks
			Survival and growth of benthic invertebrate communities	- Comparison of porewater COPC concentrations to acute and chronic surface water benchmarks
			Survival and growth of benthic invertebrate communities	- Assessment of the bioavailbility of divalent metals in sediment by evaluating AVS, SEM and TOC
			Survival and growth of benthic invertebrate communities	- Comparison of toxicity of sediment samples from Mechanics Pond to reference locations using *Hyalella azteca* and *Chironomus dilutus* laboratory bioassays
Surface water, sediment, biota	Piscivorous birds	N	Sustainability (survival, growth, reproduction) of local populations of piscivorous birds	- Quantify the average and maximum daily exposures to COPCs in the great blue heron via the consumption of animal prey (100% fish); compare these modeled exposures to published values which are indicative of potential impairment

Notes:

COPC - Chemical of Potential Concern
EA - Exposure Area
AVS - Acid Volatile Sulfides
SEM - Simultaneously Extracted Metals
TOC - Total Organic Carbon

TABLE G-Eco3. SUMMARY OF RISK BY ASSESSMENT ENDPOINT

Exposure Media	Receptors	Assessment Endpoint	Measurement Endpoint	Risk Summary
BLISS BROOK				
Surface water	Aquatic invertebrates	Survival and growth of aquatic invertebrate communities	- Comparison of dissolved surface water COPC concentrations to acute and chronic benchmarks	- Potential for adverse effects to aquatic receptors from dissolved metals with chromium (III) and chromium (VI), the risk-drivers
		Survival and growth of local populations of zooplankton	- Comparison of toxicity of surface water samples from Bliss Brook to reference locations using the water flea (*Ceriodaphnia dubia*) laboratory bioassays	- Elevated concentrations of dissolved metals were associated with significant adverse effects on survival and reproduction on *Ceriodaphnia dubia*
	Amphibians and Fish	Reproduction of amphbian populations	- Comparison of surface water COPC concentrations to acute and chronic benchmarks	- Potential for adverse effects to aquatic receptors from dissolved metals with chromium (III) and chromium (VI), the risk-drivers

Notes:

COPC - Chemical of Potential Concern

Table L-1: Surface Water Cleanup Levels for the Protection of Human Health - Bliss Brook

Carcinogenic Chemical of Concern	Cancer Classification	Cleanup Level[1]	Basis[1]
		µg/L	
Chromium, Hexavalent	NA	3.4	ILCR = 10^{-5} (Recreational User)

Key

NA - Not available or not applicable

1. See Appendix B of the 2019 FS Report for cleanup level development and basis:

ILCR - Incremental Lifetime Cancer Risk; 10^{-5} = 1 in 100,000

HQ - Hazard Quotient

Cancer Classification

A - Human carcinogen

B1 - Probable human carcinogen - Indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Table L-2: Soil Cleanup Levels for the Protection of Human Health - Residential Yards West of North Avenue

Non-Carcinogenic Chemical of Concern	Target Endpoint	Cleanup Level[1]	Basis[1, 2]
		mg/kg	
Lead	NA	200	IEUBK

Key

NA - Not available or not applicable

1. See Appendix B of the 2019 FS Report for cleanup level development and basis:

ILCR - Incremental Lifetime Cancer Risk; 10^{-6} = 1 in 1,000,000 and 10^{-5} = 1 in 100,000

HQ - Hazard Quotient

IEUBK - Integrated Exposure Uptake Biokinetic Model

2. The lead cleanup level is applicable to surface soil that has been sieved to create a fine fraction (less than 150 micrometer particle size).

Table L-3: Soil Cleanup Levels for the Protection of Human Health - W&L Property[2]

Carcinogenic Chemical of Concern	Cancer Classification	Cleanup Level[1] mg/kg	Basis[1]
Benzo(a)anthracene	Carcinogenic to humans	11	ILCR = 10^{-5}
Benzo(a)pyrene	Carcinogenic to humans	1.1	ILCR = 10^{-5}
Benzo(b)fluoranthene	Carcinogenic to humans	11	ILCR = 10^{-5}
Dibenz(a,h)anthracene	Carcinogenic to humans	1.1	ILCR = 10^{-5}
Arsenic	A	6.8	ILCR = 10^{-5}
Chromium (VI)	NA	3.0	ILCR = 10^{-5}

Non-Carcinogenic Chemical of Concern	Target Endpoint	Cleanup Level[1] mg/kg	Basis[1]
Antimony	Blood	31	HQ = 1
Cobalt	Endocrine System	23	HQ = 1
Lead	NA	200	IEUBK
Thallium	Skin	0.78	HQ = 1

Key

NA - Not available or not applicable

1. See Appendix B of the 2019 FS Report for cleanup level development and basis:

ILCR - Incremental Lifetime Cancer Risk; 10^{-5} = 1 in 100,000

HQ - Hazard Quotient

2. Cleanup levels based on hypothetical future use of the W&L Property. Institutional controls are used to prevent future residential use of the Property.

A - Human carcinogen

B1 - Probable human carcinogen - Indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Table L-4: Groundwater Cleanup Levels - Bungay River Water Resource Protection District Residential Potable Water Scenario[1]

Carcinogenic Chemical of Concern	Cancer Classification	Site-Wide Cleanup Level	
		µg/L	Basis
Dichloroethane, 1,1-	C	2.8	ILCR = 10^{-6}
Trichloroethene	Carcinogenic to humans	5	MCL
Vinyl Chloride	A	2	MCL
Dioxane, 1,4-	Likely to be carcinogenic to humans	0.46	ILCR = 10^{-6}
Arsenic	A	10	MCL
Chromium, Hexavalent	NA	0.035	ILCR = 10^{-6}

Non-Carcinogenic Chemical of Concern	Target Endpoint	Site-Wide Cleanup Level	
		µg/L	Basis
Dichloroethane, 1,1-	Kidney	2.8	ILCR = 10^{-6}
Dichloroethene, cis-1,2-	Kidney	70	MCL
Trichloroethane, 1,1,1-	Liver	200	MCL
Trichloroethene	Cardiovascular/Developmental/Immune System	5	MCL
Vinyl Chloride	Liver	2	MCL
Dioxane, 1,4-	Kidney/Liver	0.46	ILCR = 10^{-6}
Arsenic	Skin	10	MCL
Chromium	NA	100	MCL
Chromium, Hexavalent	Gastrointestinal	0.035	ILCR = 10^{-6}
Cobalt	Endocrine System	6	HQ = 1
Lead	NA	15	Action Level
Manganese	Nervous System	300	Health Advisory

Key

Health Advisory - Health Advisory on Manganese (EPA-822-R-04-003; January 2004)

See Appendix B of the 2019 FS Report for cleanup level development and basis.

HI - Hazard Index

MCL - Maximum Contaminant Level

ILCR - Incremental Lifetime Cancer Risk; 10^{-6} = 1 in 1,000,000

NA - Not available or not applicable

1. These cleanup levels are also performance monitoring standards for the areas of non-potable groundwater within the Site to assess the management of migration components of the remedy's ability to prevent Site contamination from migrating into the Bungay River Water Resource Protection District.

Cancer Classification

A - Human carcinogen

B1 - Probable human carcinogen - Indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Table L-5: Groundwater Cleanup Levels - Site-wide Residential Non-Potable Irrigation Scenario

Carcinogenic Chemical of Concern	Cancer Classification	Site-Wide Cleanup Level	
		µg/L	Basis
Trichloroethene	Carcinogenic to humans	98	HQ = 1
Vinyl Chloride	A	7	ILCR = 10^{-4}
Chromium, Hexavalent	NA	31	ILCR = 10^{-4}

Non-Carcinogenic Chemical of Concern	Target Endpoint	Site-Wide Cleanup Level	
		µg/L	Basis
Trichloroethene	Cardiovascular/Developmental/Immune System	98	HQ = 1
Vinyl Chloride	Liver	7	ILCR = 10^{-4}
Chromium, Hexavalent	Gastrointestinal	31	ILCR = 10^{-4}

Key

See Appendix B of the 2019 FS Report for cleanup level development and basis.

HI - Hazard Index

ILCR - Incremental Lifetime Cancer Risk; 10^{-4} = 1 in 10,000

NA - Not available or not applicable

Cancer Classification

A - Human carcinogen

B1 - Probable human carcinogen - Indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Table L-6: Groundwater Cleanup Levels - W&L Property Construction Worker Scenario

Carcinogenic Chemical of Concern	Cancer Classification	Site-Wide Cleanup Level	
		µg/L	Basis
Chromium, Hexavalent	NA	985	ILCR = 10^{-5}

Non-Carcinogenic Chemical of Concern	Target Endpoint	Site-Wide Cleanup Level	
		µg/L	Basis
Chromium, Hexavalent	Blood	985	ILCR = 10^{-5}

Key

See Appendix B of the 2019 FS Report for cleanup level development and basis.

HI - Hazard Index

ILCR - Incremental Lifetime Cancer Risk; 10^{-5} = 1 in 100,000

NA - Not available or not applicable

Cancer Classification

A - Human carcinogen

B1 - Probable human carcinogen - Indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Table L-Eco1. Surface Water Cleanup Levels for the Protection of Ecological Receptors

Habitat Type/Name	Exposure Medium	COC	PRG	Units	Basis	Assessment Endpoint
PROPOSED CLEANUP LEVEL						
Bliss Brook	Surface Water	Chromium	82	µg/L	Site-Specific MATC (1)	Survival and growth of aquatic invertebrate, zooplankton, amphibian and fish
		Chromium, Hexavalent	8	µg/L	Site-Specific MATC (1)	

Notes:

(1) The site-specific MATC (set as the geometric mean between the NOEC and LOEC values) has been selected as the protective level for each COC in surface water.

COC - Chemical of Concern

LOEC - Lowest Observed Effect Concentration in site-specific toxicity tests with *Ceriodaphnia dubia*

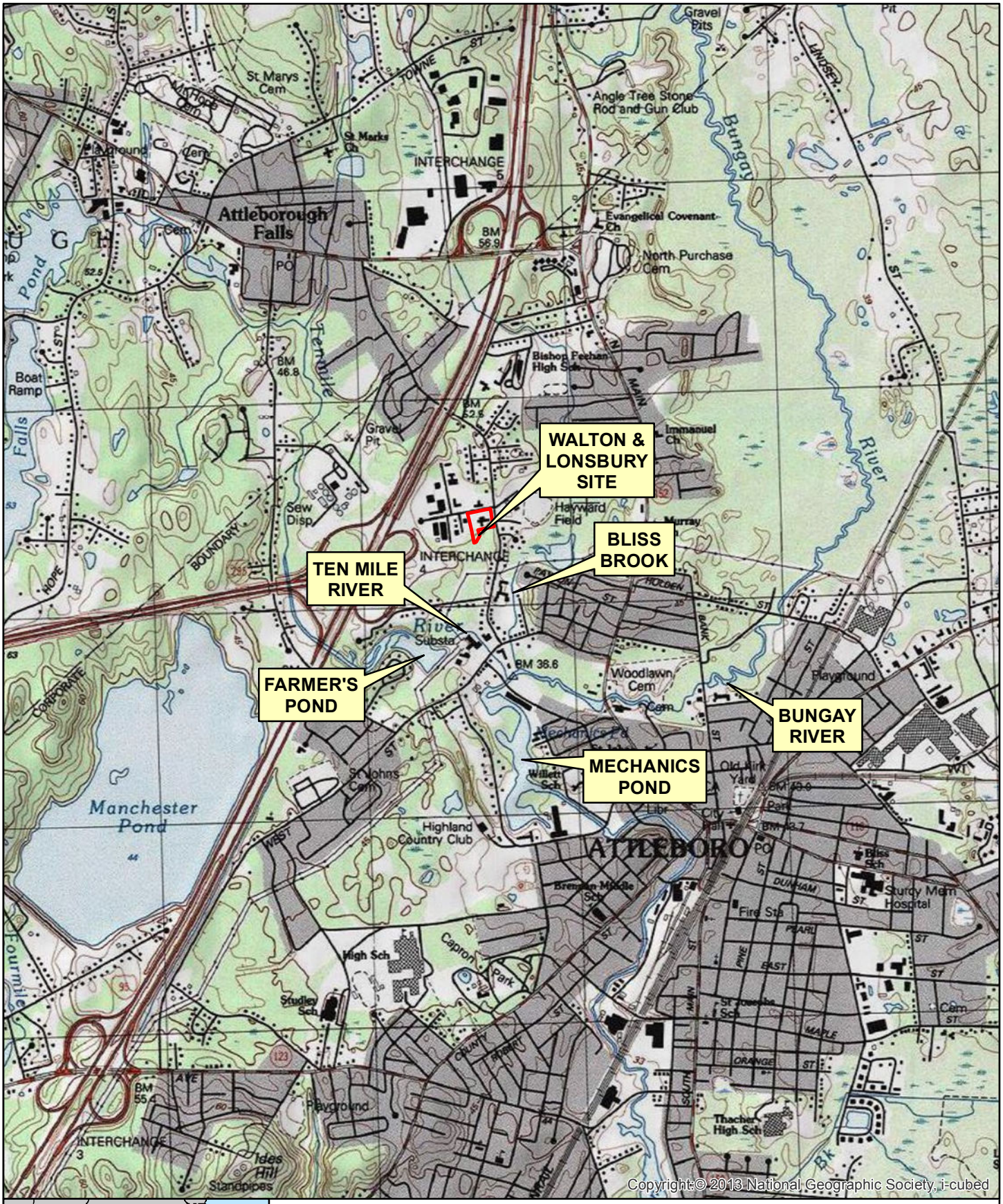
MATC - Maximum Acceptable Toxic Concentration .

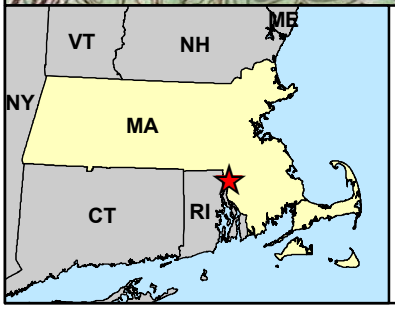
NOEC - No Observed Effect Concentration in site-specific toxicity tests with *Ceriodaphnia dubia*

PRG - Preliminary Remediation Goal

Appendix C

Figures





1:25,000

0 1,250 2,500 Feet

AECOM

FIGURE 1

SITE LOCUS MAP

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PAULETTE LANE

PAYSON STREET

NORTH AVENUE

BLISS BROOK

DEANVILLE ROAD

TEN MILE RIVER

WEST STREET

FARMERS POND

BUNGAY RIVER

MECHANICS POND

SEE DETAIL FOR SOUTHERN PORTION OF MECHANICS POND

DETAIL - SOUTHERN PORTION OF MECHANICS POND

MILK STREET

WATER STREET

ELIZABETH STREET

STATE STREET

JOHN STREET

WATSON AVENUE

RIVERBANK ROAD

SD-11

SD-12

SD-13

SD-14

FIGURE 2

SITE FEATURES AND FEMA FLOOD HAZARD AREAS

Legend

- Drainage Pipe Trunk Line
- Groundwater Collection Pipe
- PRB Trench
- Limit of Cover Installed by Removal Program
- Parcel Boundary
- Former Building Footprint
- Limit of Closed Lagoon Area

FEMA Flood Zone Designations

- A: 1% Annual Chance of Flooding, no BFE
- AE: 1% Annual Chance of Flooding, with BFE
- AE: Regulatory Floodway
- X: 0.2% Annual Chance of Flooding

Combined Wetlands

- Emergent/Open Water Wetland
- Forested/Shrub Wetland
- Open Water
- Stream Channel

N

1:3,200

0 125 250 500 Feet

AECOM

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WALTON STREET

NORTH AVENUE

Grinder Exhaust Area

Vertical Tank

Shed

Outside Drum Storage Pad

Surface Impoundment Area and Lagoon

Stack

Former Plating Room

Fuel Oil UST Area

Former Outside TCE Tank

Stack

Abandoned Dry Well

Historic Wastewater Discharge Line

FIGURE 3

HISTORIC SITE FEATURES (FROM RCA, 1989)

Legend

- Property
- Former Building Footprint
- Leased Portion of Property
- Limit of Closed Lagoon Area

NOTE: All locations approximate; not all were actually found during EPA or earlier investigations.

AECOM

0 20 40 80 Feet

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Excavate Surface Soil (0 to 1 ft.)
Between Wetland Boundary and
Flood Zone AE
Area = 2,245 sq. ft.
Volume = 83 cu. yds.

48NO-01
372

48NO-02
280

48NO-03
781

48NO-04
163

48NO-05
241

Excavate Surface Soil (0 to 1 ft.)
Between Wetland Boundary and
Flood Zone AE
Area = 301 sq. ft.
Volume = 11 cu. yds.

ME-01
490

MASS ELECTRIC PARCEL

ME-02
790

Excavate Surface Soil (0 to 1 ft.)
Between Wetland Boundary and
Flood Zone AE
Area = 100 sq. ft.
Volume = 4 cu. yds.

SO-611
474

42NO-01
369

42NO-02
404

SO-612
478

42NO-03
409

42NO-04
511

Excavate Surface Soil (0 to 1 ft.)
Between Wetland Boundary and
Flood Zone AE
Area = 2,759 sq. ft.
Volume = 102 cu. yds.

Excavate Surface Soil (0 to 1 ft.)
Between Wetland Boundary and
Flood Zone AE
Area = 2,387 sq. ft.
Volume = 88 cu. yds.

SO-617
705

34NO-01
471

SO-618
118

34NO-02
100

NORTH AVENUE

34NO-04
303

34NO-03
472

Excavate Surface Soil (0 to 1 ft.)
Extent to be Determined by
Additional Sampling
Total Area Shown = 211 sq. ft.
Volume = 8 cu. yds.

10DE-03
272

SO-622
201

28NO-01
1,170

DEANVILLE ROAD

10DE-02
172

10DE-01
89.1

28NO-02
127

10DE-04
308

28NO-03
162

SO-623
263

28NO-04
68.5

10DE-06
136

10DE-05
142

SO-624
149

10DE-07
89.8

28NO-05
124

28NO-07
126

10DE-11
198

10DE-09
220

28NO-09
358

28NO-06
360

10DE-12
131

10DE-10
1,240

28NO-08
228

10DE-08
172

Excavate Surface Soil (0 to 1 ft.)
Extent to be Determined by
Additional Sampling
Total Area Shown = 310 sq. ft.
Volume = 11 cu. yds.

FIGURE 4

CONCEPTUAL PLAN FOR ALTERNATIVE SL-3

Exposure Areas/Sampling Locations
- Residential Soil
- Wetland Soil
- Estimated Extent of Surface Soil Excavation for Lead
- Approximate Location of Drainage Pipe
- Streams

Combined Wetlands
- Emergent/Open Water Wetland
- Forested/Shrub Wetland
- Open Water

FEMA Flood Zone Designations
- AE: 1% Annual Chance of Flooding, with BFE
- X: 0.2% Annual Chance of Flooding

48NO-01: 2018 Sample Location ID
SO-601: 2017 Sample LocationID
Total Lead in Soil, Fine Fraction (< 150µm):
>200 mg/kg
<200 mg/kg

1 inch = 50 feet

0 25 50 Feet

N

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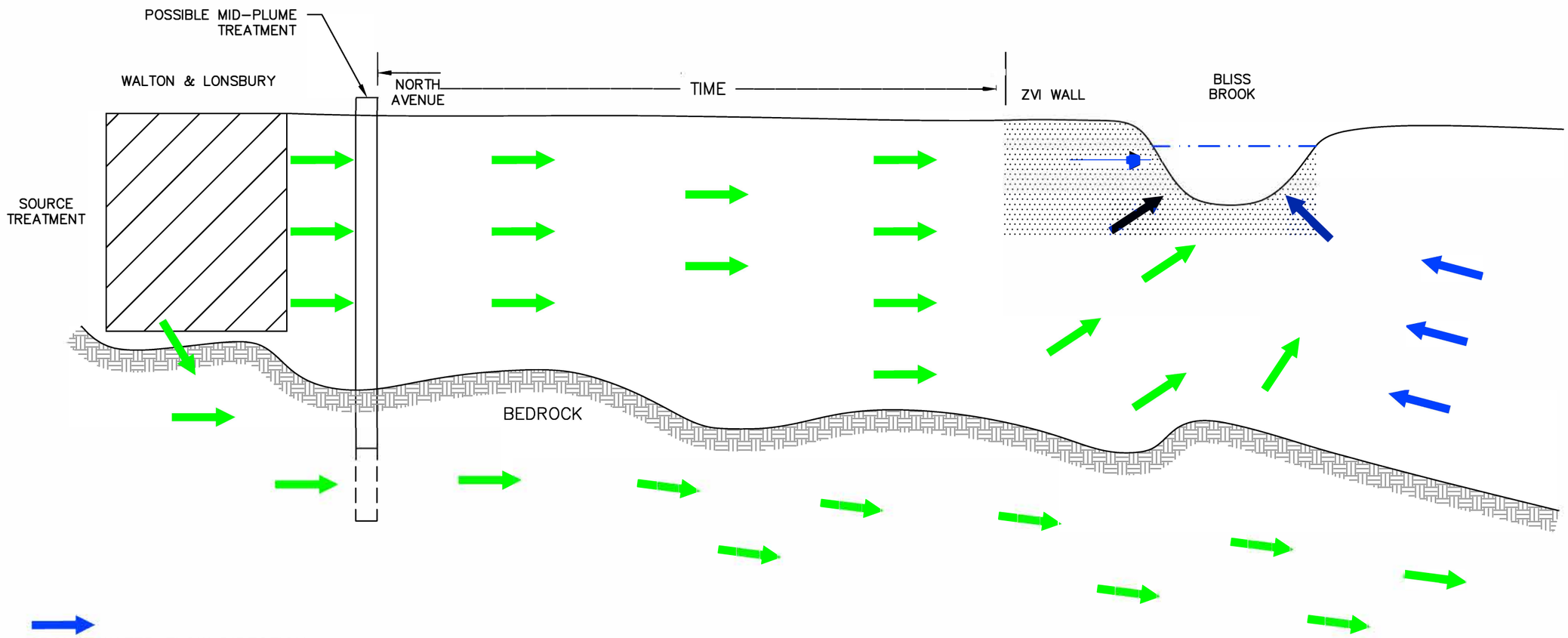

LEGEND

- GROUNDWATER CONTAINING CR+6
- GROUNDWATER NOT CONTAINING CR+6
- ZVI TREATMENT ZONE

AECOM

WALTON & LONSBURY 78 NORTH AVENUE, ATTLEBORO, MA	**CONCEPTUAL SITE MODEL**
DATE: 07/24/2018 DRWN:	**FIGURE 5**

WALTON STREET

ENTIRE FLOOR SLAB AND COBBLE-FILLED PIT TO BE REMOVED

ESTIMATED AREA OF SOURCE AREA SOIL REMOVAL AND IN-SITU TREATMENT*

FORMER OUTSIDE TCE TANK

LOCATION OF MID-PLUME IN-SITU TREATMENT LINE

100

1,000

10,000

5

PAULETTE LANE

I*

J*

K*

F**

PZ-06
0.0060

PZ-09
0.72

N PERMEABLE REACTIVE BARRIER

PZ-10
1,350

PZ-11
0.11

PZ-12
0.043

PZ-13
834

PZ-14
6,870

PAYSON STREET

EXTENDED PERMEABLE REACTIVE BARRIER

PZ-04
0.10

100

5

NORTH AVENUE

BLISS BROOK

PZ-15
0.029

PZ-05
0.31

DEANVILLE ROAD

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FIGURE 6

CONCEPTUAL PLAN FOR ALTERNATIVE GW/SW-3B: SOURCE AREA SOIL REMOVAL WITH IN-SITU TREATMENT AND EXTENSION OF PERMEABLE REACTIVE BARRIER WITH MID-PLUME TREATMENT

Legend

- Former Outside TCE Tank
- Drainage Pipe Trunk Line
- Groundwater Collection Pipe
- PRB Trench
- Site Fence
- Residential Privacy Fence
- Hexavalent Chromium, Overburden (dashed where inferred)
- TCE Concentration (maximum regardless of depth), in g/L
- Limit of Cover Installed by Removal Program
- Parcel Boundary
- Former Building Footprint
- Leased Portion of Walton Property (paved and occupied)
- Limit of Closed Lagoon Area

Combined Wetlands

- Emergent/Open Water Wetland
- Forested/Shrub Wetland
- Open Water
- Stream Channel
- Area of Excavation by Removal Program
- Mid-Plume In-Situ Treatment Line

I*, J*, K* - Home has operating SSDS.
F** - Home is abandoned.

* Includes removal of former discharge line to southern wetlands, dry well, and TCE storage tank area if located

1 inch = 150 feet

AECOM

0 75 150 300 Feet

WALTON ST

LOCATION OF ZVI INJECTIONS INTO BEDROCK

100

1

10,000

1,000

10

PAULETTE LN

I*

J*

K*

F**

AE-20B
Cr+6 = 1270 µg/L

PAYSON ST

NORTH AVE

BLISS BROOK

DEANVILLE RD

ASHTON RD

ROUNDS PL

WEST ST

COMPLIANCE MONITORING WELLS

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FIGURE 7

CONCEPTUAL PLAN FOR CONTINGENCY FOCUSED IN-SITU INJECTION COMPONENT OF ALTERNATIVE BR-3

Legend

- Monitoring Well Location
- Drainage Pipe Trunk Line
- Compliance Monitoring Wells (Locations TBD)
- Groundwater Collection Pipe
- PRB Trench
- Site Fence
- Residential Privacy Fence
- Hexavalent Chromium, Bedrock (dashed where inferred)
- TCE 10 ppb Isopleth, Bedrock
- Limit of Cover Installed by Removal Program
- Parcel Boundary
- Former Building Footprint
- Leased Portion of Walton Property (paved and occupied)
- Limit of Closed Lagoon Area

Combined Wetlands

- Emergent/Open Water Wetland
- Forested/Shrub Wetland
- Open Water
- Stream Channel
- Area of Excavation by Removal Program
- Bungay River Water Resource Protection District

I*, J*, K* - Home has operating SSDS.
F** - Home is abandoned.

N

AECOM

0 125 250 500 Feet

FIGURE 8

ESTIMATED EXTENTS OF HEXAVALENT CHROMIUM IN GROUNDWATER ABOVE IRRIGATION AND DRINKING WATER PRGs

Legend

- Overburden Monitoring Well
- Bedrock Monitoring Well
- Existing PRB Trench
- Fence Installed by Removal Program
- Hexavalent Chromium Concentration Contour Based on Phase 3 Bedrock Groundwater Results
- (Dashed Where Inferred or Estimated Based on Modeling)
- Hexavalent Chromium Concentration Contour Based on Phase 3 Overburden Groundwater Results
- (Dashed Where Inferred or Estimated Based on Modeling)
- Former Building Footprint

Combined Wetlands

- Emergent/Open Water Wetland
- Forested/Shrub Wetland
- Open Water
- Stream Channel
- Bungay River Water Resource Protection District

1 inch equals 150 feet

0 75 150 300 Feet

AECOM

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DEP-5S DEP-5D DEP-8D DEP-8S MW-7 MW-10S MW-10D MW-9S MW-9D AE-01S AE-01D AE-01B AE-02B AE-ML-01 AE-15S AE-15B AE-15D 1 µg/L 100 µg/L AE-11B MW-12S MW-12D MW-5S MW-5D MW-6D MW-6S AE-03B MW-4S MW-4D PAULETTE LANE MW-14 AE-05B MW-13 MW-100D MW-100S AE-ML-02 AE-04B AE-04D AE-04S PZ-01S PZ-01D MW-101S MW-101D PZ-02S PZ-02D MW-15 MW-102D MW-102S AE-ML-04 AE-06B AE-08D AE-08B AE-09S AE-10S RCA-19 DEP-7D DEP-7S AE-19S MW-103S MW-103D AE-12B AE-ML-03 AE-18S DEP-1S DEP-1D AE-20B AE-14D AE-14B PAYSON STREET MW-16 AE-07B AE-07D AE-16S NORTH AVENUE AE-17S DEP-3D DEP-3S DEP-2S DEP-2D AE-13B

ESTIMATED EXTENT OF GROUNDWATER ABOVE IRRIGATION WELL PRG FOR HEXAVALENT CHROMIUM (BASED ON WELL DATA AND MODELING)

BLISS BROOK

ESTIMATED EXTENT OF GROUNDWATER ABOVE DRINKING WATER PRG FOR HEXAVALENT CHROMIUM WITHIN DISTRICT (BASED ON MODELING TO ESTIMATE 1 µg/L CONCENTRATION CONTOUR: SEE NOTE)

WEST STREET

Note: Because the drinking water PRG for hexavalent chromium (0.035 µg/L) is well below the reporting limit for RI groundwater data of 0.5 µg/L, well data cannot be used to estimate a concentration contour line at the PRG. 1 µg/L (twice the reporting limit) was selected as a value that could reasonably be estimated.

FIGURE 9

CONCEPTUAL LIMITS FOR GROUNDWATER RESTRICTIONS FOR IRRIGATION WELLS

Legend

- TCE or VC exceeds groundwater PRG
- No VOCs detected above groundwater PRG
- VOCs not analyzed
- Hex Cr detected above groundwater PRG
- No metals detected above groundwater PRG(s)
- Proposed Limit of Groundwater Restriction
- Parcel Boundary
- Former Building Footprint
- Limit of Closed Lagoon Area
- Bungay River Water Resource Protection District

Combined Wetlands

- Emergent/Open Water Wetland
- Forested/Shrub Wetland
- Open Water
- Stream Channel
- Area of Excavation by Removal Program
- Approximate Limit of Work for Removal Action and Site Restoration

1:3,200

0 125 250 500 Feet

AECOM

DETAIL - SOUTHERN PORTION OF MECHANICS POND

SEE DETAIL FOR SOUTHERN PORTION OF MECHANICS POND

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Appendix D
ARARs Tables

TABLE 1a
CHEMICAL-SPECIFIC ARARs AND TBCs
ALTERNATIVE SL-3: SOIL EXCAVATION ON RESIDENTIAL PROPERTIES WITH OFF-SITE DISPOSAL
WALTON & LONSBURY SUPERFUND SITE
ATTLEBORO, MASSACHUSETTS

Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
Federal				
Recommendations of the Technical Review Workgroup for Lead for an approach to Assessing Risks Associated with Adult Exposure to Lead In Soil	EPA-540-R-03-001 (January 2003)	To Be Considered	EPA Guidance for evaluating risks posed by lead in soil.	Alternative SL-3 will achieve risk-based standards calculated using this guidance.
Updated Scientific Considerations for Lead in Soil Cleanups	OLEM Directive 9200.2-167	To Be Considered	Memorandum providing information related to blood lead levels to be considered during risk evaluations of lead.	Alternative SL-3 will achieve risk-based standards calculated using this guidance.

TABLE 1b
LOCATION-SPECIFIC ARARs AND TBCs
ALTERNATIVE SL-3: SOIL EXCAVATION ON RESIDENTIAL PROPERTIES WITH OFF-SITE DISPOSAL
WALTON & LONSBURY SUPERFUND SITE
ATTLEBORO, MASSACHUSETTS

Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
Federal				
Protection of Wetlands (Executive Order 11990)	44 CFR Part 9	Relevant and Appropriate	Per the FEMA regulations (44 CFR Part 9; incorporating requirements under Executive Order 11990), federal agencies are required to avoid adversely impacting federal jurisdictional wetlands unless there is no practicable alternative with lesser effects and the proposed action includes all practicable measures to minimize harm to federal jurisdictional wetlands that may result from such use.	To the extent federal jurisdictional wetlands exist within areas to be altered by pre-design soil borings or access ways, action to be taken will minimize alterations to protected resource areas. Mitigation measures, as required, will be taken to compensate for resource areas impacted by remedial actions. Public comment was solicited through the Proposed Plan and no negative comments were received that required EPA to modify the selected remedy.
Floodplain Management (Executive Order 11988)	44 CFR Part 9	Relevant and Appropriate	Per the FEMA regulations (44 CFR Part 9; incorporating requirements under Executive Order 11988), federal agencies are required to avoid long-and short-term adverse impacts associated with the occupancy and modification of federally-designated 100-year and 500-year floodplain wherever there is a practicable alternative.	Soil excavation is anticipated to be conducted within the 100-year and 500-year floodplain under this alternative. Available practicable means will be used to reduce the risk of flood loss during the remedial action. Because the original grade will be restored at the completion of the remedial action, there will be no occupancy or modification of the floodplain. Public comment was solicited through the Proposed Plan and no negative comments were received that required EPA to modify the selected remedy.
Clean Water Act, Guidelines for Specification of Disposal Sites for Dredged or Fill Material	33 U.S.C. § 1344; § 404(b)(1); 40 CFR Part 230, 231, and 33 CFR Parts 320-323	Applicable	Controls discharges of dredged or fill material to protect aquatic ecosystem. This alternative includes work to be performed in a wetland. Under this requirement no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Sets standards for restoration and mitigation required as a result of unavoidable impacts to wetland and aquatic resources. EPA must determine which alternative is the “Least Environmentally Damaging Practicable Alternative” (LEDPA) to protect wetland and aquatic resources.	This alternative includes excavation and filling within federal jurisdictional wetlands. Work will be done to minimize and mitigate for any impacts to wetland resources. EPA solicited public comment as to whether this alternative is the Least Environmentally Damaging Practicable Alternative and no negative comments were received that required EPA to modify its LEDPA determination.

TABLE 1b
LOCATION-SPECIFIC ARARs AND TBCs
ALTERNATIVE SL-3: SOIL EXCAVATION ON RESIDENTIAL PROPERTIES WITH OFF-SITE DISPOSAL
WALTON & LONSBURY SUPERFUND SITE
ATTLEBORO, MASSACHUSETTS

Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
Management of Undesirable Plants	7 U.S.C. § 2814	Relevant and Appropriate	Regulations calling for federal actions to contain or control undesirable plant species or group of species using all available methods, including: (A) preventive measures; (B) physical or mechanical methods; (C) biological agents; (D) herbicide methods; and (E) general land management practices.	Measures will be taken to prevent the establishment of undesirable plant species (*i.e*., non-native and invasive species) as part of any wetlands/habitat restoration conducted as part of this alterative.
Historic Sites Act of 1935; National Historic Landmarks	16 USC 469 *et seq.*; 36 CFR Part 65	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks and encourage the long-range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historical properties/structures determined to be protected by these standards activities will be coordinated with the Department of the Interior.
National Historical Preservation Act	16 USC 470 *et seq.*; 36 CFR Part 800	Applicable	When a federal agency finds, or is notified, that its activities may cause irreparable loss or destruction of significant scientific, historical, or archeological data, such agency shall consult with relevant federal, State, and Tribal officials to address the preservation of such data or other forms of mitigation, as necessary.	If it is determined that this alternative may cause irreparable loss or destruction of significant scientific, historical, or archaeological data, EPA will consult with federal, State, and Tribal officials and implement preservation and/or mitigation measures, as necessary.
Endangered Species Act	16 USC 1531 *et seq.*; 50 CFR Part 402	Applicable	If a location contains a federal endangered or threatened species or its critical habitat, and an action may impact the species or its habitat, the U.S. Fish & Wildlife Service or the National Marine Fisheries Service must be consulted.	Southeastern Massachusetts is located within the range of the federally endangered Northern Long-Eared Bat. This requirement may be applicable if tree removal is needed during remedial activities. Consultation with the U.S. Fish & Wildlife Service will occur during the planning process to determine if the project is near known hibernacula or known maternity roost trees so that activities do not adversely impact bat populations or habitat. Tree cutting may need to be restricted to timeframes outside of the summer season.

TABLE 1b
LOCATION-SPECIFIC ARARs AND TBCs
ALTERNATIVE SL-3: SOIL EXCAVATION ON RESIDENTIAL PROPERTIES WITH OFF-SITE DISPOSAL
WALTON & LONSBURY SUPERFUND SITE
ATTLEBORO, MASSACHUSETTS

Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
State				
Wetlands Protection Act	Mass. Gen. Laws ch. 131, §40; Wetlands Protection Regulations (310 CMR §10.00)	Applicable	Sets performance standards for dredging, filling, altering of inland wetland resource areas and sets buffer zones within 100 feet of a vegetated wetland and 200 feet from a perennial stream. The standards include mitigation requirements for alteration of regulated wetland resource areas. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	The site includes state regulated wetland resource areas. Alternatives requiring that work be completed within 100 feet of a state regulated wetland or 200 feet of a perennial waterway, will comply with these regulations. Mitigation of impacts on wetlands due to excavation and pre-design activities will be addressed.
Antiquities Act and Regulation; Protection of Properties included in the State Register of Historic Places	Mass. Gen. Laws ch. 9 §§ 26-27; 950 CMR § 71.00	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property must eliminate, minimize or mitigate for adverse effects to properties that are listed in the register of historic places.	Features with potential historical/cultural significance on the state register will be evaluated during the remedial design phase. Should this alternative impact historical properties/structures determined to be protected by these standards, activities will be coordinated with the Massachusetts Historical Commission.

Key:
ARAR = Applicable or Relevant and Appropriate Requirement
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Regulations
TBC = To Be Considered
USC = United States Code

TABLE 1c
ACTION-SPECIFIC ARARs AND TBCs
ALTERNATIVE SL-3: SOIL EXCAVATION ON RESIDENTIAL PROPERTIES WITH OFF-SITE DISPOSAL
WALTON & LONSBURY SUPERFUND SITE
ATTLEBORO, MASSACHUSETTS

Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
Federal Standards				
Resource Conservation and Recovery Act (RCRA) Subtitle C; Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements	42 USC §6904 *et seq.*; 40 CFR Parts 260-262	Applicable to any action that generates a hazardous waste	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Any wastes generated by remedial activity will be analyzed under these standards to determine whether they are characteristic hazardous waste. Non-hazardous materials will be disposed appropriately. All contaminated soil meeting characteristic hazardous waste standards will be excavated and disposed of off-site at a licensed facility. The soils excavated under this alternative are not expected to be hazardous waste.
Clean Water Act; National Pollutant Discharge Elimination System (NPDES)	40 CFR Parts 122 and 125	Applicable	Establishes the specifications for discharging pollutants from any point source into the waters of the U.S. Also, includes stormwater standards for activities disturbing more than one acre.	Any water generated during excavation or soil dewatering activities (if required) will be treated to meet these standards before discharge to surface waters. Storm water standard will be met if there is over one acre of construction.
Clean Water Act, National Recommend Water Quality Criteria (NRWQC)	33 U.S.C. § 1314, 40 CFR Part 131	Relevant and Appropriate	NRWQC are health-based criteria developed for chemical constituents in surface water. They have been developed to protect aquatic life and human health from harmful effects due to exposure to chemically impacted surface water. Performance standards to be used for monitoring surface water and sediment during remedial activities.	Will be used as performance standards to monitor surface water and sediments in the adjacent wetlands, if required, during the remedial action.
Clean Air Act (CAA), Hazardous Air Pollutants; National Emission Standards for Hazardous Air Pollutants (NESHAPS)	42 USC §112(b)(1); 40 CFR Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust and other release sources.	Remedial activities, including excavation and management of soil, will be implemented in accordance with these rules. No air emissions from remedial activities will cause air quality standards to be exceeded. Dust standards will be complied with during excavation and management of materials.
Generation of investigation derived waste.	USEPA OSWER Publication 9345.3-03 FS (January 1992)	To Be Considered	Guidance on the management of Investigation Derived Waste (IDW) in a manner that ensures protection of human health and the environment.	IDW generated as part of this remedial alternative will be managed based on guidance standards.

TABLE 1c
ACTION-SPECIFIC ARARs AND TBCs
ALTERNATIVE SL-3: SOIL EXCAVATION ON RESIDENTIAL PROPERTIES WITH OFF-SITE DISPOSAL
WALTON & LONSBURY SUPERFUND SITE
ATTLEBORO, MASSACHUSETTS

Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
State Standards				
Solid Waste Management Facility Regulations	310 CMR 19.00	Applicable	The regulations contain requirements for disposal of solid wastes.	Any wastes generated by remedial activity that are determined to not be hazardous wastes will be managed in accordance with this regulation.
Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes	310 CMR 30.100	Applicable	Massachusetts is delegated to administer RCRA through its State regulations. These regulations establish requirements for determining whether wastes are characteristic hazardous waste.	Any wastes generated by remedial activity will be analyzed under these standards to determine whether they are characteristic hazardous waste. Non-hazardous materials will be disposed appropriately. All contaminated soil meeting characteristic hazardous waste standards will be excavated and disposed of off-site at a licensed facility. The soils excavated under this alternative are not expected to be hazardous waste.
Massachusetts Hazardous Waste Management Rules – Requirements for Generators	310 CMR 30.300	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to off-site disposal.	If any remedial activity generates hazardous wastes, the waste will be managed in accordance with the substantive requirements of these regulations.
Massachusetts Hazardous Waste Management Rules – General standards for hazardous waste facilities	310 CMR 30.500	Relevant and Appropriate	General facility requirements for waste analysis, security measures, inspections, and training requirements. Section 30.580 addresses closure and Section 30.590 post-closure of hazardous waste facilities.	Remedial activities to address hazardous wastes will be conducted in accordance with this requirement. Specifically, storage of wastes on site will be conducted in accordance with this regulation. All workers will be properly trained. Closure/post-closure standards will be met since all wastes will be excavated and removed from the site.
Massachusetts Hazardous Waste Rules - Containers	310 CMR 30.680	Applicable	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	If any remedial activity generates hazardous wastes that will be stored in containers, the containers will be managed in accordance with the substantive requirements of these regulations.
Massachusetts Hazardous Waste Rules - Management, Storage, and Treatment in Tanks	310 CMR 30.690	Applicable	These standards specify requirements for tank systems used to store or treat hazardous waste. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating	If any remedial activity generates hazardous wastes that will be stored in tanks, the tanks will be managed in accordance with the substantive requirements of these regulations.

TABLE 1c
ACTION-SPECIFIC ARARs AND TBCs
ALTERNATIVE SL-3: SOIL EXCAVATION ON RESIDENTIAL PROPERTIES WITH OFF-SITE DISPOSAL
WALTON & LONSBURY SUPERFUND SITE
ATTLEBORO, MASSACHUSETTS

Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
			requirements, and closure and post-closure care.	
Massachusetts Clean Water Act; Surface Water Discharge Permit Regulations	314 CMR 3.00	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any water generated during excavation or soil dewatering activities (if required) will be treated to meet discharge standards if the water is to be discharged to surface waters.
Massachusetts Clean Water Act; MA Surface Water Quality Standards (MSWQS)	314 CMR 4.00	Relevant and Appropriate	These standards designate the most sensitive uses for which the various waters of the Commonwealth shall be enhanced, maintained, or protected. Minimum water quality criteria required to sustain the designated uses are established.	Will be used as performance standards to monitor surface water and sediments in the adjacent wetlands, if required, during the remedial action.
Massachusetts Ambient Air Quality Standards	310 CMR 6.00	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	Remedial activities, including excavation and management of soil will be implemented in accordance with these rules. No air emissions from remedial activities will cause air quality standards to be exceeded. Dust standards will be complied with during excavation and management of materials at the Site.
Massachusetts Air Pollution Control Regulations	310 CMR 7.00	Applicable	These regulations set emission limits necessary to attain ambient air quality standards.	Remedial activities, including excavation and management of soil will be implemented in accordance with these rules. No air emissions from remedial activities will cause air quality standards to be exceeded.
Erosion and Sediment Control Guidance	None	To Be Considered	Guidance on preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation.

Key:
ARAR = Applicable or Relevant and Appropriate Requirement
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Regulations
MGL = Massachusetts General Laws
TBC = To Be Considered
USC = United States Code

TABLE 2a
CHEMICAL-SPECIFIC ARARs AND TBCs
ALTERNATIVE GW/SW-3b: SOURCE AREA SOIL REMOVAL WITH *IN-SITU* SOIL TREATMENT AND EXTENSION OF PERMEABLE REACTIVE BARRIER WITH MID-PLUME TREATMENT
WALTON & LONSBURY SUPERFUND SITE
ATTLEBORO, MASSACHUSETTS

Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
Federal				
Human Health Assessment Cancer Slope Factors (CSFs)	None	To Be Considered	CSFs are estimates of the upper-bound probability of an individual developing cancer as a result of a lifetime exposure to a particular concentration of a potential carcinogen.	Alternative GW/SW-3b will achieve carcinogenic risk-based standards calculated using this guidance through source soil removal, soil and mid-plume *in-situ* treatment, maintenance of the engineered cover and extension of the permeable reactive barrier.
EPA Risk Reference Doses (RfDs)	None	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media. RfDs are considered to be the levels unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure for a lifetime.	Alternative GW/SW-3b will achieve non-carcinogenic risk-based standards calculated using this guidance through source soil removal, soil and mid-plume *in-situ* treatment, maintenance of the engineered cover and extension of the permeable reactive barrier.
Guidelines for Carcinogenic Risk Assessment	EPA/630/P-03/001F (March 2005)	To Be Considered	These guidelines provide guidance on conducting risk assessments involving carcinogens.	Alternative GW/SW-3b will achieve carcinogenic risk-based standards calculated using this guidance through source soil removal, soil and mid-plume *in-situ* treatment, maintenance of the engineered cover and extension of the permeable reactive barrier.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens	EPA/630/R-03/003F (March 2005)	To Be Considered	This provides guidance on assessing risk to children from carcinogens.	Alternative GW/SW-3b will achieve carcinogenic risk-based standards for children calculated using this guidance through source soil removal, soil and mid-plume *in-situ* treatment, maintenance of the engineered cover and extension of the permeable reactive barrier.
Clean Water Act; National Recommended Water Quality Criteria (“NRWQC”)	33 U.S.C. § 1251 et seq.; 40 C.F.R. § 122.44	Relevant and Appropriate	NRWQC establish water quality standards for the protection of human health and aquatic life.	These surface water standards used to derive ecological cleanup standards in surface water in Bliss Brook that will be achieved through source soil removal, soil and mid-plume *in-situ* treatment, maintenance of the engineered cover and extension of the permeable reactive barrier.

TABLE 2a
CHEMICAL-SPECIFIC ARARs AND TBCs
ALTERNATIVE GW/SW-3b: SOURCE AREA SOIL REMOVAL WITH *IN-SITU* SOIL TREATMENT AND EXTENSION OF PERMEABLE REACTIVE BARRIER WITH MID-PLUME TREATMENT
WALTON & LONSBURY SUPERFUND SITE
ATTLEBORO, MASSACHUSETTS

State				
Massachusetts Clean Water Act; MA Surface Water Quality Standards (MSWQS)	314 CMR 4.00	Relevant and Appropriate	These standards designate the most sensitive uses for which the various waters of the Commonwealth shall be enhanced, maintained, or protected. Minimum water quality criteria required to sustain the designated uses are established.	These surface water standards, when more stringent than federal standards, used to derive ecological cleanup standards for surface water in Bliss Brook that will be achieved through source soil removal, soil and mid-plume *in-situ* treatment, maintenance of the engineered cover and extension of the permeable reactive barrier.

TABLE 2b
LOCATION-SPECIFIC ARARs AND TBCs
ALTERNATIVE GW/SW-3b: SOURCE AREA SOIL REMOVAL WITH *IN-SITU* SOIL TREATMENT AND EXTENSION OF PERMEABLE REACTIVE BARRIER WITH MID-PLUME TREATMENT
WALTON & LONSBURY SUPERFUND SITE
ATTLEBORO, MASSACHUSETTS

Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
Federal				
Protection of Wetlands (Executive Order 11990)	44 CFR Part 9	Relevant and Appropriate	Per the FEMA regulations (44 CFR Part 9; incorporating requirements under Executive Order 11990), federal agencies are required to avoid adversely impacting federal jurisdictional wetlands unless there is no practicable alternative with lesser effects and the proposed action includes all practicable measures to minimize harm to federal jurisdictional wetlands that may result from such use.	To the extent federal jurisdictional wetlands exist within areas where extension of the permeable reactive barrier, source area soil removal/*in-situ* treatment, installation of the mid-plume *in-situ* treatment line, and monitoring activities will occur under this alternative, action to be taken will minimize alterations to protected resource areas. Mitigation measures, as required, will be taken to compensate for resource areas impacted by remedial actions. Public comment was solicited through the Proposed Plan and no negative comments were received that required EPA to modify the selected remedy.
Floodplain Management (Executive Order 11988)	44 CFR Part 9	Relevant and Appropriate	Per the FEMA regulations (44 CFR Part 9; incorporating requirements under Executive Order 11988), federal agencies are required to avoid long-and short-term adverse impacts associated with the occupancy and modification of federally-designated 100-year and 500-year floodplain wherever there is a practicable alternative.	Remedial activities associated with extension of the permeable reactive barrier and possibly source area removal and *in-situ* treatment, may be conducted within the 100-year or 500-year floodplain under this alternative. Available practicable means will be used to reduce the risk of flood loss during the remedial action. Because the original grade will be restored at the completion of the remedial action, there will be no long-term occupancy or modification of the floodplain. Public comment was solicited through the Proposed Plan and no negative comments were received that required EPA to modify the selected remedy.
Clean Water Act, Guidelines for Specification of Disposal Sites for Dredged or Fill Material	33 U.S.C. § 1344; § 404(b)(1); 40 CFR Part 230, 231, and 33 CFR Parts 320-323	Applicable	Controls discharges of dredged or fill material to protect aquatic ecosystem. This alternative includes work to be performed in a wetland. Under this requirement no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Sets standards for restoration and mitigation required as a	This alternative includes excavation and filling within federal jurisdictional wetlands. Work will be done to minimize and mitigate for any impacts to wetland resources. EPA solicited public comment through the Proposed Plan as to whether this alternative is the Least Environmentally Damaging Practicable Alternative and no negative comments were received that required EPA to modify the determination.

TABLE 2b
LOCATION-SPECIFIC ARARs AND TBCs
ALTERNATIVE GW/SW-3b: SOURCE AREA SOIL REMOVAL WITH *IN-SITU* SOIL TREATMENT AND EXTENSION OF PERMEABLE REACTIVE BARRIER WITH MID-PLUME TREATMENT
WALTON & LONSBURY SUPERFUND SITE
ATTLEBORO, MASSACHUSETTS

Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
			result of unavoidable impacts to wetland and aquatic resources. EPA must determine which alternative is the "Least Environmentally Damaging Practicable Alternative" (LEDPA) to protect wetland and aquatic resources.	
Management of Undesirable Plants	7 U.S.C. § 2814	Relevant and Appropriate	Regulations calling for federal actions to contain or control undesirable plant species or group of species using all available methods, including: (A) preventive measures; (B) physical or mechanical methods; (C) biological agents; (D) herbicide methods; and (E) general land management practices.	Measures will be taken to prevent the establishment of undesirable plant species (*i.e*., non-native and invasive species) as part of any wetlands/habitat restoration conducted as part of this alterative.
Fish and Wildlife Coordination Act	16 USC Part 661 *et. seq.*	Applicable	This regulation requires that any federal agency proposing to modify a body of water must consult with the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service, and other related state agencies. That federal agency must consult with the appropriate government entity and also take action to prevent, mitigate, or compensate for project-related losses of endangered species, fish and wildlife resources.	Alternatives may modify potential, fish and wildlife habitats. All appropriate state and federal agencies, such as the USFWS, will be consulted to ensure that losses of these resources will be prevented, mitigated, or compensated.
Resource Conservation and Recovery Act; Hazardous Waste Facility Standards Within a Floodplain	43 USC §6901 *et seq*.; 40 CFR 264.18(b)	Relevant and Appropriate	Any hazardous waste facility with the 100-year floodplain must be designed, constructed, and maintained to prevent the release of hazardous waste during up to a 100-year flood event.	Any remedial structures utilized by this alternative to treat, contain, or dispose of hazardous waste (including the permeable reactive barrier) within the 100-year floodplain, will be designed, constructed, and maintained to prevent a release of hazardous waste within the protected resource area.

TABLE 2b
LOCATION-SPECIFIC ARARs AND TBCs
ALTERNATIVE GW/SW-3b: SOURCE AREA SOIL REMOVAL WITH *IN-SITU* SOIL TREATMENT AND EXTENSION OF PERMEABLE REACTIVE BARRIER WITH MID-PLUME TREATMENT
WALTON & LONSBURY SUPERFUND SITE
ATTLEBORO, MASSACHUSETTS

Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
Historic Sites Act of 1935; National Historic Landmarks	16 USC 469 *et seq.*; 36 CFR Part 65	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks and encourage the long-range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historical properties/structures determined to be protected by these standards activities will be coordinated with the Department of the Interior.
National Historical Preservation Act	16 USC 470 *et seq.*; 36 CFR, Part 800	Applicable	When a federal agency finds, or is notified, that its activities may cause irreparable loss or destruction of significant scientific, historical, or archeological data, such agency shall consult with relevant federal, State, and Tribal officials to address the preservation of such data or other forms of mitigation, as necessary.	If it is determined that this alternative may cause irreparable loss or destruction of significant scientific, historical, or archaeological data, EPA will consult with federal, State, and Tribal officials and implement preservation and/or mitigation measures, as necessary.
Endangered Species Act	16 USC 1531 *et seq.*; 50 CFR Part 402	Applicable	If a location contains a federal endangered or threatened species or its critical habitat, and an action may impact the species or its habitat, the U.S. Fish & Wildlife Service or the National Marine Fisheries Service must be consulted.	Southeastern Massachusetts is located within the range of the federally endangered Northern Long-Eared Bat. This requirement may be applicable if tree removal is needed during remedial activities. Consultation with the U.S. Fish & Wildlife Service will occur during the planning process to determine if the project is near known hibernacula or known maternity roost trees so that activities do not adversely impact bat populations or habitat. Tree cutting may need to be restricted to timeframes outside of the summer season.

TABLE 2b
LOCATION-SPECIFIC ARARs AND TBCs
ALTERNATIVE GW/SW-3b: SOURCE AREA SOIL REMOVAL WITH *IN-SITU* SOIL TREATMENT AND EXTENSION OF PERMEABLE REACTIVE BARRIER WITH MID-PLUME TREATMENT
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ATTLEBORO, MASSACHUSETTS

Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
State				
Wetlands Protection Act	Mass. Gen. Laws ch. 131, §40; Wetlands Protection Regulations (310 CMR §10.00)	Applicable	Sets performance standards for dredging, filling, altering of inland wetland resource areas and sets buffer zones within 100 feet of a vegetated wetland and 200 feet from a perennial stream. The standards include mitigation requirements for alteration of regulated wetland resource areas. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	Under this alternative, extension of the permeable reactive barrier, source area soil removal/in-situ treatment, installation of the mid-plume in-situ treatment line, and monitoring activities may possibly impact wetland resource areas and buffer zones. Alternatives requiring that work be completed within 100 feet of a state regulated wetland or 200 feet of a perennial waterway, will comply with these regulations. Mitigation of impacts on wetlands will be addressed.
Massachusetts Hazardous Waste Rules, Facility Location Standards	310 CMR 30.700	Relevant and Appropriate	Sets forth criteria for siting hazardous waste facilities within Land Subject to Flooding (as defined under the Massachusetts Wetland Protection Act standards); surface water supplies; and actual, planned, or potential public water supplies.	Any remedial structures utilized by this alternative to treat, contain, or dispose of hazardous waste (including the permeable reactive barrier) within the 100-year floodplain, will be designed, constructed, and maintained to prevent a release of hazardous waste within the protected resource area.
Antiquities Act and Regulation; Protection of Properties included in the State Register of Historic Places	Mass. Gen. Laws ch. 9 §§ 26-27; 950 CMR § 71.00	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property must eliminate, minimize or mitigate for adverse effects to properties that are listed in the register of historic places.	Features with potential historical/cultural significance on the state register will be evaluated during the remedial design phase. Should this alternative impact historical properties/structures determined to be protected by these standards, activities will be coordinated with the Massachusetts Historical Commission.

Key:
ARAR = Applicable or Relevant and Appropriate Requirement
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Regulations
TBC = To Be Considered
USC = United States Code

TABLE 2c
ACTION-SPECIFIC ARARs AND TBCs
ALTERNATIVE GW/SW-3b: SOURCE AREA SOIL REMOVAL WITH *IN-SITU* SOIL TREATMENT AND EXTENSION OF PERMEABLE REACTIVE BARRIER WITH MID-PLUME TREATMENT
WALTON & LONSBURY SUPERFUND SITE
ATTLEBORO, MASSACHUSETTS

Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
Federal Standards				
Resource Conservation and Recovery Act (RCRA) Subtitle C; Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements	42 USC §6904 *et seq.*; 40 CFR Parts 260-262	Applicable to any action that generates a hazardous waste	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Any wastes generated by remedial activity will be analyzed under these standards to determine whether they are characteristic hazardous waste. Non-hazardous materials will be disposed appropriately. All contaminated soil meeting characteristic hazardous waste standards will be excavated and disposed of off-site at a licensed facility.
RCRA Subtitle C; Landfill Closure and Post-Closure Care	40 CFR Part 264.310	Relevant and Appropriate	Federal standards for closure and post-closure care of landfills containing hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Inspections and maintenance of the existing engineered cover system (including permeable reactive barrier) and long-term groundwater and surface water monitoring would be conducted to meet relevant post-closure requirements.
Clean Water Act; National Pollutant Discharge Elimination System (NPDES)	40 CFR Parts 122 and 125	Applicable	Establishes the specifications for discharging pollutants from any point source into the waters of the U.S. Also, includes stormwater standards for activities disturbing more than one acre.	Any water generated during excavation and soil dewatering activities, well installation, *in-situ* soil treatment, maintenance, or sampling , plus mid-plume *in-situ* soil treatment will be treated to meet these standards before discharge to surface waters. Storm water standards will be met if there is over one acre of construction.
Clean Water Act, National Recommend Water Quality Criteria (NRWQC)	33 U.S.C. § 1314, 40 CFR Part 131	Relevant and Appropriate	NRWQC are health-based criteria developed for chemical constituents in surface water. They have been developed to protect aquatic life and human health from harmful effects due to exposure to chemically impacted surface water. Performance standards to be used for monitoring surface water and sediment during remedial activities and long-term monitoring.	Will be used as performance standards to monitor surface water and sediments, if required, during the remedial action.

TABLE 2c
ACTION-SPECIFIC ARARs AND TBCs
ALTERNATIVE GW/SW-3b: SOURCE AREA SOIL REMOVAL WITH *IN-SITU* SOIL TREATMENT AND EXTENSION OF PERMEABLE REACTIVE BARRIER WITH MID-PLUME TREATMENT
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Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
Clean Air Act (CAA), Hazardous Air Pollutants; National Emission Standards for Hazardous Air Pollutants (NESHAPS)	42 USC §112(b)(1); 40 CFR Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust and other release sources.	Remedial activities, including excavation and management of soil, will be implemented in accordance with these rules. No air emissions from remedial activities will cause air quality standards to be exceeded. Dust standards will be complied with during excavation and management of materials.
Underground Injection Control Program	40 CFR 144, 146, 147 (Subpart EE)	Applicable	Regulations established to assure that underground injection will not endanger drinking water sources.	Mid-plume *in-situ* soil treatment, will be implemented in compliance with these standards.
RCRA, Interim Status Treatment, Storage, and Disposal Facility Standards, Chemical, Physical and Biological Treatment: 40 C.F.R. Part 265 Subpart Q	40 CFR, Part 265 Subpart Q	Relevant and Appropriate	Standards for operating chemical, physical and biological treatment systems, including the proper handling of reagents, system maintenance, and closure procedures.	*In-situ* soil treatment and mid-plume *in- situ* soil treatment will be implemented in compliance with these standards.
Generation of investigation derived waste	USEPA OSWER Publication 9345.3-03 FS (January 1992)	To Be Considered	Guidance on the management of Investigation Derived Waste (IDW) in a manner that ensures protection of human health and the environment.	IDW generated as part of this remedial action will be managed based on guidance standards.
OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air	OSWER Publication 9200.2-154 (June 2015)	To Be Considered	EPA guidance for addressing vapor intrusion issues at CERCLA sites.	Existing residential sub-slab depressurization systems will be monitored to ensure their protectiveness. Institutional controls pertaining to vapor intrusion will be implemented and maintained utilizing these guidance standards until such time as it is determined they are no longer needed.
State Standards				
Solid Waste Management Facility Regulations	310 CMR 19.00	Applicable	The regulations contain requirements for disposal of solid wastes.	Any wastes generated by remedial activity that are determined to not be hazardous wastes will be managed in accordance with this regulation.

TABLE 2c
ACTION-SPECIFIC ARARs AND TBCs
ALTERNATIVE GW/SW-3b: SOURCE AREA SOIL REMOVAL WITH *IN-SITU* SOIL TREATMENT AND EXTENSION OF PERMEABLE REACTIVE BARRIER WITH MID-PLUME TREATMENT
WALTON & LONSBURY SUPERFUND SITE
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Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
Underground Injection Control	310 CMR 27.00	Applicable	These regulations protect underground sources of drinking water by regulating the underground injection of hazardous wastes, fluids used for extraction of minerals, oil, and energy and any other fluids having potential to contaminate groundwater as required by the Federal Safe Drinking Water Act.	Mid-plume *in-situ* soil treatment, will be implemented in compliance with these standards.
Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes	310 CMR 30.100	Applicable	Massachusetts is delegated to administer RCRA through its State regulations. These regulations establish requirements for determining whether wastes are characteristic hazardous waste.	Any wastes generated by remedial activity will be analyzed under these standards to determine whether they are characteristic hazardous waste. Non-hazardous materials will be disposed appropriately. All contaminated soil meeting characteristic hazardous waste standards will be excavated and disposed of off-site at a licensed facility.
Massachusetts Hazardous Waste Management Rules – Requirements for Generators	310 CMR 30.300	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to off-site disposal.	If any remedial activity generates hazardous wastes, the waste will be managed in accordance with the substantive requirements of these regulations.
Massachusetts Hazardous Waste Management Rules – General standards for hazardous waste facilities	310 CMR 30.500	Relevant and Appropriate	General facility requirements for waste analysis, security measures, inspections, and training requirements. Section 30.580 addresses closure and Section 30.590 post-closure of hazardous waste facilities.	Remedial activities to address hazardous wastes will be conducted in accordance with this requirement. Specifically, storage of wastes on site will be conducted in accordance with this regulation. All workers will be properly trained. The existing engineered cover meets closure standards by maintaining the engineered cover, institutional controls, and long-term monitoring.

TABLE 2c
ACTION-SPECIFIC ARARs AND TBCs
ALTERNATIVE GW/SW-3b: SOURCE AREA SOIL REMOVAL WITH *IN-SITU* SOIL TREATMENT AND EXTENSION OF PERMEABLE REACTIVE BARRIER WITH MID-PLUME TREATMENT
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Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
Massachusetts Hazardous Waste Rules: Landfill Closure/Post-Closure Care	310 CMR 30.633	Relevant and Appropriate	At final closure of the landfill the owner or operator shall cover the landfill with a final cover designed and constructed to: (a) Provide long-term minimization of migration of liquids through the closed landfill; (b) Function with minimum maintenance; (c) Promote drainage and minimize erosion or abrasion of the cover; (d) Accommodate settling and subsidence so that the cover's integrity is maintained. After final closure of the landfill the owner or operator shall comply with all post-closure requirements set forth in 310 CMR 30.590, including, without limitation, maintenance and monitoring throughout the post-closure care period as specified pursuant to 310 CMR 30.592. The owner or operator shall: Maintain the integrity and effectiveness of the final cover, including making repairs to the cap to correct the effects of settling, subsidence, erosion or other events and maintain and monitor the groundwater monitoring system and comply with all other applicable requirements of 310 CMR 30.660; (e) prevent run-off and run-on from eroding or otherwise damaging the final cover; and protect and maintain surveyed benchmarks used in complying with 310 CMR 30.626.	The existing engineered cover system, which meets these performance standards, will be monitored and maintained to continue to meet these standards.
Massachusetts Hazardous Waste Rules - Containers	310 CMR 30.680	Applicable	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	If any remedial activity generates hazardous wastes that will be stored in containers, the containers will be managed in accordance with the substantive requirements of these regulations.

TABLE 2c
ACTION-SPECIFIC ARARs AND TBCs
ALTERNATIVE GW/SW-3b: SOURCE AREA SOIL REMOVAL WITH *IN-SITU* SOIL TREATMENT AND EXTENSION OF PERMEABLE REACTIVE BARRIER WITH MID-PLUME TREATMENT
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Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
Massachusetts Hazardous Waste Rules - Management, Storage, and Treatment in Tanks	310 CMR 30.690	Applicable	These standards specify requirements for tank systems used to store or treat hazardous waste. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	If any remedial activity generates hazardous wastes that will be stored in tanks, the tanks will be managed in accordance with the substantive requirements of these regulations.
Massachusetts Clean Water Act; Surface Water Discharge Permit Regulations	314 CMR 3.00	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any water generated during excavation and soil dewatering activities, well installation, *in-situ* soil treatment, maintenance, or sampling, plus mid-plume *in-situ* soil treatment, will be treated to meet discharge standards if the water is to be discharged to surface waters.
Massachusetts Clean Water Act; MA Surface Water Quality Standards (MSWQS)	314 CMR 4.00	Relevant and Appropriate	These standards designate the most sensitive uses for which the various waters of the Commonwealth shall be enhanced, maintained, or protected. Minimum water quality criteria required to sustain the designated uses are established.	Will be used as performance standards to monitor surface water and sediments, if required, during the remedial action.
Massachusetts Ambient Air Quality Standards	310 CMR 6.00	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	Remedial activities, including excavation and management of soil will be implemented in accordance with these rules. No air emissions from remedial activities will cause air quality standards to be exceeded. Dust standards will be complied with during excavation and management of materials at the Site.
Massachusetts Air Pollution Control Regulations	310 CMR 7.00	Applicable	These regulations set emission limits necessary to attain ambient air quality standards.	Remedial activities, including excavation and management of soil will be implemented in accordance with these rules. No air emissions from remedial activities will cause air quality standards to be exceeded.
Erosion and Sediment Control Guidance	None	To Be Considered	Guidance on preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation.

TABLE 3a
CHEMICAL-SPECIFIC ARARs AND TBCs
ALTERNATIVE BR-3: INSTITUTIONAL CONTROLS AND CONTINGENCY REMEDY OF FOCUSED IN-SITU INJECTIONS (WEST OF NORTH AVENUE)
WALTON & LONSBURY SUPERFUND SITE
ATTLEBORO, MASSACHUSETTS

Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
Federal				
Human Health Assessment Cancer Slope Factors (CSFs)	None	To Be Considered	CSFs are estimates of the upper-bound probability of an individual developing cancer as a result of a lifetime exposure to a particular concentration of a potential carcinogen.	Institutional controls to prevent use of bedrock groundwater will prevent non-potable exposure to groundwater exceeding carcinogenic risk-based standards on-site calculated using this guidance. Source control measures though Alternative GW/SW-3b will attain these standards in approximately 100 years. Institutional controls will also prevent the installation of wells within the potentially impacted portion of the Bungay River Water Resource Protection District (BRWRPD) to prevent plume migration from the contaminated non-drinking water area into the District. If future sampling determines that groundwater within the BRWRPD does not meet potable risk-based standards the contingency for focused *in-situ* chemical reduction treatment will be used to attain the standards in the District.
EPA Risk Reference Doses (RfDs)	None	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media. RfDs are considered to be the levels unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure for a lifetime.	Institutional controls to prevent use of bedrock groundwater will prevent non-potable exposure to groundwater exceeding non-carcinogenic risk- based standards on-site calculated using this guidance. Source control measures though Alternative GW/SW-3b will attain these standards in approximately 100 years. Institutional controls will also prevent the installation of wells within the potentially impacted portion of the Bungay River Water Resource Protection District (BRWRPD) to prevent plume migration from the contaminated non-drinking water area into the District. If future sampling determines that groundwater within the BRWRPD does not

				meet potable risk-based standards the contingency for focused *in-situ* chemical reduction treatment will be used to attain the standards in the District.
Guidelines for Carcinogenic Risk Assessment	EPA/630/P-03/001F (March 2005)	To Be Considered	These guidelines provide guidance on conducting risk assessments involving carcinogens.	Institutional controls to prevent use of bedrock groundwater will prevent non-potable exposure to groundwater exceeding carcinogenic risk-based standards on-site calculated using this guidance. Source control measures though Alternative GW/SW-3b will attain these standards in approximately 100 years. Institutional controls will also prevent the installation of wells within the potentially impacted portion of the Bungay River Water Resource Protection District (BRWRPD) to prevent plume migration from the contaminated non-drinking water area into the District. If future sampling determines that groundwater within the BRWRPD does not meet potable risk-based standards the contingency for focused *in-situ* chemical reduction treatment will be used to attain the standards in the District.

TABLE 3a
CHEMICAL-SPECIFIC ARARs AND TBCs
ALTERNATIVE BR-3: INSTITUTIONAL CONTROLS AND CONTINGENCY REMEDY OF FOCUSED IN-SITU INJECTIONS (WEST OF NORTH AVENUE)
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Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens	EPA/630/R-03/003F(March 2005)	To Be Considered	This provides guidance on assessing risk to children from carcinogens.	Institutional controls to prevent use of bedrock groundwater will prevent non-potable exposure to groundwater exceeding carcinogenic risk-based standards for children calculated using this guidance. Source control measures though Alternative GW/SW-3b will attain these standards in approximately 100 years. Institutional controls will also prevent the installation of wells within the potentially impacted portion of the Bungay River Water Resource Protection District (BRWRPD) to prevent plume migration from the contaminated non-drinking water area into the District. If future sampling determines that groundwater within the BRWRPD does not meet potable risk-based standards the contingency for focused *in-situ* chemical reduction treatment will be used to attain the standards in the District.
Safe Drinking Water Act, National Primary Drinking Water Regulations - Maximum Contaminant Levels (MCLs)	40 Code of Federal Regulations (CFR) 141 Subpart G	Relevant and Appropriate	Establishes maximum contaminant levels (MCLs) for common organic and inorganic contaminants applicable to public drinking water supplies. Used as relevant and appropriate cleanup standards for aquifers and surface water bodies that are potential drinking water sources.	No exceedances of these drinking water standards have been documented within the BRWRPD. If future sampling determines that groundwater within the District does not meet these standards the contingency for focused *in-situ* chemical reduction treatment will be used to attain the standards in the District. Institutional controls will prevent the installation of wells within the potentially impacted portion of the BRWRPD to prevent plume migration from the contaminated non-drinking water area into the District.

TABLE 3a
CHEMICAL-SPECIFIC ARARs AND TBCs
ALTERNATIVE BR-3: INSTITUTIONAL CONTROLS AND CONTINGENCY REMEDY OF FOCUSED IN-SITU INJECTIONS (WEST OF NORTH AVENUE)
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Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
Safe Drinking Water Act, National Primary Drinking Water Regulations – Maximum Contaminant Level Goals (MCLGs)	40 CFR 141 Subpart F	Relevant and Appropriate (non-zero MCLGs only)	Establishes maximum contaminant level goals (MCLGs) for public water supplies. MCLGs are health goals for drinking water sources. These unenforceable health goals are available for a number of organic and inorganic compounds.	No exceedances offthese drinking water standards have been documented within the BRWRPD. If future sampling determines that groundwater within the District does not meet these standards the contingency for focused *in-situ* chemical reduction treatment will be used to attain the standards in the District. Institutional controls will also prevent the installation of wells within the potentially impacted portion of the BRWRPD to prevent plume migration from the contaminated non-drinking water area into the District.
Drinking Water Health Advisory for Manganese (EPA Office of Drinking Water), 2004	None	To Be Considered	Health advisories are estimates of risk from consumption of contaminated drinking water. They consider non-carcinogenic effects only. To be considered for contaminants in groundwater that may be used for drinking water purposes, where the standard is more conservative than either federal or state statutory or regulatory standards. The Advisory standard for manganese is 0.3 mg/L.	No exceedances of these risk-based drinking water standards have been documentednted within the BRWRPD. If future sampling determines that groundwater within the District does not meet these standards the contingency for focused *in-situ* chemical reduction treatment will be used to attain the standards in the District. Institutional controls will also prevent the installation of wells within the potentially impacted portion of the District to prevent plume migration from the contaminated non-drinking water area into the District.
State				
Massachusetts Drinking Water Regulations	310 CMR 22.00	Relevant and Appropriate	These standards establish Massachusetts Maximum Contaminant Levels (MA MCLs) for organic and inorganic contaminants that have been determined to adversely affect human health in public drinking water supply systems.	No exceedances of these drinking water standards have been documented within the BRWRPD. If future sampling determines that groundwater within the District does not meet these standards the contingency for focused *in-situ* chemical reduction treatment will be used to attain the standards in the District. Institutional controls will also prevent the installation of wells within the potentially impacted portion of the BRWRPD to prevent plume migration from the contaminated non-drinking water area into the District.

TABLE 3b
LOCATION-SPECIFIC ARARs AND TBCs
ALTERNATIVE BR-3: INSTITUTIONAL CONTROLS AND CONTINGENCY REMEDY OF FOCUSED IN-SITU INJECTIONS (WEST OF NORTH AVENUE)
WALTON & LONSBURY SUPERFUND SITE
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Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
Federal				
Protection of Wetlands (Executive Order 11990)	44 CFR Part 9	Relevant and Appropriate	Per the FEMA regulations (44 CFR Part 9; incorporating requirements under Executive Order 11990), federal agencies are required to avoid adversely impacting federal jurisdictional wetlands unless there is no practicable alternative with lesser effects and the proposed action includes all practicable measures to minimize harm to federal jurisdictional wetlands that may result from such use.	To the extent federal jurisdictional wetlands exist within areas to be altered by monitoring well installation, maintenance or sampling or by the *in-situ* bedrock injections contingency, if needed, action to be taken will minimize alterations to protected resource areas. Mitigation measures, as required, will be taken to compensate for resource areas impacted by remedial actions. Public comment was solicited through the Proposed Plan and no negative comments were received that required EPA to modify the selected remedy.
Floodplain Management (Executive Order 11988)	44 CFR Part 9	Relevant and Appropriate	Per the FEMA regulations (44 CFR Part 9; incorporating requirements under Executive Order 11988), federal agencies are required to avoid long-and short-term adverse impacts associated with the occupancy and modification of federally-designated 100-year and 500-year floodplain wherever there is a practicable alternative.	Remedial activities associated with monitoring well installation, maintenance or sampling or with the *in-situ* bedrock injections contingency, if needed, may be conducted within the 100-year or 500-year floodplain under this alternative. Available practicable means will be used to reduce the risk of flood loss during the remedial action. Because the original grade will be restored at the completion of the remedial action, there will be no occupancy or modification of the floodplain. Public comment was solicited through the Proposed Plan and no negative comments were received that required EPA to modify the selected remedy.
Clean Water Act, Guidelines for Specification of Disposal Sites for Dredged or Fill Material	33 U.S.C. § 1344; § 404(b)(1); 40 CFR Part 230, 231, and 33 CFR Parts 320-323	Applicable	Controls discharges of dredged or fill material to protect aquatic ecosystem. This alternative includes work to be performed in a wetland. Under this requirement no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Sets standards for restoration and mitigation required as a result of unavoidable impacts to wetland and aquatic resources. EPA must determine which alternative is the “Least Environmentally Damaging Practicable Alternative” (LEDPA) to protect wetland	This alternative may include monitoring well installation, maintenance or sampling within federal jurisdictional wetlands. Work will be done to minimize and mitigate for any impacts to wetland resources. EPA solicited public comment through the Proposed Plan as to whether this alternative is the Least Environmentally Damaging Practicable Alternative and no negative comments were received that required EPA to modify its determination.

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			and aquatic resources.	
Requirement	**Citation**	**Status**	**Requirement Synopsis**	**Action to Be Taken to Attain Requirement**
Management of Undesirable Plants	7 U.S.C. § 2814	Relevant and Appropriate	Regulations calling for federal actions to contain or control undesirable plant species or group of species using all available methods, including: (A) preventive measures; (B) physical or mechanical methods; (C) biological agents; (D) herbicide methods; and (E) general land management practices.	Measures will be taken to prevent the establishment of undesirable plant species (*i.e*., non-native and invasive species) as part of any wetlands/habitat restoration conducted as part of this alterative.
Historic Sites Act of 1935; National Historic Landmarks	16 USC 469 *et seq.*; 36 CFR Part 65	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks and encourage the long-range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historical properties/structures determined to be protected by these standards activities will be coordinated with the Department of the Interior.
National Historical Preservation Act	16 USC 470 *et seq.*; 36 CFR, Part 800	Applicable	When a federal agency finds, or is notified, that its activities may cause irreparable loss or destruction of significant scientific, historical, or archeological data, such agency shall consult with relevant federal, State, and Tribal officials to address the preservation of such data or other forms of mitigation, as necessary.	If it is determined that this alternative may cause irreparable loss or destruction of significant scientific, historical, or archaeological data, EPA will consult with federal, State, and Tribal officials and implement preservation and/or mitigation measures, as necessary.
Endangered Species Act	16 USC 1531 *et seq.*; 50 CFR Part 402	Applicable	If a location contains a federal endangered or threatened species or its critical habitat, and an action may impact the species or its habitat, the U.S. Fish & Wildlife Service or the National Marine Fisheries Service must be consulted.	Southeastern Massachusetts is located within the range of the federally endangered Northern Long-Eared Bat. This requirement may be applicable if tree removal is needed during remedial activities. Consultation with the U.S. Fish & Wildlife Service will occur during the planning process to determine if the project is near known hibernacula or known maternity roost trees so that activities do not adversely impact bat populations or habitat. Tree cutting may need to be restricted to timeframes outside of the summer season.

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ALTERNATIVE BR-3: INSTITUTIONAL CONTROLS AND CONTINGENCY REMEDY OF FOCUSED IN-SITU INJECTIONS (WEST OF NORTH AVENUE)
WALTON & LONSBURY SUPERFUND SITE
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Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
State				
Wetlands Protection Act	Mass. Gen. Laws ch. 131, §40; Wetlands Protection Regulations (310 CMR §10.00)	Applicable	Sets performance standards for dredging, filling, altering of inland wetland resource areas and sets buffer zones within 100 feet of a vegetated wetland and 200 feet from a perennial stream. The standards include mitigation requirements for alteration of regulated wetland resource areas. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	Monitoring well installation, maintenance or sampling or the *in-situ* bedrock injections contingency, if needed, including access ways, may possibly impact wetland resource areas and buffer zones. Alternatives requiring that work be completed within 100 feet of a state regulated wetland or 200 feet of a perennial waterway, will comply with these regulations. Mitigation of impacts on wetlands will be addressed.
Antiquities Act and Regulation; Protection of Properties included in the State Register of Historic Places	Mass. Gen. Laws ch. 9 §§ 26-27; 950 CMR § 71.00	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property must eliminate, minimize or mitigate for adverse effects to properties that are listed in the register of historic places.	Features with potential historical/cultural significance on the state register will be evaluated during the remedial design phase. Should this alternative impact historical properties/structures determined to be protected by these standards, activities will be coordinated with the Massachusetts Historical Commission.

Key:
ARAR = Applicable or Relevant and Appropriate Requirement
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Regulations
TBC = To Be Considered
USC = United States Code

TABLE 3c
ACTION-SPECIFIC ARARs AND TBCs
ALTERNATIVE BR-3: INSTITUTIONAL CONTROLS AND CONTINGENCY REMEDY OF FOCUSED IN-SITU INJECTIONS (WEST OF NORTH AVENUE)
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Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
Federal Standards				
Resource Conservation and Recovery Act (RCRA) Subtitle C; Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements	42 USC §6904 *et seq.*; 40 CFR Parts 260-262	Applicable to any action that generates a hazardous waste	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Any wastes generated by remedial activities including drilling for well installation and groundwater monitoring or drilling for bedrock injections, if the contingency component is needed, will be analyzed under these standards to determine whether they are characteristic hazardous waste. Non-hazardous materials will be disposed appropriately. Contaminated soil from well drilling, as well as any groundwater removed, meeting characteristic hazardous waste standards will be disposed of off-site at a licensed facility.
Clean Water Act; National Pollutant Discharge Elimination System (NPDES)	40 CFR Parts 122 and 125	Applicable	Establishes the specifications for discharging pollutants from any point source into the waters of the U.S. Also, includes stormwater standards for activities disturbing more than one acre.	Any water generated during drilling for monitoring well installation, maintenance or sampling or during *in-situ* bedrock injection, if the contingency component is needed, will be treated to meet these standards before discharge to surface waters.
Safe Drinking Water Act, National Primary Drinking Water Regulations – Maximum Contaminant Levels (MCLs)	40 CFR 141 Subpart G	Applicable	Establishes maximum contaminant levels (MCLs) for common organic and inorganic contaminants applicable to public drinking water supplies. Used as relevant and appropriate cleanup standards for aquifers and surface water bodies that are potential drinking water sources.	Groundwater monitoring using these standards will ensure that contamination present in the non-potable aquifer does not migrate into the downgradient drinking water aquifer within the Bungay River Resource Protection District (BRWRPD). If the contingency remedy is required, groundwater within the BRWRPD will be monitored to determine when these standards have been achieved.
Safe Drinking Water Act, National Primary Drinking Water Regulations – Maximum Contaminant Level Goals (MCLGs)	40 CFR 141 Subpart F	Applicable (non-zero MCLGs only)	Establishes maximum contaminant level goals (MCLGs) for public water supplies. MCLGs are health goals for drinking water sources. These unenforceable health goals are available for a number of organic and inorganic compounds.	Groundwater monitoring using these standards will ensure that contamination present in the non-potable aquifer does not migrate into the downgradient drinking water aquifer within the BRWRPD. If the contingency remedy is required, groundwater within the BRWRPD will be monitored to determine when these standards have been achieved.

TABLE 3c
ACTION-SPECIFIC ARARs AND TBCs
ALTERNATIVE BR-3: INSTITUTIONAL CONTROLS AND CONTINGENCY REMEDY OF FOCUSED IN-SITU INJECTIONS (WEST OF NORTH AVENUE)
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Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
Underground Injection Control Program	40 CFR 144, 146, 147 (Subpart EE)	Applicable	Regulations established to assure that underground injection will not endanger drinking water sources.	If the contingency component of this alternative is needed, *in-situ* treatment will be implemented in compliance with these standards.
RCRA, Interim Status Treatment, Storage, and Disposal Facility Standards, Chemical, Physical and Biological Treatment: 40 C.F.R. Part 265 Subpart Q	40 CFR, Part 265 Subpart Q	Relevant and Appropriate	Standards for operating chemical, physical and biological treatment systems, including the proper handling of reagents, system maintenance, and closure procedures.	If the contingency component of this alternative is needed, *in-situ* treatment will be implemented in compliance with these standards.
EPA Groundwater Protection Strategy	August 1984; NCP Preamble, Vol. 55, No. 46, March 8, 1990, 40 CFR 300, p. 8733); Guidelines for Ground-Water Classification (November 1986)	To Be Considered	The Groundwater Protection Strategy provides a common reference for preserving clean groundwater and protecting the public health against the effects of past contamination. Guidelines for consistency in groundwater protection programs focus on the highest beneficial use of a groundwater aquifer.	Institutional controls will prohibit use of site bedrock groundwater for non-drinking water (irrigation well) uses throughout the area where non-drinking water cleanup standards are exceeded in the underlying groundwater aquifer and the source control measures of Alternative GW/SW-3b and natural processes will work to reduce COC concentrations over to achieve cleanup standards in over 100 years. If drinking water cleanup standards are found to be exceeded within the area of Bungay River Resource Protection District (BRWRPD), the contingency portion of this alternative will implemented, including 1) ICs to prohibit use of bedrock groundwater as drinking water within that BRWRPD area until groundwater cleanup standards are achieved and permanent institutional controls to prevent the installation of wells within the potentially impacted portion of the BRWRPD to prevent plume migration from the contaminated non-drinking water area into the District; 2) expansion of the monitoring area to include impacted groundwater within the BRWRPD; and 3) *in-situ* bedrock injections to further work to reduce COC concentrations to achieve drinking water standards in the BRWRPD.

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ACTION-SPECIFIC ARARs AND TBCs
ALTERNATIVE BR-3: INSTITUTIONAL CONTROLS AND CONTINGENCY REMEDY OF FOCUSED IN-SITU INJECTIONS (WEST OF NORTH AVENUE)
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Requirement	Citation	Status	Requirement Synopsis	Action to Be Taken to Attain Requirement
Generation of investigation derived waste.	USEPA OSWER Publication 9345.3-03 FS (January 1992)	To Be Considered	Guidance on the management of Investigation Derived Waste (IDW) in a manner that ensures protection of human health and the environment.	IDW generated as part of this remedial alternative will be managed based on guidance standards.
State Standards				
Solid Waste Management Facility Regulations	310 CMR 19.00	Applicable	The regulations contain requirements for disposal of solid wastes.	Any wastes generated by remedial activity that are determined to not be hazardous wastes will be managed in accordance with this regulation.
Massachusetts Drinking Water Regulations	310 CMR 22.00	Relevant and Appropriate	These standards establish Massachusetts Maximum Contaminant Levels (MA MCLs) for organic and inorganic contaminants that have been determined to adversely affect human health in public drinking water supply systems.	Groundwater monitoring using these standards will ensure that contamination present in the non- potable aquifer does not migrate into the downgradient drinking water aquifer within the BRWRPD. If the contingency remedy is required, groundwater within the BRWRPD will be monitored to determine when these standards have been achieved.
Underground Injection Control	310 CMR 27.00	Applicable	These regulations protect underground sources of drinking water by regulating the underground injection of hazardous wastes, fluids used for extraction of minerals, oil, and energy and any other fluids having potential to contaminate groundwater as required by the Federal Safe Drinking Water Act.	If the contingency component of this alternative is needed, *in-situ* treatment will be implemented in compliance with these standards.
Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes	310 CMR 30.100	Applicable	Massachusetts is delegated to administer RCRA through its State regulations. These regulations establish requirements for determining whether wastes are characteristic hazardous waste.	Any wastes generated by remedial activities including drilling for well installation and groundwater monitoring or drilling for bedrock injections, if the contingency component is needed, will be analyzed under these standards to determine whether they are characteristic hazardous waste. Non-hazardous materials will be disposed appropriately. Contaminated soil from well drilling, as well as any groundwater removed, meeting characteristic hazardous waste standards will be disposed of off-site at a licensed facility.

TABLE 3c
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Massachusetts Hazardous Waste Management Rules – Requirements for Generators	310 CMR 30.300	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to off-site disposal.	Wastes generated during remedial actions that are determined to be hazardous would be managed in accordance with these requirements.
Massachusetts Hazardous Waste Rules - Containers	310 CMR 30.680	Applicable	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	If any remedial activity generates hazardous wastes that will be stored in containers, the containers will be managed in accordance with the substantive requirements of these regulations.
Massachusetts Hazardous Waste Rules - Management, Storage, and Treatment in Tanks	310 CMR 30.690	Applicable	These standards specify requirements for tank systems used to store or treat hazardous waste. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	If any remedial activity generates hazardous wastes that will be stored in tanks, the tanks will be managed in accordance with the substantive requirements of these regulations.
Massachusetts Clean Water Act; Surface Water Discharge Permit Regulations	314 CMR 3.00	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any water generated during drilling for well installation and groundwater monitoring or during *in-situ* bedrock injection, if the contingency component is needed, will be treated to meet discharge standards if the water is to be discharged to surface waters.
Massachusetts Clean Water Act; MA Surface Water Quality Standards (MSWQS)	314 CMR 4.00	Relevant and Appropriate	These standards designate the most sensitive uses for which the various waters of the Commonwealth shall be enhanced, maintained, or protected. Minimum water quality criteria required to sustain the designated uses are established.	Will be used as performance standards to monitor surface water and sediments, if required, during the remedial action.

Appendix E

References

References

AECOM, 2019a. Revised Draft Final Baseline Human Health Risk Assessment, Walton & Lonsbury Superfund Site, Attleboro, Massachusetts. Prepared for: USEPA Region I, Boston, Massachusetts, Contract EP-S1-06-01. May.

AECOM, 2019b. Final Baseline Ecological Risk Assessment, Walton & Lonsbury Superfund Site, Attleboro, Massachusetts. Prepared for: USEPA Region I, Boston, Massachusetts, Contract EP-S1-06-01. May.

AECOM, 2019c. Draft Final Remedial Investigation, Walton & Lonsbury Superfund Site, Attleboro, Massachusetts. Prepared for: USEPA Region I, Boston, Massachusetts, Contract EP-S1-06-01. June.

AECOM, 2019d. Draft Final Feasibility Study, Walton & Lonsbury Superfund Site, Attleboro, Massachusetts. Prepared for: USEPA Region I, Boston, Massachusetts, Contract EP-S1-06-01. July.

MassDEP, 2017. Groundwater Use and Value Determination, Walton & Lonsbury Superfund Site, Attleboro, Massachusetts. RTN #4-0000023. March.

USEPA, 1985. Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses, Office of Research and Development, PB85-227049.

Appendix F
Acronyms and Abbreviations

Acronyms and Abbreviations

ALM	Adult Lead Model
ARAR	Applicable or Relevant and Appropriate Requirement
AST	Aboveground Storage Tank
AVS	Acid Volatile Sulfides
BAF	Bioaccumulation Factor
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
BMP	Best Management Practice
BSAF	Biota-Sediment Accumulation Factor
CCC	Criterion Continuous Concentration
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulation
cm	Centimeter
CMC	Criterion Maximum Concentration
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
CSF	Cancer Slope Factor
CSM	Conceptual Site Model
CTE	Central Tendency Exposure
CWA	Clean Water Act
cy	cubic yard
EA	Exposure Area
EPC	Exposure Point Concentration
ESD	Explanation of Significant Difference
FEMA	Federal Emergency Management Agency
FS	Feasibility Study
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
IC	Institutional Control
IEUBK	Integrated Exposure Uptake Biokinetic
ILCR	Incremental Lifetime Cancer Risk
IUR	Inhalation Unit Risk
kg	Kilogram
LOEC	Lowest Observed Effects Concentration
MassDEP	Massachusetts Department of Environmental Protection
MassDEQE	Massachusetts Department of Environmental Quality Engineering
MCP	Massachusetts Contingency Plan
mg	Milligram
MM	Management of Migration
MOA	Mode of Action
msl	mean sea level
NAUL	Notice of Activity and Use Limitation

NCP	National Oil and Hazardous Substances Contingency Plan
NOEC	No Observed Effects Concentration
NPL	National Priorities List
NRWQC	National Recommended Water Quality Criteria
O&M	Operation and Maintenance
OEME	Office of Environmental Measurement and Evaluation
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbon
PCE	Tetrachloroethene
PDI	Pre-design investigation
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
ppb	Part Per Billion
PPE	Personal Protective Equipment
ppm	Part Per Million
PRB	Permeable Reactive Barrier
PRG	Preliminary Remediation Goal
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RfC	Reference Concentration
RfD	Reference Dose
RG	Remediation Goal
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
ROD	Record of Decision
RR	Residual Risk
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SEM	Simultaneously Extracted Metals
SHPO	State Historic Preservation Officer
SI	Site Investigation
SLERA	Screening-level Ecological Risk Assessment
SSDS	Sub-Slab Depressurization System
TBC	To-be-Considered
TCE	Trichloroethene
1,1,1-TCA	1,1,1-Trichloroethane
TCLP	Toxicity Characteristic Leaching Procedure
TDD	Total Daily Dose
THPO	Tribal Historic Preservation Officer
TMV	Toxicity, Mobility, or Volume
TOC	Total Organic Carbon
TRV	Toxicity Reference Value
UCL	Upper Concentration Limit
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
µg/dL	microgram per deciliter

VI	Vapor Intrusion
VISL	Vapor Intrusion Screening Level
VOC	Volatile Organic Compound
W&L	Walton & Lonsbury
ZVI	Zero-valent Iron

Appendix G

Administrative Record Index and Guidance Documents

Walton & Lonsbury Inc.
NPL Site Administrative Record
Record of Decision (ROD)

Index

ROD Signed: September 2019
Released: October 2019

Prepared by
EPA New England
Superfund & Emergency Management Division

Introduction to the Collection

This is the administrative record for the Walton & Lonsbury Inc. Superfund Site, Attleboro, Massachusetts, Record of Decision (ROD), signed September 2019. The file contains site-specific documents and a list of guidance documents used by EPA staff in selecting a response action at the site.

This record replaces the administrative record file for the Walton & Lonsbury Inc. Superfund Site, Attleboro, Massachusetts, Record of Decision (ROD) Proposed Plan, released July 2019. This record includes, by reference, administrative record for the Revised Removal Action, issued September 2013. Documents listed as bibliographic sources in individual reports might not be listed separately in the index.

The administrative record file is available for review at:

Online: https://go.usa.gov/xVQPS

Additional information about the site is also available at www.epa.gov/superfund/walton

EPA New England
SEMS Records and Information Center
5 Post Office Square, Suite 100 (02-3)
Boston, MA 02109-3912
(by appointment)
617-918-1440 (phone)
617-918-0440 (fax)

Attleboro Public Library
74 North Main Street
Attleboro, MA 02703
508-222-0157
http://attleborolibrary.org/

An administrative record is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

Questions about this administrative record should be directed to the EPA New England site manager, Ethan Finkel (617) 918-1293, finkel.ethan@epa.gov

AR 66025 Record of Decision (ROD) September 2019

Document ID	Title	Document Date	Page Count	Author	Addressee	Resource Type	Program Information	Access Control	Region	URL
639773	RECORD OF DECISION (ROD)	9/30/2019	174	R01: (US EPA REGION 1)		RPT / Report	053-REMEDIAL/0531-Remedy Characterization/05.04-RECORD OF DECISION (ROD)	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/639773
639774	LETTER REGARDING STATE CONCURRENCE WITH RECORD OF DECISION (ROD)	9/30/2019	2	R01: Locke, Paul, W (MA DEPT OF ENVIRONMENTAL PROTECTION)	R01: Olson, Bryan (US EPA REGION 1)	LTR / Letter	053-REMEDIAL/0531-Remedy Characterization/05.04-RECORD OF DECISION (ROD)	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/639774
100012263	RESPONSIVENESS SUMMARY, RECORD OF DECISION (ROD)	9/30/2019	2	R01: (US EPA REGION 1)		RPT / Report	053-REMEDIAL/0531-Remedy Characterization/05.03-RESPONSIVENESS SUMMARIES	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/100012263
100012280	EPA RESPONSE TO MA DEPT OF ENVIRONMENTAL PROTECTION (MADEP) COMMENTS REGARDING APLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) (EMAIL TRANSMITTAL WITH HISTORY ATTACHED)	9/25/2019	6	R01: Peterson, David (US EPA REGION 1)	R01: Buckley, David (MA DEPT OF ENVIRONMENTAL PROTECTION), R01: Cohen, Andrew (MA DEPT OF ENVIRONMENTAL PROTECTION)	EML / Email	053 - REMEDIAL / 0531 - Remedy Characterization / 04.05 - ARARS (FS)	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/100012280
100012232	TECHNICAL MEMORANDUM REGARDING REVISED IRRIGATION WELL SCENARIO PRELIMINARY REMEDIAL GOAL (PRG) FOR HEXAVALENT CHROMIUM	9/18/2019	1	R01: Sugatt, Richard (US EPA REGION 1)	R01: Finkel, Ethan (US EPA REGION 1)	MEMO / Memorandum	053-REMEDIAL/0531-Remedy Characterization/04.04-INTERIM DELIVERABLES (FS)	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/100012232
100012233	REPLACEMENT PAGES FOR DRAFT FINAL FEASIBILITY STUDY (FS), REVISED IRRIGATION WELL SCENARIO PRELIMINARY REMEDIATION GOAL (PRG) FOR HEXAVALENT CHROMIUM	9/18/2019	20	R01: Weir, Barbara (AECOM)	R01: Finkel, Ethan (US EPA REGION 1)	MEMO / Memorandum	053-REMEDIAL/0531-Remedy Characterization/04.06-FEASIBILITY STUDY REPORTS	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/100012233
100012188	MEMO REGARDING CORRECTION OF ERROR IN REVISED DRAFT FINAL BASELINE HUMAN HEALTH RISK ASSESSMENT (HHRA)	9/12/2019	219	R01: Weir, Barbara (AECOM)	R01: Finkel, Ethan (US EPA REGION 1)	MEMO / Memorandum	053-REMEDIAL/0531-Remedy Characterization/03.10-ENDANGERMENT/BASELINE RISK ASSESSMENTS	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/100012188
637768	ACTION MEMORANDUM - REQUEST FOR A REMOVAL ACTION	9/3/2019	15	R01: (US EPA REGION 1)		MEMO / Memorandum	054-REMOVAL/0541-Removal Responses/02.09-ACTION MEMORANDA	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/637768
100012062	CONCURRENCE TO LETTER REGARDING CONCLUSION OF REMEDIAL INVESTIGATION / FEASIBILITY STUDY (RI/FS), NATIONAL HISTORIC PRESERVATION ACT - SECTION 106 CONSULTATION	8/6/2019	3	R01: Simon, Brona (MA HISTORICAL COMMISSION)		LTR / Letter	053-REMEDIAL/0531-Remedy Characterization/16.01-CORRESPONDENCE (NATURAL RESOURCE TRUSTEE)	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/100012062
637921	NEWS ARTICLE: WALTON AND LONSBURY CLEANUP IN ATTLEBORO TO GO ON FOR YEARS	8/4/2019	4	R01: Rhodes, George, W (ATTLEBORO SUN CHRONICLE)		PUB / Publication	051-COMMUNITY INVOLVEMENT/0511-Community Involvement Activities/13.03-NEWS CLIPPINGS/PRESS RELEASES	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/637921
100012052	TRANSCRIPT OF FORMAL PUBLIC HEARING 07/31/2019	8/2/2019	16	R01: Buckley, Elaine (LEAVITT REPORTING INC)		MTG / Meeting Document	051-COMMUNITY INVOLVEMENT/0511-Community Involvement Activities/13.04-PUBLIC MEETINGS/HEARINGS	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/100012052
100012063	PUBLIC COMMENT REGARDING PROPOSED PLAN	8/2/2019	1	R01: Daugman, David (ATTLEBORO (MA) RESIDENT)	R01: White, Sarah (US EPA REGION 1)	LTR / Letter	053-REMEDIAL/0531-Remedy Characterization/05.03-RESPONSIVENESS SUMMARIES	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/100012063
637916	NEWS ARTICLE: EPA TO HOLD HEARING ON SUPERFUND SITE IN ATTLEBORO	7/31/2019	4	R01: (NBC 10 NEWS WJAR)		PUB / Publication	051-COMMUNITY INVOLVEMENT/0511-Community Involvement Activities/13.03-NEWS CLIPPINGS/PRESS RELEASES	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/637916
100012019	PRESENTATION: PUBLIC INFORMATIONAL MEETING, PROPOSED CLEANUP PLAN	7/31/2019	25	R01: Keefe, Daniel (US EPA REGION 1), R01: White, Sarah (US EPA REGION 1), R01: Buckley, David (MA DEPT OF ENVIRONMENTAL PROTECTION), R01: Weir, Barbara (AECOM), R01: Finkel, Ethan (US EPA REGION 1)		MTG / Meeting Document	051-COMMUNITY INVOLVEMENT/0511-Community Involvement Activities/13.04-PUBLIC MEETINGS/HEARINGS	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/100012019
637910	NEWS ARTICLE: PUBLIC MEETING SET TO DISCUSS EPA SUPERFUND SITE	7/27/2019	1	R01: (ASSOCIATED PRESS)		PUB / Publication	051-COMMUNITY INVOLVEMENT/0511-Community Involvement Activities/13.03-NEWS CLIPPINGS/PRESS RELEASES	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/637910

637902	PRESS RELEASE: EPA ANNOUNCES PROPOSED PLAN TO CLEAN UP THE WALTON AND LONSBURY SUPERFUND SITE IN ATTLEBORO, MA	7/25/2019	3	R01: (US EPA REGION 1)		PUB / Publication	051-COMMUNITY INVOLVEMENT/0511-Community Involvement Activities/13.03-NEWS CLIPPINGS/PRESS RELEASES	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/637902
637905	NEWS ARTICLE: EPA ANNOUNCES CLEANUP PLAN FOR ATTLEBORO SUPERFUND SITE	7/25/2019	3	R01: (PROVIDENCE BUSINESS NEWS)		PUB / Publication	051-COMMUNITY INVOLVEMENT/0511-Community Involvement Activities/13.03-NEWS CLIPPINGS/PRESS RELEASES	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/637905
637906	NEWS ARTICLE: EPA ANNOUNCES MORE CLEANUP FOR WALTON AND LONSBURY SUPERFUND SITE IN ATTLEBORO	7/25/2019	5	R01: Rhodes, George, W (ATTLEBORO SUN CHRONICLE)		PUB / Publication	051-COMMUNITY INVOLVEMENT/0511-Community Involvement Activities/13.03-NEWS CLIPPINGS/PRESS RELEASES	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/637906
635795	LETTER REGARDING CONCLUSION OF REMEDIAL INVESTIGATION / FEASIBILITY STUDY (RI/FS), NATIONAL HISTORIC PRESERVATION ACT - SECTION 106 CONSULTATION	7/9/2019	3	R01: Finkel, Ethan (US EPA REGION 1)	R01: Washington, Bettina (WAMPANOAG TRIBE OF GAYHEAD), R01: Simon, Brona (MA HISTORICAL COMMISSION), R01: Peters, Ramona (WAMPANOAG TRIBE)	LTR / Letter	053 - REMEDIAL / 0531 - Remedy Characterization / 16.01 - CORRESPONDENCE (NATURAL RESOURCE TRUSTEE)	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/635795
100011964	DRAFT FEASIBILITY STUDY (FS)	7/1/2019	713	R01: (AECOM)	R01: (US EPA)	RPT / Report	053-REMEDIAL/0531-Remedy Characterization/04.06-FEASIBILITY STUDY REPORTS	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/100011964
635756	PROPOSED PLAN	7/1/2019	37	R01: (US EPA REGION 1)		RPT / Report	053-REMEDIAL/0531-Remedy Characterization/04.09-PROPOSED PLANS FOR SELECTED REMEDIAL ACTION	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/635756
100011962	DRAFT FINAL REMEDIAL INVESTIGATION (RI) REPORT, VOLUME 1 OF 2: TEXT, TABLES, AND FIGURES	6/1/2019	519	R01: (AECOM)	R01: (US EPA)	RPT / Report	053-REMEDIAL/0531-Remedy Characterization/03.06-REMEDIAL INVESTIGATION REPORTS	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/100011962
100011963	DRAFT FINAL REMEDIAL INVESTIGATION (RI) REPORT, VOLUME 2 OF 2: APPENDICES A-Z	6/1/2019	4154	R01: (AECOM)	R01: (US EPA)	RPT / Report	053-REMEDIAL/0531-Remedy Characterization/03.06-REMEDIAL INVESTIGATION REPORTS	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/100011963
100011929	DRAFT FINAL BASELINE HUMAN HEALTH RISK ASSESSMENT (HHRA) - REVISED	5/7/2019	1543	R01: (AECOM)	R01: (US EPA)	RPT / Report	053 - REMEDIAL / 0531 - Remedy Characterization / 03.10 - ENDANGERMENT/BASELINE RISK ASSESSMENTS	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/100011929
100011928	DRAFT FINAL BASELINE ECOLOGICAL RISK ASSESSMENT	5/1/2019	2263	R01: (AECOM)	R01: (US EPA)	RPT / Report	053 - REMEDIAL / 0531 - Remedy Characterization / 03.10 - ENDANGERMENT/BASELINE RISK ASSESSMENTS	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/100011928
635786	EMAIL REGARDING REASONABLE MAXIMUM EXPOSURE FREQUENCY TO RESIDENTIAL WETLAND SOIL	6/11/2018	1	R01: Sugatt, Richard (US EPA REGION 1)	R01: Finkel, Ethan (US EPA REGION 1)	EML / Email	053 - REMEDIAL / 0531 - Remedy Characterization / 03.09 - HEALTH ASSESSMENTS	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/635786
100011375	EMAIL REGARDING MEETING SUMMARY (05/07/2018 MEETING NOTES ATTACHED)	5/18/2018	3	R01: Finkel, Ethan (US EPA REGION 1)	R01: Heroux, Paul (CITY OF ATTLEBORO)	EML / Email	053 - REMEDIAL / 0531 - Remedy Characterization / 03.01 - CORRESPONDENCE (RI)	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/100011375
635785	EMAIL REGARDING FUTURE PROPERTY ZONING USE (EMAIL HISTORY ATTACHED)	5/11/2018	1	R01: Craffey, Paul (MA DEPT OF ENVIRONMENTAL PROTECTION)	R01: Finkel, Ethan (US EPA REGION 1)	EML / Email	053 - REMEDIAL / 0534 - Post Construction / 08.01 - CORRESPONDENCE (POST REMEDIAL ACTION)	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/635785
635787	EMAIL REGARDING REASONABLE MAXIMUM EXPOSURE FREQUENCY FOR SOUTHERN WETLAND SEDIMENT (EMAIL HISTORY ATTACHED)	4/23/2018	1	R01: Buckley, David (MA DEPT OF ENVIRONMENTAL PROTECTION)	R01: Finkel, Ethan (US EPA REGION 1)	EML / Email	053 - REMEDIAL / 0531 - Remedy Characterization / 03.09 - HEALTH ASSESSMENTS	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/635787
100011369	LETTER REPORT REGARDING GROUNDWATER USE AND VALUE DETERMINATION	3/27/2018	14	R01: Buckley, David (MA DEPT OF ENVIRONMENTAL PROTECTION)	R01: Finkel, Ethan (US EPA REGION 1)	RPT / Report	053 - REMEDIAL / 0531 - Remedy Characterization / 16.01 - CORRESPONDENCE (NATURAL RESOURCE TRUSTEE)	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/100011369
100011376	TREATABILITY TEST REPORT - BENCH TESTING HEXAVALENT CHROMIUM TREATMENT	3/1/2017	2648	R01: (AECOM)	R01: (US EPA REGION 1)	RPT / Report	053 - REMEDIAL / 0531 - Remedy Characterization / 03.04 - INTERIM DELIVERABLES (RI)	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/100011376
500024647	Updated Scientific Considerations for Lead in Soil Cleanups. 9200.2-167	12/22/2016	3	R11: Stanislaus, Mathy (Environmental Protection Agency)		MEMO / Memorandum	053-REMEDIAL/0533-Remedial Action	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/500024647

588000	MEMO REGARDING CONSTRUCTION WORKER RISK SCREENING	7/6/2016	24	R01: Weir, Barbara (AECOM), R01: Silverman, Diane (TRC SOLUTIONS)	R01: Keefe, Daniel (MA DEPT OF ENVIRONMENTAL PROTECTION)	CORR / Correspondence	053-REMEDIAL/0531-Remedy Characterization/03.10-ENDANGERMENT/BASELINE RISK ASSESSMENTS	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/588000
100000133	RECOMMENDATIONS FOR SIEVING SOIL AND DUST SAMPLES AT LEAD SITES FOR ASSESSMENT OF INCIDENTAL INGESTION	7/1/2016	34	R11: (US ENVIRONMENTAL PROTECTION AGENCY)		LAWS / Laws/Regulations/Guidance	058-PROGRAM SUPPORT/0583-Regulatory Development/B8.1-Regulations, Standards & Guidelines, 058-PROGRAM SUPPORT/0583-Regulatory Development/B8.4-Directives and Policy Guidance Documents	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/100000133
196702	VAPOR INTRUSION SCREENING LEVEL (VISL) CALCULATOR V3.5.1	5/1/2016	1	R11: (US ENVIRONMENTAL PROTECTION AGENCY)		OTH / Other	053-REMEDIAL/0532-Remedial Design/A4.3-Remedial Design	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/196702
586419	LETTER REGARDING EPA CONTAINED-IN DETERMINATION FOR OFF-SITE SHIPMENTS OF INVESTIGATION-DERIVED WASTE	1/13/2016	4	R01: Keefe, Daniel (US EPA REGION 1)	R01: Weir, Barbara (AECOM)	CORR / Correspondence	053-REMEDIAL/0531-Remedy Characterization/03.01-CORRESPONDENCE (RI)	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/586419
190145	OSWER TECHNICAL GUIDE FOR ASSESSING AND MITIGATING THE VAPOR INTRUSION PATHWAY FROM SUBSURFACE VAPOR SOURCES TO INDOOR AIR	6/1/2015	267			LAWS / Laws/Regulations/Guidance	058-PROGRAM SUPPORT/0583-Regulatory Development/B8.1-Regulations, Standards & Guidelines	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/190145
100000002	GUIDANCE FOR SAMPLE COLLECTION FOR IN VITRO BIOACCESSIBILITY ASSAY FOR LEAD (Pb) IN SOIL, OSWER 9200.3-100	3/1/2015	16	R11: (US ENVIRONMENTAL PROTECTION AGENCY)		LAWS / Laws/Regulations/Guidance	058-PROGRAM SUPPORT/0583-Regulatory Development/B8.1-Regulations, Standards & Guidelines	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/100000002
564348	LETTER INITIATING CONSULTATION WITH STATE HISTORIC PRESERVATION OFFICER AND WAMPANOAG TRIBE, AND NOTIFICATION OF REMEDIAL INVESTIGATION / FEASIBILITY STUDY (RI/FS)	10/1/2014	6	R01: Keefe, Daniel (US EPA REGION 1)	R01: Washington, Bettina (WAMPANOAG TRIBE OF GAYHEAD), R01: Simon, Brona (MA HISTORICAL COMMISSION), R01: Peters, Ramona (WAMPANOAG TRIBE)	LTR / Letter	053 - REMEDIAL / 0531 - Remedy Characterization / 16.01 - CORRESPONDENCE (NATURAL RESOURCE TRUSTEE)	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/564348
566302	HEALTH CONSULTATION, EVALUATION OF RESIDENTIAL INDOOR AIR [TRANSMITTAL LETTER ATTACHED]	9/18/2014	75	R01: (MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH)		RPT / Report	053 - REMEDIAL / 0531 - Remedy Characterization / 03.09 - HEALTH ASSESSMENTS	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/566302
565488	LETTER NOTIFYING NATURAL RESOURCE TRUSTEE OF UPCOMING REMEDIAL INVESTIGATION / FEASIBILITY STUDY (RI/FS)	5/13/2014	4	R01: Keefe, Daniel (US EPA REGION 1)	R01: Sullivan, Richard K Jr (MA EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS)	LTR / Letter	053 - REMEDIAL / 0531 - Remedy Characterization / 16.04 - TRUSTEE NOTIFICATION FORM AND SELECTION GUIDE	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/564488
635793	LETTER NOTIFYING NATURAL RESOURCE TRUSTEE OF UPCOMING REMEDIAL INVESTIGATION / FEASIBILITY STUDY (RI/FS)	5/13/2014	4	R01: Keefe, Daniel (US EPA REGION 1)	R01: Finkelstein, Kenneth (US NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION)	LTR / Letter	053 - REMEDIAL / 0531 - Remedy Characterization / 16.04 - TRUSTEE NOTIFICATION FORM AND SELECTION GUIDE	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/635793
635794	LETTER NOTIFYING NATURAL RESOURCE TRUSTEE OF UPCOMING REMEDIAL INVESTIGATION / FEASIBILITY STUDY (RI/FS)	5/13/2014	4	R01: Keefe, Daniel (US EPA REGION 1)	R01: Raddant, Andrew (US DEPT OF INTERIOR)	LTR / Letter	053 - REMEDIAL / 0531 - Remedy Characterization / 16.04 - TRUSTEE NOTIFICATION FORM AND SELECTION GUIDE	UCTL(Uncontrolled)	1	https://semspub.epa.gov/src/document/01/635794
140530	RISK ASSESSMENT GUIDANCE FOR SUPERFUND VOLUME I: HUMAN HEALTH EVALUATION MANUAL (RAGS) PART F, SUPPLEMENTAL GUIDANCE FOR INHALATION RISK ASSESSMENT	1/1/2009	68			LAWS / Laws/Regulations/Guidance	058-PROGRAM SUPPORT/0583-Regulatory Development/B8.1-Regulations, Standards & Guidelines, 058-PROGRAM SUPPORT/0583-Regulatory Development/B8.4-Directives and Policy Guidance Documents	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/140530
175344	SHORT SHEET - ESTIMATING THE SOIL LEAD CONCENTRATION TERM FOR THE INTEGRATED EXPOSURE UPTAKE BIOKINETIC (IEUBK) MODEL - OSWER 9200.1-78	9/1/2007	11	R11: (US ENVIRONMENTAL PROTECTION AGENCY)		LAWS / Laws/Regulations/Guidance	058-PROGRAM SUPPORT/0583-Regulatory Development/B8.1-Regulations, Standards & Guidelines, 058-PROGRAM SUPPORT/0583-Regulatory Development/B8.4-Directives and Policy Guidance Documents	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/175344

195	RISK ASSESSMENT GUIDANCE FOR SUPERFUND (RAGS), VOLUME 9 - HUMAN HEALTH EVALUATION MANUAL, PART E: SUPPLEMENTAL GUIDANCE FOR DERMAL RISK ASSESSMENT	7/1/2004	156			LAWS / Laws/Regulations/Guidance	[illegible] Regulatory Development/B8.1-Regulations, Standards & Guidelines, 058-PROGRAM SUPPORT/0583-Regulatory Development/B8.4-Directives and Policy Guidance Documents	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/195
112636	GUIDANCE FOR COMPARING BACKGROUND AND CHEMICAL CONCENTRATIONS IN SOIL FOR CERCLA SITES	9/1/2002	89	R11: (US ENVIRONMENTAL PROTECTION AGENCY)		LAWS / Laws/Regulations/Guidance	052-ENFORCEMENT, 052-ENFORCEMENT/0521-PRP Search/A6.1-PRP-Specific Enforcement, 058-PROGRAM SUPPORT/0583-Regulatory Development/B8.1-Regulations, Standards & Guidelines, 058-PROGRAM SUPPORT/0583-Regulatory Development/B8.4-Directives and Policy Guidance Documents	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/112636
175137	RISK ASSESSMENT GUIDANCE FOR SUPERFUND: VOLUME I HUMAN HEALTH EVALUATION MANUAL RAGS) PART D, STANDARDIZED PLANNING, REPORTING, AND REVIEW OF SUPERFUND RISK ASSESSMENTS) - FINAL	12/1/2001	218			LAWS / Laws/Regulations/Guidance	058-PROGRAM SUPPORT/0583-Regulatory Development/B8.1-Regulations, Standards & Guidelines	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/175137
189662	GUIDELINES FOR ECOLOGICAL RISK ASSESSMENT	4/1/1998	188			RPT / Report	053-REMEDIAL, 058-PROGRAM SUPPORT/0583-Regulatory Development/B8.1-Regulations, Standards & Guidelines	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/189662
157968	EPA RULES OF THUMB FOR SUPERFUND REMEDY SELECTION	8/1/1997	26				053-REMEDIAL, 053-REMEDIAL/0531-Remedy Characterization/A4.2-Record of Decision/Remedy Selection	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/157968
157941	ECOLOGICAL RISK ASSESSMENT GUIDANCE FOR SUPERFUND: PROCESS FOR DESIGNING AND CONDUCTING ECOLOGICAL RISK ASSESSMENTS - INTERIM FINAL	6/1/1997	239			LAWS / Laws/Regulations/Guidance	053-REMEDIAL, 053-REMEDIAL/0531-Remedy Characterization/A4.2-Record of Decision/Remedy Selection, 058-PROGRAM SUPPORT/0583-Regulatory Development/B8.1-Regulations, Standards & Guidelines	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/157941
157100	GUIDANCE MANUAL FOR THE INTEGRATED EXPOSURE UPTAKE BIOKINETIC MODEL FOR LEAD IN CHILDREN	2/1/1994	248				053-REMEDIAL, 053-REMEDIAL/0531-Remedy Characterization/A4.2-Record of Decision/Remedy Selection	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/157100
156759	GUIDANCE FOR DATA USEABILITY IN RISK ASSESSMENT (PART B) - FINAL	5/1/1992	74			LAWS / Laws/Regulations/Guidance	053-REMEDIAL, 053-REMEDIAL/0531-Remedy Characterization/A4.2-Record of Decision/Remedy Selection, 058-PROGRAM SUPPORT/0583-Regulatory Development/B8.1-Regulations, Standards & Guidelines	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/156759
127549	SUPPLEMENTAL GUIDANCE TO RAGS: CALCULATING THE CONCENTRATION TERM	5/1/1992	8			LAWS / Laws/Regulations/Guidance	[illegible] Regulatory Development/B8.1-Regulations, Standards & Guidelines, 058-PROGRAM SUPPORT/0583-Regulatory Development/B8.4-Directives and Policy Guidance Documents	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/127549
156756	GUIDANCE FOR DATA USEABILITY IN RISK ASSESSMENT (PART A) - FINAL	4/1/1992	282			LAWS / Laws/Regulations/Guidance	053-REMEDIAL, 053-REMEDIAL/0531-Remedy Characterization/A4.2-Record of Decision/Remedy Selection, 058-PROGRAM SUPPORT/0583-Regulatory Development/B8.1-Regulations, Standards & Guidelines	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/156756

190620	FRAMEWORK FOR ECOLOGICAL RISK ASSESSMENT	2/1/1992	57			RPT / Report	058-PROGRAM SUPPORT/0583-Regulatory Development/B8.1-Regulations, Standards & Guidelines	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/190620
192	RISK ASSESSMENT GUIDANCE FOR SUPERFUND (RAGS), VOLUME I - HUMAN HEALTH EVALUATION MANUAL, PART B: DEVELOPMENT OF RISK-BASED PRELIMINARY REMEDIATION GOALS	12/1/1991	57			LAWS / Laws/Regulations/Guidance	058-PROGRAM SUPPORT/0583-Regulatory Development/B8.1-Regulations, Standards & Guidelines, 058-PROGRAM SUPPORT/0583-Regulatory Development/B8.4-Directives and Policy Guidance Documents	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/192
156748	A Guide to Principal Threat and Low Level Threat Wastes Office	11/1/1991	4				053-REMEDIAL, 053-REMEDIAL/0531-Remedy Characterization/A4.2-Record of Decision/Remedy Selection	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/156748
191	RISK ASSESSMENT GUIDANCE FOR SUPERFUND (RAGS), VOLUME I-HUMAN HEALTH EVALUATION MANUAL, PART A	12/1/1989	288			LAWS / Laws/Regulations/Guidance	058-PROGRAM SUPPORT/0583-Regulatory Development/B8.1-Regulations, Standards & Guidelines, 058-PROGRAM SUPPORT/0583-Regulatory Development/B8.4-Directives and Policy Guidance Documents	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/191
174527	SUPERFUND LDR GUIDE #5 DETERMINING WHEN LAND DISPOSAL RESTRICTIONS (LDRS) ARE APPLICABLE TO CERCLA RESPONSE ACTIONS OSWER 9347.3-05FS	7/1/1989	4					UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/174527
199078	Interim Final Guidance on Preparing Superfund Decision Documents	6/30/1989	209			LAWS / Laws/Regulations/Guidance	058-PROGRAM SUPPORT	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/199078
128301	Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final, OSWER Directive 9355.3-01	10/1/1988	186			LAWS / Laws/Regulations/Guidance	058-PROGRAM SUPPORT/0583-Regulatory Development/B8.4-Directives and Policy Guidance Documents	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/128301
174076	CERCLA COMPLIANCE WITH OTHER LAWS MANUAL: INTERIM FINAL EPA/540/G-89/006	8/1/1988	243			LAWS / Laws/Regulations/Guidance	058-PROGRAM SUPPORT/0583-Regulatory Development/B8.1-Regulations, Standards & Guidelines	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/174076
101190	OSWER Directive 9285.5-1: Superfund Exposure Assessment Manual; Compendium 5013	4/1/1988	164				058-PROGRAM SUPPORT/0583-Regulatory Development/B8.4-Directives and Policy Guidance Documents	UCTL(Uncontrolled)	11	https://semspub.epa.gov/src/document/11/101190