Creese & Cook Tannery Site

Danvers, MA

U.S. EPA | HAZARDOUS WASTE PROGRAM AT EPA NEW ENGLAND

THE SUPERFUND PROGRAM protects human health and the environment by locating, investigating, and cleaning up abandoned hazardous waste sites and engaging communities throughout the process. Many of these sites are complex and need long-term cleanup actions. Those responsible for contamination are held liable for cleanup costs. EPA strives to return previously contaminated land and ground-water to productive use.

CLEANUP PROPOSAL SNAPSHOT

EPA's Proposed Plan for the soil contamination at the Creese & Cook Tannery (Former) Superfund (Site) in Danvers, Massachusetts generally includes the following elements in each of the identified geographic areas:

East Study Area (ESA) (areas located on the east side of the Crane River)

- Excavate approximately 4,300 cubic yards of contaminated soil up to three feet deep from certain paved and unpaved locations at 33 and 45 Water Street and restore excavated areas with a clean soil cover, landscaping, and/or asphalt; consolidate non-hazardous material on northwestern portion of 55 Clinton Avenue.
- Excavate approximately 9,600 cubic yards of contaminated soil up to three feet deep from certain unpaved locations at the MBTA Right of Way and 35 Water Street and restore excavated areas with clean soil cover and vegetation; dispose of all excavated material at an appropriate off-site facility.
- Dewater and excavate approximately 2,600 cubic yards of contaminated soil up to two feet deep from the Riverfront Area and restore excavated area with clean soil and vegetation; excavate the lead hot spot area on 20 Cheever Street and restore excavated areas with a clean soil cover and vegetation; consolidate non-hazardous material on the northwestern portion of 55 Clinton Avenue and dispose of any soils meeting the definition of hazardous waste at an appropriate off-site facility.

West Study Area (WSA) (areas located on the west side of the Crane River)

- Excavate up to four feet of contaminated soil south of the former beamhouse to provide for unrestricted use, excavate the remaining area up to three feet deep (totaling approximately 32,700 cubic yards of contaminated soil) from 55 and 27 Clinton Avenue, and placement of a clean soil cover and landscaping; consolidate and cap non-hazardous material on the northwestern portion of 55 Clinton Avenue. EPA may also consider shipping other higher concentration materials off-site, if appropriate, such as soils that exceed the state's Upper Concentration Limits (UCLs).

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Excavated soil from the ESA or WSA that meets the definition of hazardous waste will be disposed of at an appropriate off-site facility.

The overall remedy will also include land use controls to protect the remedy where unrestricted use standards are not achieved, long-term monitoring and maintenance, and periodic five-year reviews to ensure protectiveness of the remedy. EPA's proposed remedy for the ESA and WSA, including construction, operation and maintenance (O&M) and long-term monitoring, is estimated to cost approximately $24.7 million in net present value and is estimated to take approximately three to four years to properly design and implement. The Crane River portion of the Site will be addressed as a separate operable unit. A more detailed description of this proposal for the ESA and WSA areas is outlined in this document and in the Feasibility Study, dated September 2018.

A CLOSER LOOK AT EPA'S PROPOSED CLEANUP APPROACH

The ESA Final Remedial Investigation (RI) Report dated March 2018, and the WSA Final RI dated September 2018, summarize the nature and extent of contamination at the Site and were used to prepare a September 2018 Feasibility Study (FS) that identifies all the options EPA considered for the proposed cleanup. The FS evaluated the efficacy of different cleanup options (also called "alternatives") to restrict access to, contain, remove, and/or treat contamination to protect human health and the environment by preventing risk of exposure to Site-related contaminants in soil. Based upon the alternatives evaluated in the Feasibility Study, EPA is proposing the following long-term cleanup approach for the ESA and WSA areas of the Site:

YOUR OPINION COUNTS: OPPORTUNITIES TO COMMENT ON THE PLAN

EPA will be accepting public comments on this proposed cleanup plan from October 9, 2018 through November 9, 2018. You don't have to be a technical expert to comment. If you have a concern, suggestion, or preference regarding this Proposed Plan, EPA wants to hear from you before making a final decision on how to protect your community.

EPA is also specifically soliciting public comment concerning its determination that the alternatives chosen are the least damaging practicable alternatives for protecting wetland and floodplain resources.

Comments can be sent by mail, e-mail, or fax. People also can offer oral or written comments at a formal public hearing (see page 35 for details). If you have specific needs for the upcoming public meeting or hearing, questions about the facility and its accessibility, or questions on how to comment, please contact Kate Melanson (see below).

Public Informational Meetings

Thurs, Oct. 25 at 6 p.m.
Riverside Elelmentary School,
95 Liberty St., Danvers, MA

Formal Public Hearings

Thurs, Oct. 25 at 7:30 p.m.
Riverside Elelmentary School,
95 Liberty St., Danvers, MA

In accordance with Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the law that established the Superfund program, this document summarizes EPA's cleanup proposal. For detailed information on the cleanup options evaluated for use at the Site, see the Creese & Cook Tannery (Former) Superfund Site – East and West Feasibility Study and other documents contained in the Site's Administrative Record, which are available for review online at www.epa.gov/superfund/creese or at the Site information repositories at the Peabody Institute Library, 15 Sylvan Street in Danvers, MA and the EPA Region 1 Records Center, 5 Post Office Square, First Floor, Boston, MA 02109.

ESA SOIL

EPA's preferred soil cleanup alternative for 33 and 45 Water Street is ESA Residential-2A-Soil Excavation (0-3 ft), which includes the following components:

- Excavate (0-3 feet below ground surface (ft bgs)) approximately 4,300 cubic yards (CY) of contaminated soil that exceed Proposed Cleanup Levels (PCLs) from paved and unpaved locations at 33 and 45 Water Street (excluding under buildings). See table 1 for the PCLs for each contaminant of concern.
- Backfill excavation with clean soil cover and restore landscaping or asphalt to its original condition.
- Off-site disposal of hazardous waste and potentially any soil exceeding UCLs
- Onsite consolidation, grading and capping of non-hazardous material on the northwestern portion of 55 Clinton Avenue
- Wetland restoration
- Institutional Controls, where necessary, to limit future excavation and other activities that could pose a risk
- Long-term operation and maintenance of soil covers
- Five-year reviews to ensure that the remedy remains protective

EPA's preferred soil cleanup alternative for the MBTA Right of Way and MBTA property located at 35 Water Street is ESA MBTA-3-Soil Excavation (0-3 ft), which includes the following components:

- Excavate (0-3 ft bgs) approximately 9,600 CY of contaminated soil that exceed PCLs from the MBTA Right of Way and 35 Water Street (excluding under monuments) after removal and recycling of railroad tracks
- Off-site disposal of all excavated material
- Backfill excavation with clean soil cover and restore vegetation to its original condition.
- Wetland restoration
- Institutional Controls, where necessary, to limit future excavation and other activities that could pose a risk
- Long-term operation and maintenance of soil cover
- Five-year reviews to ensure that the remedy remains protective

EPA's preferred soil cleanup alternative for the ESA Riverfront soil is ESA Riverfront 2A-Soil Excavation (0-2 ft), which includes the following components:

- Using temporary cofferdams, dewater and excavate (0-2 ft bgs) approximately 2,600 CY of contaminated soil that exceeds PCLs from the Riverfront Area
- Excavate soils that exceed UCLs on 20 Cheever Street
- Backfill excavations with clean soil cover and restore vegetation
- Offsite disposal of hazardous waste and potentially material exceeding UCLs
- Onsite consolidation, grading, and capping of non-hazardous material on northwestern portion of 55 Clinton Avenue
- Wetland restoration
- Institutional Controls, where necessary, to limit future excavation and other activities that could pose a risk
- Long-term operation and maintenance of soil covers
- Five-year reviews to ensure that the remedy remains protective

EPA's preferred soil cleanup alternative for the WSA soil is WSA-2-Comprehensive Soil Excavation South of Former Beamhouse and surface excavation (0-3 ft) of the remaining WSA area, which includes the following components:

- Excavate all contaminated soil south of the former beamhouse to levels that allow for unrestricted use and backfill with clean soil (estimated up to 4 ft bgs) and excavation (0-3 ft bgs or up to 10 ft for soil exceeding UCLs) of remaining area (excluding consolidation and cemetery areas), approximately 32,700 CY of contaminated soil, from 55 and 27 Clinton Avenue
- Backfill with clean soil cover and restore vegetation.
- Off-site disposal of hazardous waste and soil exceeding UCLs
- Construction of on-site consolidation area on 55 Clinton Avenue
- On-site consolidation and capping of soil and beamhouse building debris with a permeable cap type cap (also referred to as a RCRA-D cap) on the northern portion of 55 Clinton Avenue
- Construct storm water controls
- Wetland restoration
- Institutional Controls, where necessary, to limit future excavation and other activities that could pose a risk
- Long-term operation and maintenance of the soil covers and consolidation area cap, including groundwater monitoring around capped area
- Five-year reviews to ensure the remedy remains protective

Figures 1 through 7 show the approximate depths and locations of planned soil excavations for both the East and West Study Areas as well as the conceptual construction layout. Prior to completing the Remedial Design, a Pre-design Investigation (PDI) will be performed at each area and will include various surveys such as a detailed utility survey for developed parcels, a wetland delineation (and use and value evaluation), and a soil investigation to confirm existing disposal assumptions and volume of hazardous waste soil. An archeological survey will be conducted at the MBTA ROW, ESA Riverbank, and WSA areas. All proposed actions also include temporary fencing and signage, construction of temporary access roads, construction of temporary staging and decontamination areas (20 Cheever Street for ESA proposals; 55 Clinton for the WSA proposed action), and the use of erosion control measures. No soil will be staged or stockpiled at the ESA Residential area or the staging area at 20 Cheever Street.

EPA may explore opportunities and methods to expedite portions of the cleanup in residentially inhabited areas within the ESA.

GROUNDWATER

The proposed remedy does not address groundwater at the Site because conditions do not provide a basis for action, as explained further below. Over 115 groundwater samples were obtained from 28 groundwater monitoring wells, every three months for one year, from both the west and east study areas. Groundwater results had low and sporadic levels of contaminants that do not pose unacceptable risks. A human health risk assessment was performed, and the results indicate that there are no unacceptable risks to a construction worker from dermal contact with groundwater, which is located approximately 8-9 feet below the ground surface, or within construction trenches. Residents and occupants of commercial/industrial buildings on the Site are not expected to be exposed to Site groundwater. Groundwater underneath the Site is not a current or potential future drinking water supply. It is influenced by saline infiltration as a result of the Site's close location to the ocean. The area is supplied with potable drinking water by the town of Danvers. According to the Town of Danvers Board of Health, any potable water well must be installed at a depth greater than 100 ft bgs and would require authorization prior to any well installation. Danvers also requires that potable water wells are prohibited from being installed in or near septic systems or associated leach fields and cannot be installed in municipal easements.

No action was selected for groundwater and no groundwater remediation alternatives were evaluated.

EPA IS REQUESTING PUBLIC COMMENT ON THE FOLLOWING PROPOSED DETERMINATIONS:

Impacts to Wetlands and Floodplains

Section 404 of the Clean Water Act and Executive Order 11990 (Protection of Wetlands) require a determination that there is no practical alternative to taking federal actions in waters of the United States or wetlands. Should there be no alternative, the federal actions should minimize the destruction, loss, or degradation of these resources and preserve and enhance their natural and beneficial values. Through its analysis of the alternatives (See FS Report, Section 4.1), EPA has determined that because of the extensive existence of wetlands at this Site on both sides of the River (see Figure 1-5 of the FS) and the significant levels of Site-related waste that exists in these wetlands, there is no practicable alternative to conducting work in these areas. EPA is also required to make a determination that the clean-up alternatives that are conducted are the least damaging practicable alternatives. EPA has determined, through its analysis of the various alternatives, that the proposed clean-up alternatives which impact these wetland areas are the least damaging practicable alternatives. EPA will minimize potential harm and avoid adverse impacts to wetlands by using best management practices during excavation to minimize harmful impacts on the wetlands, wildlife or habitat, and by restoring these areas consistent with federal and state wetlands protection laws. Any wetlands affected by remedial work will be restored as a wetland area and such restoration will be monitored. Mitigation measures will be used to protect wildlife and aquatic life during remediation, as necessary.

Before EPA can select a clean-up alternative, Executive Order 11988 (Floodplain Management) and federal regulations require EPA to make a determination that there is no practicable alternative to activities that affect or result in the occupancy and modification of the floodplain. Through its analysis of alternatives (See FS Report, Section 4.1), EPA has determined that the proposed clean-up will cause temporary impacts but will not result in the occupancy and modification of floodplains. Similar to wetlands, properties on both sides of the Crane River are located within the 100-year and 500-year floodplains (see Figure 1-5 of the FS). While excavation and placement of soil covers are proposed for most of the Site properties located in floodplains, only temporary impacts to the floodplains are anticipated. Waste located within the floodplain will be excavated and backfilled with clean fill and restored to 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. Best management practices will be used during construction, which include erosion control measures, proper regrading, and restoration and monitoring of impacted areas. The proposed consolidation area at 55 Clinton Avenue is not located within the 500-year or100-year floodplain. More detail regarding wetland and floodplain management can be found in the FS Report. See Figures 5-1C, 5-2C, 5-3C, 5-4C, 5-5B, and 5-7B of the September 2018 FS for alternative specific impacts. Through this Proposed Plan, EPA is specifically soliciting public comment concerning its determination that the alternatives chosen are the least damaging practicable alternatives for protecting the Site wetland and floodplain resources.

VAPOR INTRUSION AND SUMP PUMP WATER IN BASEMENTS

A Vapor Intrusion (VI) risk evaluation was conducted to determine if low levels of groundwater contamination could volatilize and enter buildings through basements and/or sump pump, via indoor air, or if construction workers could be exposed to vapor from groundwater in construction trenches. The results of the VI risk evaluation confirmed that there are no unacceptable risks to residents living at 33 or 45 Water Street, to future residents at 55 and 27 Clinton Streets, or occupants of 12 Cheever Street, or to construction workers. Therefore, there is no basis to clean-up the groundwater to eliminate the risk via a VI pathway.

ESTIMATED COST

The estimated total present value of this proposed cleanup approach, including construction, operation and maintenance, and long-term monitoring, is approximately $24.7 million. Costs for all alternatives are presented in Table 2 and discussed in the September 2018 FS in greater detail.

POTENTIAL COMMUNITY IMPACTS

Contamination found in soil at the Creese Site consists mainly of metals, including arsenic and chromium. Other contaminants include dioxins/furans and Polycyclic Aromatic Hydrocarbons (PAHs) from railroad operations, combustion and asphalt. Metals tend to remain attached to the soil because they aren't easily mobile and don't readily volatilize into air. Although unlikely, short-term impacts to Site workers could include the potential inhalation of airborne contaminants in dust during soil excavation. Engineering control measures conducted during remediation activities, like spraying soil with clean water, covering soil filled trucks during excavation activities and transportation, and covering temporarily stockpiled soils on the WSA, will be used to control any resulting dust. In addition, air monitoring will be performed while activities are conducted on-Site. The cleanup work will be performed during typical work hours, Monday through Friday, in order to minimize noise to residents. Additionally, soil excavation will be completed in several phases in smaller areas, in order to minimize impacts to the residents of the condominium complexes. It is expected that the cleanup work will require approximately 1,200 truckloads to transport soil from the ESA to the proposed consolidation area on 55 Clinton Ave. An additional 500 trucks would be needed to transport soil off-site for disposal. For safety reasons, during excavation, loading of contaminated soil, and delivering of clean fill, access to the work areas will be controlled and restricted to Site workers only. It is anticipated that no more than 6 to 14 months will be needed to excavate, transport and provide clean backfill to the areas being addressed in the ESA. It is expected to take approximately 33 months to excavate, consolidate, cap and provide clean backfill to the excavated areas located on the WSA.

SITE DESCRIPTION AND HISTORY

Site Description

The Creese & Cook Tannery (Former) Superfund Site is in Danvers, Essex County, Massachusetts. The Site is located adjacent to mixed commercial/residential area, bounded on the north by Massachusetts Route 128, and to the east, west, and south by residential and commercial properties. The Site includes the West Study Area (WSA) and East Study Area (ESA) and these areas are the focus of the current Remedial Investigations, Risk Assessments and Feasibility Study. This Proposed Plan presents proposed cleanup actions for WSA and ESA. The Site also includes the Crane River which bisects the ESA and WSA. A separate Remedial Investigation will be completed for the Crane River in the future. A Site Locus is presented on Figure 8 and a Site Plan is presented on Figure 9. The properties included in the ESA and WSA are briefly described below.

The ESA includes the following properties:

- 33 Water Street – The site of original tannery operations, it was redeveloped in 1986 as a residential condominium complex consisting of 28 units in four buildings (approximately 3.5 acres), and is zoned for residential use.
- 45 Water Street – A former residential/farm property, which is adjacent to the former Creese & Cook facility on 33 Water Street and was redeveloped in 1989 as a five-unit residential condominium building (approximately 1 acre), and is zoned for residential use.
- 35 Water Street – A former railroad station property, it is owned by the MBTA and situated between 33 and 45 Water Street. It is the current location of the Colonel Hutchinson Memorial (approximately 0.1 acre), and is zoned for residential use.
- MBTA ROW – An abandoned railroad line that was constructed in the 1840s and operated by the former Boston and Maine Railroad (approximately 4 acres). It is no longer in use as a railroad and is currently owned by the MBTA and zoned for residential use.

- 12 Cheever Street – Owned and occupied by the Polish Russian Lithuanian American Citizens' Club (commonly called the Polish Club) since 1941, this property was previously both residential and commercial (approximately 1.3 acres), and is currently zoned as "Waterfront Village," which allows for mixed commercial/residential use.

- 20 Cheever Street – An undeveloped, heavily vegetated property with a large wetland area that was historically used as a solid waste (garbage) area (approximately 2.3 acres). The property is entirely within the 100-year floodplain and zoned for residential use.

The West Study Area (WSA) includes the following properties:

- 55 Clinton Avenue – A former site of tannery operations from 1914 until 1983. The former tannery beamhouse building was subsequently demolished in place and the building debris, with asbestos containing material (non-friable), remains on the Site. MassDEP oversaw previous investigations on this parcel. Two historical burial grounds are located on this parcel, i.e., the Endicott and Russell cemeteries. The parcel is currently vacant, privately owned and overgrown (approximately 12.7 acres), and zoned for residential use.

- 27 Clinton Avenue – Creese & Cook originally acquired this land in approximately 1914, and it was subsequently used by a local radio station in July 1962. Publicly available photographs reviewed on the internet indicate the radio station building burned down in February 1991. Remnants of the former radio station building and a radio tower remain on the property, which is currently vacant, privately owned, overgrown (approximately 3.5 acres), and zoned for residential use.

- 15 Pleasant Street – This property was suspected to be a possible tannery waste disposal area, and is a small vacant parcel located north and east of the Crane River, immediately south of Route 128 (approximately 0.3 acres), and is zoned for residential use.

Site History

Leather tanneries operated at the Site from the late 1800s until the early 1980s. From the 1870s through 1903, portions of what is now 33 Water Street housed tanneries operated under several names, including the Cross & Murphy Morocco Manufactory and the Alfred A. Bates Morocco Factory. The Creese & Cook Company Calfskin Tannery (Creese & Cook) began operations at the 33 Water Street property in 1903. Creese & Cook used raw animal hides to produce leather shoes, handbags, gloves, and garment leather, primarily from cowhide stock. The original Creese & Cook Tannery facility on Water Street was a four-story building, with beamhouse and tanning operations occurring on the first floor, leather finishing on the second floor, leather tacking and ironing on the third floor, and leather drying on the fourth floor. Heat and power were supplied by a single 100 horsepower coal-fired steam engine which was situated at the rear of the building, the exhaust from which was reportedly expelled from a 50-foot iron chimney. After its initial construction at 33 Water Street in 1903, the Creese & Cook Tannery facility was significantly expanded in several phases over its operational history.

Most tannery operations, except for finishing operations and offices, were reportedly moved to a larger new facility at 55 Clinton Avenue on the west side of the Crane River in 1914. Tannery beamhouse operations were reportedly moved for multiple reasons, including complaints of odors from beamhouse operations at the Water Street factory, and the need for a more productive, higher quality water source. The Water Street factory was served by a supply well that produced increasingly saline water with the increased pumping and deeper well development needed for expanding tannery operations. At the time of the beamhouse construction, a multi-purpose bridge was constructed across the Crane River to carry steam piping, water piping, and electric power lines, and to provide worker access between the new beamhouse facility on Clinton Avenue and the original Creese & Cook Tannery facility on Water Street.

All tanning operations at Site properties ceased in 1983. The former Creese & Cook properties, including 33 Water Street, 55 Clinton Avenue, 20 Cheever Street, as well as 15 Pleasant Street, were later sold or transferred, or held in trust or private ownership, and the 33 Water Street parcel was redeveloped into a condominium complex in 1986. The property at 45 Water Street was also developed into condominiums in 1989; 27 Clinton Avenue, which was also formerly owned by Creese & Cook, was sold to a private owner on or about November 2007; and the MBTA right-of-way (ROW) and 35 Water Street, formerly owned by Boston and Maine Railroad and its predecessors, was purchased by the MBTA in approximately 1976. A property that abuts the Site, 12 Cheever Street, home of a Polish-Lithuanian Club, has been sampled and evaluated due to its proximity to the former tannery and railroad operations. More details about property ownership are in the FS.

Since the mid-1980s, during a span of over twenty years, the Massachusetts Department of Environmental Protection ("MassDEP") oversaw PRP-lead investigations and response actions at some of the properties that comprise the Site, including fencing of Imminent Hazard Areas, which contain high levels of arsenic and dioxins/furans in soil, and construction of a waste disposal cell at the 55 Clinton Avenue parcel. However, MassDEP eventually requested that EPA evaluate these properties to determine if the area would become eligible for inclusion on the National Priorities List ("NPL"); thereafter, the Site was proposed for inclusion on the NPL in September 2012 and included in the final listing of NPL sites in 2013. In addition, EPA conducted a removal action and removed 450 tons of arsenic-contaminated soil at 33 Water Street from April through June 2012 to address arsenic in soils adjacent to one of the condominium buildings.

Study Areas

The Creese & Cook Tannery (Former) Superfund Site was listed on the NPL on May 24, 2013. During Site investigations, the following ESA and WSA properties were sampled and evaluated as part of the Study Area: 33 Water Street, 35 Water Street (MBTA property), 45 Water Street, MBTA ROW, 12 Cheever Street, 20 Cheever Street, 55 Clinton Avenue, the northern portion of 27 Clinton Avenue and 15 Pleasant Street. The properties located at 15 Pleasant Street, a vacant piece of land adjacent to route 128, and 12 Cheever Street, which is currently a Polish Lithuanian Club, although not necessarily where tannery operations may have occurred, were included in the sampling efforts because tannery-related waste could have been present on these properties. Evaluation of the current sampling results from 12 Cheever Street confirms that there are no unacceptable risks to human health and the environment, and therefore no cleanup actions are warranted at this location. A Site Plan is presented on Figure 9.

Prior Cleanup Actions

In 1984 and 1985, MassDEP, formerly known as the Massachusetts Department of Environmental Quality Engineering (MADEQE), conducted an initial investigation for the purpose of determining the nature and extent of contamination and evaluating potential remedial options under state cleanup regulations for the 55 Clinton Avenue parcel.

Under State remediation laws, from 1988 through 1990, MassDEP reviewed and then approved a plan to design and construct a containment cell on the 55 Clinton Avenue property, in order for wastes to be excavated, solidified, and then buried within the cell. The excavation, stabilization, and placement of wastes into the cell was implemented by consultants for the property owner in 1990. However, subsequent sampling between 1990 and 1995 showed that levels of arsenic and chromium were still above MassDEP cleanup goals. As a result, MassDEP withheld final approval of the work performed at 55 Clinton Avenue.

In response to MassDEP's request that EPA investigate the area, EPA conducted a site inspection for 33 Water Street, 20 Cheever Street, 35 Water Street, and the MBTA ROW in 2010. The results of this investigation are summarized in the Final Report for Creese & Cook (Former 2), Site Inspection, Danvers, MA, dated July 2012; Site Assessment Report for 55 Clinton Avenue, with results summarized in a report titled Final Report for Creese & Cook (Former 1), and Site Reassessment, Danvers, MA, dated August 2012.

After completing an initial investigation of the area, the EPA Removal Program performed a Preliminary Assessment and Site Investigation ("PA/SI") at 33 Water Street and issued an Action Memorandum for performance of a removal action to address contaminated soil located mainly around back decks of one of the condominium buildings at 33 Water Street (behind building D) in 2012, removing and properly disposing of about 450 tons of soil that posed an imminent hazard due to high arsenic concentrations.

CURRENT & FUTURE LAND USE

According to the zoning information from the town of Danvers, the existing land use at the Creese & Cook Site is zoned for residential use with 12 Cheever Street zoned as Waterfront Village, which allows for mixed commercial/residential use. Future land use on the East Study Area is expected to be consistent with the current land use and may include: residential, recreational and/or Waterfront Village. Portions of 55 and 27 Clinton Avenue that are restored for unrestricted use may ultimately be developed for residential use.

CREESE & COOK (FORMER) SITE TIMELINE

Circa 1847 .... Railroad tracks installed within the MBTA ROW

Circa 1890......... Several leather tanneries operated on portions of 33 Water Street

1903 – 1981 .... Creese & Cook built and operated main facility on 33 Water Street

1914 – 1981...... Creese & Cook built and operated beamhouse on 55 Clinton Avenue

1981 .... Creese & Cook company files for bankruptcy

1981 – 1983 ..... Creese rented 33 Water Street property to Danversport Tannery

1983 .... Fire burned a portion of the former tannery building at 33 Water Street

1984 – 1992 ..... Contractors for the landowner of 55 Clinton Avenue characterized the facilities (both eastern and western banks of the Crane River), removed some contaminated soil, constructed an on-site containment cell on northwest portion of 55 Clinton Avenue, and performed additional soil sampling

1986.................... The 33 Water Street parcel was redeveloped as residential condominiums

1989.................... The 45 Water Street parcel was redeveloped as residential condominiums

1995 and 2007. The property owner constructed fencing on areas of 55 Clinton Avenue to prevent contact with high concentrations of arsenic and dioxins/furans that met the MassDEP Imminent Hazard criteria

2004.................... Beamhouse on 55 Clinton Avenue was demolished and building debris and foundation remain on-site, enclosed by chain-link fence due to non-friable asbestos containing materials

2009.................... The Massachusetts Attorney General filed suit in June 2009, citing inaction of the property owner of 55 Clinton Avenue to properly address contamination on the property

2010.................... EPA conducted a site investigation and produced a Site Inspection Report for 33 Water Street, 20 Cheever Street, 35 Water Street, the MBTA ROW in 2010

2012 .... EPA issued an Action Memorandum for a removal action at 33 Water Street and conducted a soil removal action behind the Condominium Building D, removing approximately 450 tons of high arsenic concentrations in surface soil

2012 .... EPA proposed the Site for inclusion on the National Priorities List (NPL)

2013 .... EPA finalized the Site for listing on the NPL

2017 .... EPA completed the Final East Human Health Risk Assessment

2018 .... EPA completed the West and East Study Area Remedial Investigations, Final West Human Health Risk Assessment and Feasibility Study

2018 .... EPA released the proposed cleanup plan

WHY CLEANUP IS NEEDED

EPA has determined that there are both current and future potential threats to human health and the environment due to the presence of metals, dioxins/furans, and PAHs in soils on the Site, primarily from historic tannery operations, as well as from historic railroad operations at MBTA ROW and 35 Water Street. More specifically, from 1903 to 1981, Creese & Cook processed raw hides and made them into leather garments and shoes. Wastewater from the tanning process was discharged into unlined lagoons on 55 Clinton Avenue, and leather scraps and hides were disposed of in former landfills created on 55 Clinton Avenue. Past tannery processing and operations at multiple Site parcels resulted in the contamination of soil with metals like arsenic, chromium and hexavalent chromium, all of which were used in the tanning process to soften and remove infestations from raw hides. Dioxin/furans, Polycyclic Aromatic Hydrocarbons (PAHs) and lead were also detected in soil at the Site. Because levels of contaminants in some locations at the Site were determined to pose an unacceptable risk to human health and potentially unacceptable ecological risks through long-term exposure, clean-up of soil is needed. In addition, metals and PAHs are also present on properties that were formerly used as a railroad and depot at unacceptable human health risk levels, which require cleanup.

SITE CONTAMINANTS

The main contaminants of concern (COCs) at the Site include, but are not limited to:

Metals/Inorganics: Including arsenic, hexavalent chromium, and chromium. These metals were found in soil at the Site and were used in the tanning process in most portions of the Site. An isolated area of soil contaminated with lead was found at levels above the MassDEP's Upper Concentration Limits on 20 Cheever Street. Lead was not used at the Site for the tanning process and it's not known how lead became located here.

Dioxin/furans: These compounds are unwanted by-products of industrial and natural processes, usually involving combustion. For example, by-products produced from coal use when Creese operated a coal fired boiler at the Site; from steam locomotives when they were in use; and from a fire that destroyed the Creese building in 1983.

Polycyclic Aromatic Hydrocarbons (PAHs): A group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. Specifically, benzo(a)pyrene was found at most locations where PAHs were found. PAHs in soil may also be caused by use at the Site of asphalt pavement, roofing products, in preservative for wooden railroad ties, and pesticides.

HOW IS RISK TO PEOPLE EXPRESSED?

In evaluating risk to humans, estimates for risk from carcinogens and non-carcinogens (chemicals that may cause adverse effects other than cancer) are expressed differently.

For carcinogens, risk estimates are expressed in terms of probability. For example, exposure to a particular carcinogenic chemical may present a 1 in 10,000 increased chance of causing cancer over an estimated lifetime of 70 years. This can also be expressed as 1 x 10-4. The EPA acceptable risk range for carcinogens is 1 x 10-6 (1 in 1,000,000) to 1 x 10-4 (1 in 10,000) in a 70-year lifetime. In general, calculated risks higher than this range would require consideration of clean-up alternatives.

For non-carcinogens, exposures are first estimated and then compared to a reference dose (RfD). RfDs are developed by EPA scientists to estimate the amount of a chemical a person (including the most sensitive person) could be exposed to over a lifetime without developing adverse health effects. The exposure dose is divided by the RfD to calculate the measure known as a hazard index (HI) (a ratio). A HI greater than 1.0, suggests that adverse effects may be possible.

EXPOSURE PATHWAYS & POTENTIAL RISK

Just because contamination exists does not mean people or the environment are at risk. There has to be exposure to the contaminant to have a potential risk. If there is no exposure, there is no potential risk. Exposure occurs when people or other living organisms eat, drink, breathe or have direct skin contact with a hazardous substance or waste material. Based on existing or reasonably anticipated future land use at a site, EPA develops different possible exposure scenarios to determine potential risk, appropriate cleanup levels for contaminants, and potential cleanup approaches, which are documented in the FS.

Human health and ecological risk assessments have been prepared for the Site (detailed risk summaries can be found in the ESA and WSA Human Health Risk Assessments (HHRA) and the ESA and WSA Screening Level Ecological Risk Assessments (SLERA)). These conservative assessments use a number of possible contamination exposure scenarios to determine if and where there are current or potential future unacceptable risks to humans and/or the environment.

HUMAN HEALTH RISKS

People have the potential for exposure to Site contaminants through eating, breathing or by having direct skin contact with contaminated soil. The risk assessments for this Site evaluated the exposure pathways discussed below.

EXPOSURE ASSESSMENT

The exposure assessment characterizes the physical setting of the Site and evaluates the exposures that may be experienced by a receptor population. To have an exposure, several factors must be present: there must be a source of contamination, a mechanism through which a receptor can come into contact with the contaminants in that medium, and a potential or actual receptor present at the point of contact.

Current land use is mixed residential, commercial, industrial and Waterfront Village which allows for mixed commercial/residential use. Because Danvers zoning at the Site does not prevent residential use of any parcel, the Human Health Risk Assessment (HHRA) conservatively evaluated current and future residential as well as recreational use, across the entire Site. Residential use refers to use of property for the location of a residential dwelling, with the assumption that young children and adults spend the majority of their time each day in the residential dwelling at their property. Residential land uses are assumed to involve exposure to soils via contact with the skin, inhalation, or incidental ingestion.

Health risks were evaluated for other possible current and future uses of the Site, including passive recreational use, industrial/commercial use, for construction/utility workers that may dig into soil, for an adolescent trespasser, and adult homeless person. The construction/utility worker scenario evaluated the potential for direct contact with shallow groundwater and soil during trenching, digging foundations, and other such activities and vapor pathways. The human health risk assessment evaluated the following potential exposure routes through which receptors at the Site may be exposed:

- Incidental ingestion of contaminated soils;
- Dermal contact with contaminated soils;
- Inhalation of dust and volatiles from soils;
- Inhalation of volatile contaminants in groundwater that may volatilize into excavation trenches;
- Incidental ingestion of shallow groundwater in excavation trenches;
- Dermal contact with shallow groundwater in excavation trenches;
- Inhalation of volatile contaminants in groundwater that may volatilize into indoor air spaces through vapor intrusion, and
- Ingestion of homegrown fruits and vegetables.

Overall, EPA found that the following pathways pose unacceptable risks because the calculated risks exceed EPA's acceptable cancer risk range of 10-6 to 10-4 and the non-cancer Hazard Index of 1:

33 and 45 Water Street

- Non-cancer (for a child HI = 7) and cancer risks for current residents exposed to surface soil (3 x 10-4)
- Non-cancer (for a child HI = 8) and cancer risks for future residents exposed to aggregate soil (0 to 10 ft bgs) (4 x 10-4)

Calculated human health risks were within or below EPA target levels for non-cancer and cancer risks for construction workers exposed to aggregate soil.

20 Cheever Street

- Non-cancer (for a child HI =11) and cancer risks for hypothetical future resident exposed to aggregate soil (3.4 x 10-4)
- Potential exposure to lead exceeding state UCLs in surface soil in a localized area (hot spot) by a recreational visitor or hypothetical future resident exposed to aggregate soil

Calculated human health risks are within or below EPA target levels for the following:

- Re-evaluation of lead in surface soil with data from the hot spot area removed indicated that lead exposures would not exceed EPA's level of concern following removal of soil from the identified lead hot spot area
- Non-cancer and cancer risks for recreational visitors exposed to surface soil

MBTA ROW and 35 Water Street Properties

- Non-cancer (for a child HI = 3) and cancer risks for recreational child (3 x 10-4) and adult (3 x 10-5) visitor exposed to surface soil
- Non-cancer (for a child HI = 11) and cancer risk for hypothetical future resident exposed to aggregate soil (9.6 x 10-4)
- Lead would be a concern for hypothetical future residents exposed to aggregate soil

East Riverfront Soil

- Non-cancer risk (for a child HI = 4) for recreational visitor exposed to riverbank soil

Calculated human health risks are within or below EPA target levels for cancer risks for recreational visitors exposed to riverbank soil.

27 & 55 Clinton Avenues

Current Use

- Non-cancer (HI = 20) and cancer risks (3 x 10-4) for current homeless adult trespassers exposed to surface soil
- Non-cancer (HI = 3) risks for current adolescent trespassers exposed to surface soil

Calculated human health risks are within or below EPA target levels for cancer risks for current adolescent trespassers exposed to surface soil.

Future Use

- Non-cancer (child HI=43; adult HI=4) and cancer risks (9 x 10-4) for future residents exposed to aggregate soil at 55 Clinton Street
- Non-cancer (HI=3) and cancer risks (1.7 x 10-4) for future commercial/industrial workers exposed to aggregate soil at 55 Clinton Street
- Non-cancer risks (HI=8) for future construction workers exposed to aggregate soil at 55 Clinton Street

Calculated human health risks are within or below EPA target levels for cancer risks for future construction workers exposed to aggregate soil at 55 Clinton Street.

Calculated human health risks are within or below EPA target levels for non-cancer and cancer risks for future residents, construction workers, and commercial/industrial workers exposed to aggregate soil at 27 Clinton Street.

15 Pleasant Street

- Non-cancer (for a child HI =13) and cancer risks for hypothetical future resident exposed to aggregate soil (1.4 x 10-4)
- Lead would be a concern for hypothetical future residents exposed to aggregate soil

Calculated human health risks are within or below EPA target levels for non-cancer and cancer risks for current adult and adolescent trespassers exposed to surface soils.

West Riverfront Soil

- Non-cancer (for a child HI =9) and cancer risks for hypothetical future resident exposed to aggregate soil (3 x 10-4)

Calculated human health risks are within or below EPA target levels for non-cancer and cancer risks for recreational visitors to riverbank soil.

No unacceptable risks were identified for 12 Cheever Street.

The detailed evaluation of potential human health risks is presented in the Final Human Health Risk Assessment for the ESA, dated September 2017 and the Final Human Health Risk Assessment for the WSA, and supplemental human health risk evaluations, both dated September 2018. These were used to develop the clean-up alternatives presented in the Final FS.

PRINCIPAL THREAT WASTE

The National Contingency Plan at 40 CFR Section 300.430 (a)(1)(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 (EPA, 1997)."

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, to surface water, to air, or acts as a source for direct exposure. In the each of the areas (ESA Residential, ESA MBTA, ESA Riverfront, and WSA), the contaminated soil and riverbank soil are source materials.

Although EPA has not established a threshold level of toxicity/risk to identify 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 principal threat waste. With respect to the Creese & Cook soils, total cancer risk levels in all areas evaluated in the HHRAs are below 10-3, soil contaminant concentrations generally do not significantly exceed the reference dose levels for non-cancer risks, and with the exception of a small area on 20 Cheever Street, the lead soil concentrations are below levels that would result in blood lead levels of concern. Additionally, the source area contaminants on the Site are not highly mobile, as demonstrated by the relatively low concentrations of Site COCs in groundwater. Therefore, Site soils are not considered to be principal threat wastes; rather they are considered to be low-level threat wastes.

THREATS TO THE ENVIRONMENT

A Screening Level Ecological Risk Assessment (SLERA) provides a preliminary assessment of the potential exposure and consequent risks to ecological receptors exposed to Site-related contaminants at both the WSA and ESA. The results of the SLERA do not support the finding of no significant impact for any of the areas evaluated for ecological risks. EPA assumes that unacceptable ecological risks, if any, will be adequately addressed by cleaning up areas at the site that present unacceptable risks to human health. In the future, additional ecological sampling will be conducted as part of a future Site Remedial Investigation for the Crane River portion of the Site to confirm this assumption.

CLEANUP ALTERNATIVES CONSIDERED

Once possible exposure pathways and potential risks have been identified at a site, cleanup alternatives are developed to address the identified unacceptable risks and achieve the site-specific Remedial Action Objectives (RAOs), which are also known as the cleanup objectives.

The RAOs for this Site are as follows:

- Prevent direct human exposure through incidental ingestion, inhalation and dermal contact with soil containing identified Site-specific COCs in concentrations exceeding EPA's target risk range of a total excess lifetime cancer risk of 10-4 to 10-6 and/or a noncancer Hazard Index greater than 1.0 or exceeding the levels in the MassDEP Draft Technical Update, Historic Fill/Anthropogenic Background Levels in Soil, May, 2016, whichever is higher.
- Prevent exposure by ecological receptors to contaminants in soil that result in potential adverse impacts.

COMMON COMPONENTS FOR ALL ALTERNATIVES

Unless otherwise indicated, the following components will be completed for each alternative to obtain information needed for a detailed remedial design:

- Pre-design investigation studies (PDI): Consists of a utility survey to avoid interference with or damage to existing utilities during excavation and consolidation activities; a wetland delineation and use and value assessment to inform any necessary wetland restoration activities; and an environmental soil investigation to more accurately delineate the extent of contaminated soils to be addressed and determine suitability for disposal. A land survey will be conducted for Riverbank alternatives to determine the mean-high water line and other location and elevation data. The WSA alternatives will also include an engineering evaluation to support the consolidation area design, and includes the relocation and consolidation on-site of beamhouse debris along with any potential asbestos-containing material so that environmental soil investigations can be conducted. (See Appendix D of FS for more detail on PDI studies.)
- Mobilization and demobilization: Includes mobilization and demobilization of personnel and heavy equipment and preparation of plans such as for air monitoring, surface water protection, and construction management activities.
- Site Preparation: Requires a pre-construction survey to establish existing conditions, clearing of trees, brush and vegetation and use of temporary erosion controls, installing temporary access roads and necessary utilities, long-term and movable fencing and signage around work areas, and construction of decontamination areas and temporary staging areas at 20 Cheever Street and/or 55 Clinton Avenue. Riverbank alternatives will also include installation of a temporary damming system in the River, along the shoreline, to dewater soils prior to excavation.
- Institutional controls: As necessary to prevent future exposure to remaining contaminated soil, if any, and prohibit activities that could damage the remedy.

BACKGROUND LEVELS

Determining appropriate background levels at this Site is complicated by its historical industrial uses and the levels of naturally occurring metals, such as arsenic, which are also present in the area. Much of the ESA soil contains fill material including ash, construction debris and burnt wood (man-made or anthropogenic); these are not present in the WSA; however, naturally occurring metals in fill are present in WSA soil. EPA utilized the concentrations in the MassDEP Draft Technical Update, Historic Fill/Anthropogenic Background Levels in Soil, May, 2016 ("MassDEP Technical Update") as representative background concentrations for arsenic, PAHs and hexavalent chromium at the Site. At Superfund sites, cleanup levels, initially called Proposed Cleanup Levels ("PCLs"), are generally not set at concentrations below naturally occurring background levels or anthropogenic background concentrations. Therefore, the proposed cleanup levels for ESA soils are those background levels in the MassDEP Technical Update for soil containing coal ash or wood ash associated with fill material and the cleanup levels for the WSA soil are those concentrations in the Technical Update for natural soils. The contaminants proposed cleanup levels are provided in Table 1.

A detailed description and analysis of each alternative developed to meet these cleanup objectives and reduce risks from Site soil is presented in the Final FS, dated September 2018, and it's available for public review. See page 35 of this Proposed Plan for more information on where you can find Site-related documents. Below is a summary of the multiple cleanup alternatives considered for the ESA and WSA areas:

The Nine Criteria for Choosing a Cleanup Plan

EPA uses nine criteria to evaluate cleanup alternatives and select a final cleanup plan. EPA has already evaluated how well each of the cleanup alternatives developed for the Creese & Cook Superfund Site meets the first seven criteria in the Feasibility Study. Once comments from the community and state are received and considered, EPA will select the final cleanup plan and document its selection in the Record of Decision (ROD) for the Site.

1. Overall protection of human health and the environment: Will it protect you and the plant and animal life on and near the site? EPA will not choose a cleanup plan that does not meet this basic criterion.
2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs): Does the alternative meet all federal and state environmental statutes, regulations and requirements? The cleanup plan must meet this criterion.
3. Long-term effectiveness and permanence: Will the effects of the cleanup plan last or could contamination cause future risk?
4. Reduction of toxicity, mobility or volume through treatment: Using treatment, does the alternative reduce the harmful effects of the contaminants, the spread of contaminants, and the amount of contaminated material?
5. Short-term effectiveness: How soon will site risks be adequately reduced? Could the cleanup cause short-term hazards to workers, residents or the environment?
6. Implementability: Is the alternative technically feasible? Are the right goods and services (i.e. treatment equipment, space at an approved disposal facility) available?
7. Cost: What is the total cost of an alternative over time? EPA must select a cleanup plan that provides necessary protection for a reasonable cost.
8. State acceptance: Do state environmental agencies agree with EPA's proposal?
9. Community acceptance: What support, objections, suggestions or modifications did the public offer during the comment period?

- Long-term monitoring and maintenance: Consists of inspections and maintenance of the permeable cap and clean soil covers, including paved and landscaped areas, as well as restored wetlands.
- Five-year reviews: Where waste is left in place, reviews will be conducted every five-years to ensure the remedy remains protective of human health and the environment.

ALTERNATIVE ESA RESIDENTIAL-1 – NO ACTION

As a baseline to compare against other alternatives, no action would be taken to address soil contamination at 33 or 45 Water Street. No construction would take place, and RAOs would not be achieved.

Alternative ESA Residential -2A – Soil Excavation (0-3 ft bgs) and On-Site Consolidation, Soil Cover, and Institutional Controls. (This is EPA's preferred Alternative)

This alternative includes the excavation of soil up to 3 ft bgs in areas of 33 and 45 Water Street where COCs exceed PCLs. Any PCL exceedances below 3 ft bgs or beneath buildings will be left in place, covered with a soil cover, and protected through long-term monitoring and maintenance and by institutional controls. The excavated soil will be transported to the WSA, stockpiled, sampled, spread, and compacted in a newly constructed on-site consolidation area on 55 Clinton Avenue. (See Attached Figures 1 & 2)

- Excavation of soils that exceed PCLs up to 3 ft bgs, including paved areas
- No excavation beneath buildings
- Confirmatory sampling and testing
- Install warning layer at bottom of excavation
- Backfill and install soil cover over contaminated soil left in place below 3 ft bgs
- Seed and/or asphalt excavated areas
- Transfer excavated material to on-site consolidation area on 55 Clinton Avenue for staging, characterization, and consolidation
- Off-site disposal of hazardous waste and UCL soil (if needed)
- Wetlands restoration

Alternative ESA Residential-2B – Soil Excavation (0-3 ft bgs) and Off-Site Disposal, Soil Cover, and Institutional Controls

This alternative includes the excavation of soil up to 3 ft bgs in areas of 33 and 45 Water Street where COCs exceed PCLs. Any PCL exceedances below 3 ft bgs or beneath buildings will be left in place, covered with a soil cover, and protected through long-term monitoring and maintenance and by institutional controls. The excavated soil will be transported to the WSA, stockpiled, sampled, loaded, and transported for off-site disposal at a licensed disposal facility.

- Excavation of soils that exceed PCLs up to 3 ft bgs, including paved areas
- No excavation beneath buildings
- Confirmatory sampling and testing
- Install warning layer at bottom of excavation
- Backfill and install soil cover over contaminated soil left in place below 3 ft bgs
- Seed and/or asphalt excavated areas
- Transfer excavated material to 55 Clinton Avenue for staging, characterization, and off-site disposal
- Wetlands restoration

Alternative ESA Residential-3A – Soil Excavation (0-8 ft bgs) and On-Site Consolidation, and Institutional Controls

This alternative includes the excavation of soil up to 8 ft bgs in areas of 33 and 45 Water Street where COCs exceed PCLs. Any PCL exceedances beneath buildings will be left in place and protected through long-term monitoring and maintenance and by institutional controls. The excavated soil will be transported to the WSA, stockpiled, sampled, spread, and compacted in a newly constructed on-site consolidation area on 55 Clinton Avenue.

- Excavation of soils that exceed PCLs up to 8 ft bgs, including paved areas
- No excavation beneath buildings
- Confirmatory sampling and testing
- Install warning layer at bottom of excavation
- Backfill and seed/asphalt excavated areas
- Transfer excavated material to on-site consolidation area on 55 Clinton Avenue for staging, characterization, and consolidation
- Off-site disposal of hazardous waste soil and UCL soil (if needed)
- Wetlands restoration

Alternative ESA Residential-3B – Soil Excavation (0-8 ft bgs) and Off-Site Disposal, and Institutional Controls

This alternative includes the excavation of soil up to 8 ft bgs in areas of 33 and 45 Water Street where COCs exceed PCLs. Any PCL exceedances beneath buildings will be left in place and protected through long-term monitoring and maintenance and by institutional controls. The excavated soil will be transported to the WSA, stockpiled, sampled, loaded, and transported for off-site disposal at a licensed off-site disposal facility.

- Excavation of soils that exceed PCLs up to 8 ft bgs, including paved areas
- No excavation beneath buildings
- Confirmatory sampling and testing
- Install warning layer at bottom of excavation
- Backfill and seed excavated areas
- Transfer excavated material to 55 Clinton Avenue for staging, characterization, and off-site disposal
- Wetlands restoration

Alternative ESA Residential-4 – In-Situ Treatment (0-8 ft bgs) using Solidification/Stabilization and Institutional Controls

This alternative includes in situ treatment using solidification/stabilization of soil up to 8 ft bgs in areas of 33 and 45 Water Street where COCs exceed PCLs. Any PCL exceedances beneath buildings will be left in place and protected through long-term monitoring and maintenance and by institutional controls. The solidification/stabilization process would use large diameter drilling augers or excavation equipment to introduce a grout-like mixture (possibly including fly-ash, lime, or other bulking agents) into the soil, creating a solid mass which would decrease permeability and entrap contaminants. The solid mass would remain in place indefinitely, covered with a warning layer, soil cover, and seeded. Institutional controls will be used to limit future disturbances of the solidified soil.

- Bench and pilot scale testing
- In-situ solidification/stabilization of all soils that exceed PCLs to a depth up to 8 ft bgs (including beneath pavement/asphalt)
- Confirmation samples of solidified soils
- No excavation beneath buildings
- Install warning layer above treated in-place soil
- Install soil cover and seed

Alternative ESA Residential-5 – Soil Excavation (0-8 ft bgs), Ex-Situ Treatment, and On-Site Reuse

This alternative includes the excavation of soil up to 8 ft bgs in areas of 33 and 45 Water Street where COCs exceed PCLs. Any PCL exceedances beneath buildings will be left in place and protected through long-term monitoring and maintenance and by institutional controls. The excavated soil will be transported to the WSA, stockpiled, and treated using a treatment train consisting of soil washing to address the inorganic (metals) contamination followed by incineration to address the organic (PAHs and dioxins) contamination. Treated soil will be tested prior to being used as backfill in the ESA Residential Area. Excess treated soil and/or treated soil that does not meet PCLs will be sent off-site for disposal at a licensed facility.

- Bench and pilot scale testing of treatment
- Excavation of soils that exceed PCLs up to 8 ft bgs (including beneath pavement/asphalt)
- No excavation beneath buildings
- On-site ex-situ treatment using soil washing and incineration
- Off-site disposal of treatment residues (as needed)
- Install warning layer at bottom of excavation
- Backfill of excavated areas using treated soil (if possible) and/or clean backfill

The five remedial alternatives were screened for relative effectiveness, implementability, and costs. Through screening, Alternatives ESA Residential-4 and ESA Residential-5 were eliminated due to the volume of soil that would require treatment; the variety of contaminants that would need to be addressed and the multi-stage treatment processes that would be required for treatment of those contaminants; the questionable effectiveness of some of those treatment trains for certain contaminants; spatial restraints; the presence of underground utilities; and the estimated total costs of the alternatives. All alternatives are located in floodplains; however, ESA Residential-4 and -5, as a result of the treatment processes which would add volume, would also likely require off-site disposal of some of the treated waste in order maintain the original grade of the area and avoid occupancy and modification of the floodplains, adding to the costs of these two alternatives.

ESA MBTA AREA ALTERNATIVES

Alternative ESA MBTA -1 – No Action

As a baseline to compare against other alternatives, no action would be taken to address soil contamination at the MBTA ROW or 35 Water Street. No construction would take place and this alternative would not achieve RAOs.

Alternative ESA MBTA-2 – Soil Cover and Institutional Controls

This alternative includes the placement of a soil cover in areas of MBTA right-of-way (ROW) and 35 Water Street where COCs exceed PCLs. Any PCL exceedances beneath buildings or monuments will be protected through long-term monitoring and maintenance and by institutional controls. The soil cover will consist of a geotextile warning layer, 16-inches of clean soil, and a vegetative layer. To compensate for the loss of approximately 1,600 cubic yards (CY) of floodplain capacity, this alternative includes the excavation, grading, and off-site disposal of 1,600 CY of soil to be excavated from another area within the ESA to maintain flood storage capacity.

- Archaeological survey
- Remove and recycle railroad tracks
- Grade area of soils that exceed PCLs to prepare for cover placement
- Excavation and off-site disposal of approximately 1600 CY of soils to maintain flood zone capacity
- Construct permeable soil cover consisting of geotextile warning layer and 16-inches of soil and vegetative cover
- Wetlands restoration

Alternative ESA MBTA-3 – Soil Excavation (0-3 ft bgs) and Off-Site Disposal, Soil Cover, and Institutional Controls. (This is EPA's preferred Alternative)

This alternative includes the excavation of soil up to 3 ft bgs in areas of MBTA ROW and 35 Water Street where COCs exceed PCLs. Any PCL exceedances below 3 ft bgs or beneath buildings or monuments will be left in place, covered with a soil cover if contamination above cleanup levels remains below 3 ft bgs, and protected through long-term monitoring and maintenance and by institutional controls. The excavated soil will be transported to the WSA, stockpiled, sampled, loaded, and transported off-site for disposal at a licensed off-site disposal facility. (See Figures 3 & 4)

- Archaeological survey
- Remove and recycle railroad tracks
- No excavation beneath monuments
- Excavation of soils that exceed PCLs up to 3 ft bgs
- Confirmatory sampling and testing
- Install warning layer at bottom of excavation
- Install soil cover over contaminated soil left in place below 3 ft bgs
- Seed and or asphalt excavated areas
- Wetlands restoration
- Transfer excavated material to 55 Clinton Avenue for staging, characterization, and off-site disposal

No alternatives were screened out for the MBTA ROW and 35 Water Street area.

ESA RIVERFRONT AREA ALTERNATIVES

Alternative ESA Riverfront -1 – No Action

As a baseline to compare against other alternatives, no action would be taken to address soil contamination at the ESA Riverfront Areas. No construction would take place and this alternative would not achieve RAOs.

Alternative ESA Riverfront-2A – Soil Excavation (0-2 ft bgs) and On-Site Consolidation, Soil Cover, and Institutional Controls. (This is EPA's preferred Alternative)

This alternative includes the excavation of soil up to 2 ft bgs where COCs exceed PCLs above the mean high tide mark from the banks of the Crane River along the MBTA ROW, 20 Cheever Street, 33 Water Street, and 45 Water Street parcels. The eastern or inland excavation extent would be from approximately the base of the adjacent slope (at approximately 5 ft mean sea level (MSL)) and extending west toward the river along the nearshore shelf to the approximately mean high tide line (at approximately 2 ft MSL). Any PCL exceedances below 2 ft bgs will be left in place, covered with a soil cover, and protected through long-term monitoring and maintenance and by institutional controls. The excavated soil will be transported to the WSA, stockpiled, sampled, spread, and compacted in a newly constructed on-site consolidation area on 55 Clinton Avenue. (See Figure 5)

- Archaeological survey
- Dewater riverbank area using cofferdams
- Excavation of soils that exceed PCLs up to 2 ft bgs
- Excavate soils that exceed UCLs at 20 Cheever St
- Confirmatory sampling and testing
- Install warning layer at bottom of excavation
- Install soil cover over contaminated soil left in place below 2 ft bgs
- Restore excavated areas/wetlands restoration
- Transfer excavated material to on-site consolidation area on 55 Clinton Avenue for staging, characterizing, and onsite consolidation
- Off-site disposal of hazardous waste soil (if applicable)

Alternative ESA Riverfront-2B – Soil Excavation (0-2 ft bgs) and Off-Site Disposal, Soil Cover, and Institutional Controls

This alternative includes the excavation of soil up to 2 ft bgs where COCs exceed PCLs above the mean high tide mark from the banks of the Crane River along the MBTA ROW, 20 Cheever Street, 33 Water Street, and 45 Water Street parcels. The eastern or inland excavation extent would be from approximately the base of the adjacent slope (at approximately 5 ft MSL) and extending west toward the river along the nearshore shelf to the approximately mean high tide line (at approximately 2 ft MSL). Any PCL exceedances below 2 ft bgs will be left in place, covered with a soil cover, and protected through long-term monitoring and maintenance and by institutional controls. The excavated soil will be transported to the WSA, stockpiled, sampled, loaded, and transported for off-site disposal at a licensed off-site disposal facility.

- Archaeological survey
- Dewater riverbank area using cofferdams
- Excavation of soils that exceed PCLs up to 2 ft bgs
- Excavate soils that exceed UCLs at 20 Cheever St
- Confirmatory sampling and testing
- Install warning layer at bottom of excavation
- Install soil cover over contaminated soil left in place below 2 ft bgs
- Restore excavated areas/wetlands restoration
- Transfer excavated material to 55 Clinton Avenue for staging, characterization, and off-site disposal

No alternatives were screened out for the ESA Riverfront Area.

WSA ALTERNATIVES

Alternative WSA-1 – No Action

As a baseline to compare against other alternatives, no action would be taken to address soil contamination at the WSA Areas. No construction would take place and this alternative would not achieve RAOs.

Alternative WSA-2 – Comprehensive Excavation South of Former Beamhouse, Surface Excavation (0-3 ft bgs) of Remaining Area, On-Site Consolidation, soil Cover, Cap, and Institutional Controls. (This is EPA's Preferred Alternative.)

This alternative includes the excavation of soils where COCs exceed applicable PCLs to allow for future unrestricted use (up to 4 ft bgs) from the southern boundary of the WSA (27 and 55 Clinton Street) up to southern edge of beamhouse footprint. The remainder of the WSA area (not including consolidation area and cemetery areas) would be excavated up to 3 ft (or up to 10 ft to address UCL exceedances) and covered with a soil cover. The excavated soil will be consolidated in a newly constructed on-site consolidation area on the northern portion of the WSA (except for soil that exceeds UCLs or is classified as hazardous waste which will be disposed of off-site) and a permeable cap will be installed over the consolidation area. This alternative will create an area with unrestricted future use for approximately half of the WSA; the remaining half of the WSA will have restricted future use. Long-term monitoring and maintenance, including groundwater monitoring around the capped consolidation area, will be conducted and institutional controls will restrict land uses that pose a risk. (See attached Figures 6 & 7)

- Archaeological survey
- Excavation of soils that exceed PCLs to allow for unrestricted use south of the beamhouse building footprint (estimated up to 4 ft bgs)
- Excavation of remainder of the WSA (except for the proposed consolidation and cemetery areas) to 3 ft bgs
- Excavate soils that exceed UCLs (up to 10 ft bgs)

- No excavation in cemetery areas
- Dewatering may be necessary
- Confirmatory sampling and testing
- Former beamhouse building debris will be consolidated on-site
- Install warning layer at bottom of excavation
- Install soil cover over contaminated soil left in place below 3 ft bgs
- Seed excavated areas
- Construct on-site consolidation area on 55 Clinton Avenue
- Consolidate excavated WSA (and any stockpiled ESA material) soils and former beamhouse building debris
- Cover consolidation area with permeable cap
- Off-site disposal of UCL and/or hazardous soil (if applicable)
- Construct storm water controls
- Wetlands restoration

Alternative WSA-3 – Comprehensive Excavation South Sewer Easement, Surface Excavation (0-3 ft bgs) of Remaining Area, On-Site Consolidation, Soil Cover, Cap, and Institutional Controls

This alternative includes the excavation of soils where COCs exceed applicable PCLs and/or UCLs to allow for future unrestricted use (up to 10 ft bgs) from the southern boundary of the WSA (27 and 55 Clinton Street) up to and including the sewer easement. The remainder of the WSA area (not including consolidation area and cemetery areas) would be excavated up to 3 ft (or up to 10 ft to address UCL exceedances) and covered with a soil cover. The excavated soil will be consolidated in a newly constructed on-site consolidation area on the northern portion of the WSA (except for soil that exceeds UCLs or is classified as hazardous waste which will be disposed of off-site) and a permeable RCRA-D cap will be installed over the consolidation area. This alternative will create an area with unrestricted future use for approximately two-thirds of the WSA; the remaining third of the WSA will have restricted future use. Long-term monitoring and maintenance, including groundwater monitoring around the consolidation area, will be conducted and institutional controls will restrict land uses that pose a risk.

- Archaeological survey
- Excavation of soils, including waste stockpiles, that exceed PCLs to allow for unrestricted use up to and including the sewer easement
- Excavation of reminder of the WSA area (except for the proposed consolidation and cemetery areas) to 3 ft bgs
- Excavate soils that exceed UCLs (up to 10 ft bgs)
- No excavation in cemetery areas
- Dewatering may be necessary
- Former beamhouse building debris will be consolidated on-site
- Install warning layer at bottom of excavation
- Install soil cover over contaminated soil left in place below 3 ft bgs
- Backfill areas excavated to unrestricted future use
- Seed excavated areas
- Construct on-site consolidation area on 55 Clinton Avenue
- Consolidate excavated WSA (and any stockpiled ESA material) and former beamhouse building debris
- Cover with a permeable RCRA-D cap
- Off-site disposal of UCL and/or hazardous soil (if applicable)
- Construct storm water controls
- Confirmatory sampling and testing
- Wetlands restoration

Alternative WSA-4 – Comprehensive Excavation, On-Site Consolidation, and Institutional Controls

This alternative includes the excavation of soils where COCs exceed applicable PCLs and/or UCLs to allow for future unrestricted use (up to 15 ft bgs) throughout the WSA, except for the consolidation and cemetery areas. The excavated soil will be consolidated in a newly constructed on-site consolidation area on the northern portion of the WSA (except for soil that exceeds UCLs or is classified as hazardous waste which will be disposed of off-site) and a permeable RCRA-D cap will be installed over the consolidation area. This alternative will create an area with unrestricted future use for approximately three-quarters of the WSA; the remaining quarter of the WSA will have restricted future use. Long-term monitoring and maintenance, including groundwater monitoring around the consolidation area, will be conducted and institutional controls will restrict land uses that pose a risk.

- Archaeological survey
- Excavation of soils, including waste stockpiles, that exceed PCLs that allows for unrestricted use throughout the WSA (except for the proposed consolidation and cemetery areas)
- Excavate soils that exceed UCLs (up to 10 ft bgs)
- No excavation in cemetery areas
- Dewatering may be necessary
- Former beamhouse building debris will be consolidated on-site
- Install warning layer at bottom of excavation
- Backfill areas excavated to unrestricted future use
- Seed excavated areas
- Construct on-site consolidation area on 55 Clinton Avenue
- Consolidate excavated WSA (and any stockpiled ESA material) and former beamhouse building debris
- Cover with permeable RCRA-D cap
- Off-site disposal of UCL and/or hazardous waste soil (if applicable)
- Construct storm water controls
- Confirmatory sampling and testing
- Wetlands restoration

Alternative WSA-5 – In-Situ Treatment using Solidification/ Stabilization, Soil Cover, and Institutional Controls

This alternative includes in-situ treatment using solidification/stabilization of soil up to 15 ft bgs in areas of 55 and 27 Clinton Avenue where COCs exceed PCLs (excluding the consolidation area and cemetery). The solidification/stabilization process would use large diameter drilling augers or excavation equipment to introduce a grout-like mixture (possibly including fly-ash, lime, or other bulking agents) into the soil, creating a solid mass which would decrease permeability and entrap contaminants. The solid mass would remain in place indefinitely. Soils that exceed UCLs will be addressed in situ and do not require excavation under this alternative. Treated soil would be left in place and covered with a warning layer, clean soil cover, and seeded. Long-term monitoring and maintenance would be conducted and institutional controls would restrict land uses that pose a risk.

- Archaeological survey
- Bench and pilot scale testing
- Removal and off-site disposal of former beamhouse building debris
- In-situ solidification/stabilization of all soils that exceed PCLs up to a depth of 15 ft bgs, or the water table
- No excavation/treatment in cemetery areas
- Install warning layer above treated in-place soil, cover with clean fill/soil cover, and seed
- Wetlands restoration

Alternative WSA-6 – Comprehensive Excavation, Ex-Situ Treatment, and On-Site Reuse

This alternative includes the excavation of soil up to 15 ft bgs in areas of 27 and 55 Clinton Avenue where COCs exceed PCLs (excluding the existing consolidation area and the cemetery). The excavated soil will be transported to the staging area, stockpiled, and treated using an onsite treatment train consisting of soil washing to address the inorganic (metals) contamination followed by incineration to address the organic (PAHs and dioxins) contamination. Treated soil will be tested prior to being used as backfill in the WSA. Treatment residues, excess treated soil and/or treated soil that does not meet PCLs will be sent off-site for disposal at a licensed facility. Long-term monitoring and maintenance would be conducted and institutional controls would restrict land uses that pose a risk.

- Archaeological survey
- Bench and pilot scale testing of treatment
- Excavation of soils that exceed PCLs up to 15 ft bgs or the water table
- Removal and off-site disposal of former beamhouse building debris
- No excavation in cemetery areas
- Dewatering may be necessary
- On-site ex-situ treatment of excavated soils using soil washing and incineration
- Off-site disposal of treatment residues (as needed), excess treated soil and/or treated soil that does not meet PCLs
- Backfill of excavated areas using treated soil (if possible) and/or clean backfill
- Wetlands restoration

Alternative WSA-7 – Comprehensive Excavation, Removal of Existing Solidified Waste Containment Cell, and Off-Site Disposal

This alternative includes the excavation of soils where COCs exceed applicable PCLs and/or UCLs to allow for future unrestricted use (up to 15 ft bgs) throughout the WSA, except for the cemetery areas. The excavated soil will be stockpiled, sampled, loaded, and transported for off-site disposal at a licensed disposal facility. This alternative will create an area with unrestricted future use for all of the WSA, except for the exiting containment cell.

- Archaeological survey
- Removal and off-site disposal of former beamhouse building debris
- Excavation and offsite disposal of soils that exceed PCLs (including waste stockpile and existing containment cell) up to 15 ft bgs
- No excavation in cemetery areas
- Dewatering may be necessary
- Confirmatory sampling and testing
- Backfill and seed excavated areas
- Wetlands Restoration

All seven remedial alternatives were screened for relative effectiveness, implementability, and costs. Through screening, similarly to the ESA Residential alternatives 4 and 5, Alternatives WSA-5, WSA-6, and WSA-7 were eliminated due to the variety of contaminants that would need to be addressed and the multi-stage treatment processes that would be required for treatment of those contaminants, the questionable effectiveness of some of those treatment trains for certain contaminants, spatial restraints, and the estimated total costs of the alternatives. All alternatives are located in floodplains; however, WSA-5 and -6, as a result of the treatment processes which would add volume, would also likely require offsite disposal in order maintain the original grade of the area and avoid occupancy and modification of the floodplains, adding to the costs of the alternatives. In addition, WSA-7 would pose significant short-term risks to the community and to workers during excavation given that the material is in a solidified state and must be excavated and handled again for offsite disposal. The large volume of this waste combined with the rest of the waste on site going off-site result in significant volume and cost.

CLEANUP ALTERNATIVES COMPARISON

The remaining alternatives that survived the screening process were compared to each other to identify how well each alternative meets EPAs evaluation criteria. The following discussion and tables present a general comparison summary of the alternatives for each geographical area. Detailed evaluations and comparisons of alternatives are included in Section 6.0 of the Feasibility Study. Table 2 summarizes the comparison of alternatives against EPAs evaluation criteria and a summary of the cost. The cleanup objectives for the ESA and WSA are to 1) prevent unacceptable risks to human exposure posed by contaminated soil through direct contact, inhalation, and incidental ingestion; and 2) prevent adverse impacts on ecological receptors.

ESA ALTERNATIVES

Overall Protection of Human Health and the Environment

ESA Residential

Alternative ESA Residential-1 does not provide any protection of human health or the environment because no actions would be taken to address the unacceptable risks posed by contaminated soils and therefore does not meet RAOs. Alternatives ESA Residential-2A and -2B provide adequate protection of human health and the environment by removing surface soil (0-3 ft bgs) with contaminants exceeding cleanup levels from the ESA Residential Area, thereby preventing the potential for exposure to or transport of accessible contaminated soils. Institutional controls would be used to ensure long-term restricted access to contaminated soils remaining deeper than 3 ft bgs and below buildings.

Alternatives ESA Residential-3A and -3B provide protection of human health and the environment by removing contaminated soil from the surface to the top of the water table (0-8 ft bgs) with contaminants exceeding PCLs from the ESA Residential Area, thereby preventing the potential for exposure to or transport of accessible contaminated soils.

Under current use conditions, ESA Residential-2A, 2B, -3A and -3B are similarly protective of human health and the environment because all would address surface soils (0-3 ft bgs) by excavation and removal from the ESA. Alternatives ESA Residential-3A and -3B provide somewhat greater protection of human health and the environment in the long-term by removing all soil with contaminants exceeding cleanup levels to a depth of 8 ft bgs, rather than relying on adequate monitoring and maintenance of the soil cover and institutional controls to prevent exposure to deeper soils. Institutional controls would still be used to prevent future exposure to contaminated soil beneath buildings.

ESA Residential alternatives 2A and 3A include on-site disposal of the excavated soil in a consolidation area on the WSA capped with a permeable RCRA-D cap that will prevent exposure to contaminated soil. Alternatives 2B and 3B include off-site disposal of contaminated soils in appropriately permitted/licensed disposal facilities. Human health and the environment will be equally protected by either on-site consolidation (ESA Residential-2A and -3A alternatives) or off-site disposal (ESA Residential–2B and -3B alternatives) of the excavated soils with proper maintenance of the capped areas on the WSA, or, if off-site, to an appropriately licensed facility.

ESA-MBTA

Alternative ESA MBTA-1, No Action, does not prevent unacceptable risks posed by exposure to contaminated soil because no actions would be taken. ESA MBTA-2 provides protection through the installation of a 16-inch thick soil cover over areas where contaminants exceed cleanup levels. The ESA MBTA-3 alternative provides protection through excavation and off-site disposal of surface soil (0-3 ft bgs) where COCs exceed cleanup levels. Institutional controls in the form of land use restrictions would be used to ensure long-term restricted access to contaminated soil remaining beneath the soil cover under ESA MBTA-2, and, for ESA MBTA-3, on limited areas with a similar soil cover where contaminants exceed cleanup levels in soil deeper than 3 ft bgs.

Alternative MBTA-3 offers a slightly higher level of protection because a mass of contaminated soil would be removed from the area, leaving less residual contamination in place, and the excavated area would be backfilled, then the soil cover installed to bring the area to the original grade. The ESA MBTA-2 alternative does not remove a significant mass of contaminated soils exceeding cleanup levels and does not have the benefit of backfilled clean material under the soil cap. In addition, ESA MBTA-3 removes significant volume and mass not only from the ESA MBTA area but from the Site through offsite disposal of the excavated material at a licensed facility; whereas, ESA MBTA-2 leaves contaminated material onsite under a protective cover.

ESA-RIVERFRONT

Alternative ESA Riverfront-1, No Action, does not prevent unacceptable risks posed by exposure to contaminated soil because no actions would be taken. Alternatives ESA Riverfront-2A and -2B provide similar protection from exposure to contaminated soil by excavating riverbank soil (0-2 ft bgs) and 20 Cheever Street hot spot area soil for (0-4 ft bgs) with contaminants exceeding cleanup levels, removing the excavated soil from the ESA Riverfront, and restoring the excavated areas to match original conditions (including wetland/saltmarsh and upland habitat). Institutional controls in the form of land use restrictions would restrict activities that would allow exposure to contaminated soils remaining beneath the excavated depths. Both alternatives address the same areas and depths and include the same restoration, and both alternatives would include soil covers which, if properly monitored and maintained, would be protective because excavated soils would be consolidated on-site under ESA Riverfront-2A and would be disposed of off-Site under ESA Riverfront-2B, there is a higher degree of protectiveness with ESA Riverfront-2B since it does not involve significant re-handling for onsite consolidation.

Compliance with ARARS

ESA RESIDENTIAL

There is no ARARs analysis for alternative ESA Residential-1 since no action will be taken. Alternatives ESA Residential-2A, -2B, -3A, and -3B, will comply with all ARARs, including requirements in state solid waste regulations and guidance for construction of protective soil covers over contaminated soil that remains in place. These alternatives will require work in wetlands. As a result, these actions must be evaluated to determine if they are the least damaging practicable alternative. Work in floodplains will occur with each alternative and 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 storage capacity. According to Executive Order 11988, a determination would need to be made that there was no other practicable alternative before selecting any of these options as the preferred remedy. Any impacts to wetlands and floodplains must be minimized and damage mitigated.

ESA-MBTA

There is no ARARs analysis for ESA MBTA-1 alternative since no action will be taken. Alternatives ESA MBTA-2 and -3 will comply with all chemical, action, and location specific ARARs. However, the ESA MBTA-2 alternative would result in the loss of compensatory flood storage capacity within both the 100 and 500-year floodplain because of the installation of the 16" in-place soil cover. Therefore, approximately 1,600 cubic yards of replacement flood storage capacity would need to be replicated at another location within the floodplain of the Crane River. The ESA MBTA-3 alternative includes the excavation and removal of contaminated soil and backfilling/installation of a soil cover to match the existing grade, resulting in only temporary occupancy of the floodplain. According to Executive Order 11988, a determination would need to be made that there was no other practicable alternative before selecting any of these options as the preferred remedy. In addition, because these alternatives will require work in comply with federal and state wetlands, and these actions must be evaluated to determine if they are the least damaging practicable alternative. Since 35 Water Street contains a historic monument, and because certain areas were also identified to potentially contain pre-contact archaeological sites, tribal and state historic contacts will be consulted prior to work occurring in these areas and any necessary mitigation measures will be taken.

ESA-RIVERFRONT

There is no ARARs analysis for ESA MBTA-1 alternative because no action would be taken. Alternatives ESA Riverfront-2A and 2B will comply with all ARARs but will have unavoidable impacts to the wetlands and floodplains during excavation of contaminated soil. As a result, these actions must be evaluated to determine that this is the least damaging practicable alternative for the wetland areas. Work in floodplains will occur with each alternative and 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 storage capacity. According to Executive Order 11988, a determination would need to be made that there was no other practicable alternative before selecting an of these options as the preferred remedy. Any impacts to wetlands and floodplains must be minimized and damage mitigated.

Areas of potential historical and archaeological significance have been identified in parts of the ESA Riverfront proposed for remedial action. To comply with federal and state historical preservation requirements, state historic contacts will be consulted prior to remediation. In addition, archaeological surveys will be performed prior to the remedial design, to determine whether any areas of high archaeological significance are present that could be impacted by the remedial action. If such areas are identified, a plan will be developed, and measures will be taken to prevent impacts. If impacts are determined to be unavoidable, mitigating measures will be implemented in consultation with the state historical commission, local tribes and local stakeholder's.

Long-term Effectiveness and Performance

ESA RESIDENTIAL

For Alternative ESA Residential-1, the no action alternative, the residual risk remains high and there are no institutional controls to prevent exposure to contaminated soil, so this is the least effective alternative. Although the inherent hazard remains under Alternatives ESA Residential-2A and -2B, there are institutional controls to prevent exposure and actions required to maintain the controls would be included as part of these alternatives. The controls are only effective if adequately monitored and enforced. This alternative provides greater effectiveness than the no action alternative. Alternatives ESA Residential-3A and 3B provide the highest long-term effectiveness and permanence through the removal of soil above the water table (0-8 ft bgs) where contaminants exceed cleanup levels. Residual risks would remain for all alternatives because contaminants exceeding cleanup levels will remain beneath buildings, but the magnitude of risk remaining would be greater for the alternatives that leave more soil in place under soil covers (alternatives 2A and 2B). Five-year reviews will be required for all alternatives because contamination will remain on-site.

Similar to ESA Residential-2A, ESA Residential-3A would have slightly greater residual risk remaining on Site than ESA Residential-3B because contaminated soil exceeding cleanup levels would remain within the capped consolidation area on the WSA. However, exposure to the contaminated soils would be prevented through monitoring and maintenance of the cap on the WSA, and implementation and enforcement of institutional controls.

ESA-MBTA

For alternative ESA MBTA-1, the no action alternative, the residual risk remains high and there are no institutional controls to prevent exposure to contaminated soil. Alternative ESA MBTA-2 and ESA MBTA-3 leave the inherent hazard of contaminated soil onsite, there are intuitional controls to prevent exposure and actions required to maintain the controls which would be included as part of these alternatives. The alternative provides greater effectiveness than the no action alternative, however, the long-term effectiveness and permanence would depend on adequate monitoring and enforcement of these controls. Alternatives, ESA MBTA-3 would provide the highest long-term effectiveness and permanence because approximately 9600 cubic yards of contaminated soil will be removed from the area before a soil cover is placed over the remaining soil. ESA MBTA-2 does not include the removal of a similar volume of soil before placement of the soil cover.

Both alternatives would include placement of a non-woven geotextile warning/separation layer beneath the fill/cover to help limit incidental contact, inhibit the upward migration of stones from the existing soil due to freeze/thaw, discourage root penetration into the contaminated soils, and be a visible barrier in the event of backfill/cover damage/erosion or the need to perform additional remediation.

ESA-RIVERFRONT

For alternative ESA Riverfront-1, the no action alternative, the residual risk remains high and there are no institutional controls to prevent exposure to contaminated soil. Both ESA Riverfront-2A and -2B would reduce current risks to acceptable levels by excavating and removing riverbank soil (0-2 ft bgs) and hot spot area soil (0-3 ft bgs) from the ESA with contaminants exceeding cleanup levels, covering the excavated areas with soil cover, and restoring the surfaces to match original conditions. The two alternatives would incorporate the same IC's for preventing future exposure risks at the ESA following excavation. The two alternatives would provide the same level of long-term effectiveness and permanence regarding contaminant exposure in the ESA Riverfront Areas provided the institutional controls are adequately monitored and enforced.

Reduction of Contaminant, Toxicity, Mobility, or Volume through Treatment

ESA RESIDENTIAL, ESA-RIVERFRONT AND ESA-MBTA

None of the alternatives apply active treatment but all, except the no action alternative, require excavation and capping with either a soil cover or permeable cap which will reduce mobility of contaminated soil, to some extent, from current conditions of erosion and tidal surges. Otherwise, since no treatment will be applied under any of the ESA Residential alternatives, there will be no reduction in toxicity, mobility, or volume.

Short-term Effectiveness

The short-term effectiveness of the remedial alternatives has been evaluated from five perspectives: risks to the community during implementation, risks to onsite workers during implementation, short-term environmental impacts, short-term sustainability, and the time until remedial action objectives are achieved.

ESA RESIDENTIAL

ESA Residential-1, the no action alternative, has the least short-term impacts in all categories because no construction activities would be performed for ESA Residential-1 and there would be little disruption to the residents of 33 and 45 Water Streets or the nearby community. The remaining alternatives all include excavation and transport of contaminated soils, which will have some short-term impacts, as described below.

ESA Residential- 2A and -2B would have moderate impacts to the on-site residents and the community from the excavation of contaminated soils from occupied residential properties, and transport of excavated soils from the ESA to the WSA for staging and consolidation or off-site disposal. Impacts to on-site residents would be more significant than to the surrounding community. Impacts may include fugitive dust emissions, noise, physical safety, inconvenience, increased traffic. These impacts can be mitigated through use of engineering controls; careful planning of excavation in phases, materials staging, transport routes, work schedule, and other project details; and coordination with community stakeholders.

ESA Residential-3A and -3B would have similar, but more significant impacts to on-site residents and the surrounding community than alternatives 2A and 2B because more than twice the volume of contaminated soil would be excavated and transported to the WSA for consolidation or staging, and excavation depths would be greater, making excavation on the ESA properties more complicated and require a much longer duration.

ESA Residential-2B and -3B would have somewhat greater impacts to the community compared to ESA Residential-2A and -3A because of the additional truck traffic required to transport excavated soils from the WSA staging area to off-site disposal facilities. ESA Residential-2A, -2B, -3A, and -3B would all pose some short-term risk to on-Site workers from excavation and handling of contaminated soil and general physical hazards from construction and transportation activities. Risks to workers can be minimized for all alternatives through compliance with a comprehensive Health and Safety Plan; use of engineering controls (water, fencing, covers, monitoring) to reduce fugitive dust and airborne contaminants. In addition, air monitoring and use of proper personal protective equipment would be used to prevent exposures to contaminant-laden dusts (for both workers and the surrounding residents). The potential risks to workers would be greater for ESA Residential-3A and -3B than to ESA Residential-2A and -2B because of the significantly larger volume of excavated soil. Potential risks would be greater for alternatives ESA Residential-2A and -3A, relative to ESA Residential-2B and -3B because more on-site handling of materials would be required for on-site consolidation.

Impacts to the environment would be similar for the four alternatives. No permanent adverse impacts would be expected. and the areas would be restored to match existing conditions. It is anticipated that a small area of wetland may be impacted; wetland restoration would be performed to mitigate any disturbance. General environmental impacts include emissions and fuel usage from on-site equipment and trucks for transport of the excavated soil and delivery of the backfill and cover materials. These impacts would be somewhat greater for the alternatives that require more excavation (ESA Residential-3A and -3B). Transport of excavated soil to off-site disposal facilities (ESA Residential-2B and -3B) would also result in greater emissions and fuel use. Similar to the general environmental impacts, the relative sustainability of the four alternatives is most affected by the excavation and backfill volume and distance to the ultimate disposal location; these factors will be the most important variables in the amount of energy expended and materials required to implement the remedial action.

Time to achieve RAOs is directly correlated with the amount of contaminated soil that is addressed in each alternative. ESA Residential-2A and -2B would take approximately 6 months to implement in the field, excluding time for pre-design investigations, remedial design, and preparation of plans. ESA Residential-3A and -3B would take approximately 10 months to implement in the field.

ESA-MBTA

ESA MBTA-1 is the no action alternative and has the least short-term impacts in all categories because no action will be taken and there would be little disruption to the residents of 33 and 45 Water Street. The remaining alternatives both include actions that will have some short-term impacts, as described below.

ESA MBTA-2 would have low to moderate impacts to the surrounding community (including adjacent residential properties) from site preparation and capping activities. Impacts may include fugitive dust emissions, noise, physical safety, inconvenience, and increased traffic. These impacts can be mitigated through use of engineering controls; careful planning of construction, materials staging, transport routes, work schedule, and other project details; and coordination with community stakeholders.

ESA MBTA-3 will have somewhat greater impacts than ESA MTBA-2 because of the additional disturbance of contaminated materials that will result from excavation of contaminated soils and the additional materials handling that will be required for transport of contaminated materials off-site for staging and disposal and the larger volume of backfill materials (as compared to cover materials). Similarly, short-term risk to on-site workers would be somewhat greater for ESA MBTA-3 than for ESA MBTA-2 because of additional disturbance of contaminated soil and additional handling of a larger total volume of materials (excavated soils and clean soil cover materials). Risks to workers can be minimized for both alternatives through compliance with a comprehensive site operations, Health and Safety Plan; use of engineering controls to reduce fugitive dust and airborne contaminants; air monitoring; and use of proper personal protective equipment, water and covers, to prevent exposures to contaminant-laden dusts from becoming airborne. The most significant short-term impacts to the environment posed by the MBTA Area alternatives are the impacts to the 100-year floodplain that would be caused by construction of the soil cover under MBTA-2 and anticipated damage to a small area of wetlands posed by both ESA MBTA-2 and -3. Placement of the 16-inch thick soil cover along the MBTA ROW would reduce floodplain capacity. This impact could be mitigated by providing compensatory floodplain volume. The mitigation would be accomplished by excavation and off-site disposal of approximately 1,600 CY of non-hazardous soil from within the floodplain of the Crane River, grading of the excavated area to provide the compensatory flood storage volume, and seeding the area. Any areas where wetlands are impacted or destroyed as part of the remedial action will be restored to their original conditions or wetland mitigation will be performed near the impacted area.

Short-term impacts to the environment from both alternatives would also include emissions from on-site equipment, trucks delivering clean soil backfill and cover materials, trucks transporting excavated material offsite (ESA MBTA-3). Of the two alternatives addressing remedial action objectives, ESA MBTA-2 would have slightly lower general impacts to the environment because of the lower volume of materials that would have to be handled.

Like the general environmental impacts, the relative sustainability of the two alternatives is most affected by the volume of materials to be handled (excavation, cover, backfill, grading, transport) and distance to the ultimate disposal location; these factors are the most important variables in the amount of energy expended and materials required to implement the remedial action. Overall, ESA MBTA-2 is more sustainable than ESA MBTA-3.

The time to achieve RAOs is directly correlated with the amount of soil that handled (excavation, cover/backfill, grading) in each alternative. Alternative ESA MBTA-2 would be the faster of the two action alternatives (approximately 5 months), as it requires significantly less soil handling; alternative ESA MBTA-3 would take more than twice as long (approximately 10 months) to achieve RAOs.

Implementability

ESA RESIDENTIAL

ESA Residential-1, the no action alternative, would not require any action and therefore does not present any implementability issues. The four active ESA Residential alternatives are all relatively comparable with regard to implementability given that they all rely on excavation, backfilling, soil covering, site restoration, and removal of contaminated soils from the ESA properties as the primary means of reducing risk.

Excavation, the installation of a soil cover (ESA Residential-2A and -2B) or backfill (ESA Residential-3A and -3B), and site restoration are highly implementable, conventional, and reliable technologies. Although the construction work for all four alternatives would be routine, implementation at this Site would be more difficult because the remediation area is in close proximity to condominium buildings and there is limited space available for material, equipment and efficient operations. This is made more challenging by the presence of subsurface utilities especially alternatives ESA Residential-3A and 3B which include deeper excavation, raising the likelihood of more encounters with subsurface utilities.

Furthermore, the excavation of a larger volume of soil under ESA Residential-3A and 3B will require more stockpiled clean material and more areas around the proposed excavation areas for appropriate sloping. This will be challenging because of the limited open area and presence of occupied residential buildings on the ESA residential properties.

All alternatives result in adverse impacts to wetlands and floodplain which would need to be minimized to the extent possible, and mitigation, including restoration, for unavoidable impacts would be required. Given the space restraints finding a suitable area for restoration presents some challenges

In summary, no action is the easiest to implement, followed by ESA Residential 2B, then 2A, followed by alternatives ESA Residential 3B and then Residential 3A.

ESA-MBTA

Alternative ESA MBTA-1 would not require any action and therefore does not present any implementability issues. Alternatives ESA MBTA-2 and 3 are relatively comparable with regards to most implementability issues, as they rely on conventional construction/ remediation technologies. However, floodplain impacts of MBTA-2 would make implementation more difficult that MBTA-3.

Both ESA MBTA-2 and ESA MBTA-3 involve routine construction work and are readily implementable.

Both of these alternatives result in adverse impacts to wetlands and floodplains, with ESA MBTA-2 also resulting in permanent occupation and modification of the floodplain. Such impacts would need to be minimized to the extent possible and mitigation for unavoidable wetland/floodplain impacts, including creation of flood storage capacity for ESA MBTA-2, would be required. Implementation of floodplain and wetland mitigation measures under ESA MBTA-2 may be more difficult that mitigation measures for ESA MBTA-3 because of the limited additional area within the floodplain where floodplain and wetland mitigation could occur.

ESA-RIVERFRONT

ESA Riverfront-1, the no action alternative, would not require any action to be taken and therefore does not present any implementability issues. ESA Riverfront-2A and ESA Riverfront-2B are comparable given that they both rely on routine construction work and both are easily implementable. Both ESA Riverfront-2A and -2B incorporate shallow soil excavation (0-2 ft bgs), a remedial technology that is readily available and generally simple to execute. Both alternatives rely on comparable heavy equipment to implement that is easy to contract. Both alternative excavations are equally reliable in reducing soil exposure risk and would have minimal objections from other regulatory agencies.

Costs

The costs for the alternatives are presented in Table 2 below.

ESA Residential: The least expensive is the No Action Alternative (ESA Residential-1); however, this alternative would not achieve Site RAOs. The second least expensive action alternative is ESA Residential-2A, followed by ESA Residential-2B, ESA Residential-3A and then ESA Residential-3B.

ESA-MBTA: The least expensive is the No Action Alternative (ESA Riverfront-1); however, the alternative would not achieve Site RAOs. The second most expensive alternative is ESA MBTA-2, the soil cover only alternative. The most expensive alternative is ESA MBTA-3.

ESA-Riverfront: The least expensive is the No Action Alternative (ESA Riverfront-1); however, the alternative would not achieve Site RAOs. Of the two remedial action alternatives, ESA Riverfront-2A is the lower cost alternative. ESA Riverfront-2B is approximately 15 percent more expensive than ESA Riverfront-2A.

WSA Alternatives

Overall Protection of Human Health and the Environment

Alternative WSA-1, no action alternative, does not provide any protection from exposure to unacceptable health risks posed by contaminated soil since no cleanup actions would be taken. Alternatives WSA-2, -3, and -4 all would provide adequate protection of human health and the environment by excavating soil with contaminants exceeding cleanup levels from the WSA and consolidating the excavated soil on-site in the WSA consolidation area under a protective cap, thereby preventing the potential for exposure to or transport of accessible contaminated soils. Institutional controls in the form of land use restrictions would be used to prohibit activities that would interfere with the remedy or allow residential use in the consolidation/cap area.

Alternatives WSA-2, -3, and -4 differ in the size of the area that is excavated to allow for unrestricted use where use will be restricted by institutional controls. WSA-2 includes the least excavation, allowing for unrestricted use of the southern 50% of the WSA. WSA-3 allows for unrestricted use of the southern 67% of the WSA. WSA-4 includes the most excavation, allowing for unrestricted use, of approximately 75% of the WSA, except for the historical cemetery areas and consolidation/cap area.

Under current use conditions (assuming no development, and use of the area by homeless trespassers), WSA-2, -3, and -4 are similarly protective of human health and the environment because all would address surface soils (0-3 ft bgs) by excavation and containment in the WSA consolidation area that will be covered with a permeable RCRA-D cap. Under future use conditions (assuming development for residential use), the relative protectiveness provided by WSA-2, -3, and 4 is directly related to the amount of soil that is excavated and consolidated on site. The most protective is WSA-4, excavating all contaminated soil above cleanup levels that is not beneath the consolidation area or cemetary; this alternative would allow unrestricted use on most of the parcel. Alternative WSA-3 and WSA-2 are progressively less protective of human health, as the alternatives leave more contaminated soil in place that is deeper than 3 ft bgs.

Compliance with ARARS

There is no ARARs analysis for alternative WSA-1 since no action will be taken. Alternatives WSA-2, -3, and -4 will comply with all ARARs, including requirements in state solid waste regulations and guidance for construction of a protective permeable RCRA-D cap at the on-site consolidation area and soil covers placed over contaminated soil that remains in place. Long-term groundwater monitoring will be implemented around the consolidation area to ensure there are no impacts to groundwater from potential leachate from the consolidated waste. Dust suppression and air monitoring will be conducted during excavation activities, and additional wetting and other dust control measures will be used as necessary during removal and consolidation of asbestos-containing material from the building debris area in accordance with the Clean Air Act. Water resulting from dust controls activities, decontamination and any dewatering will be collected and either treated to pre-treatment standards prior to discharge to sewers or containerized and disposed of offsite. Storm water and controls and measures to prevent erosion will be designed in accordance with the Clean Water Act to ensure any discharges to the River to not degrade the surface water.

Alternatives WSA-2, -3, and -4 will have unavoidable impacts to the wetlands. As a result, these actions must be evaluated to determine the least damaging practicable alternative. Work in floodplains will occur with each alternative and 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 storage capacity. According to Executive Order 11988, a determination would need to be made that there was no other practicable alternative before selecting any of these options as the preferred remedy. Any impacts to wetlands and floodplains must be minimized and damage mitigated. The location of the consolidation area is beyond the limits of the 100-yr and 500-yr floodplains. Excavated materials will not be discharged to wetlands or water but will be sent to the consolidation area in the northwest corner of the WSA. Implementation of WSA-2, -3, and -4 will be unlikely to pose potential impacts to coastal resources. However, these impacts will be considered during remedial design and mitigated, if necessary.

Areas of potential historical and archaeological significance were identified under the 106 National Preservation Act, in parts of the WSA proposed for remedial action. To comply with federal and state historical preservation requirements, archaeological surveys will be performed prior to the remedial design to determine whether any areas of high archaeological significance are present that could be impacted by the cleanup. If such areas are identified, a plan will be developed and measures will be taken to prevent impacts. If impacts are determined to be unavoidable, mitigating measures will be implemented in consultation with the state, tribal and local stakeholders.

Long-term Effectiveness and Permanence

For Alternative WSA-1, the no action alternative, the residual risk remains high and there are no institutional controls to prevent exposure at the Site. Although the inherent hazard remains under Alternatives WSA-2, -3, and -4 to varying degrees, depending on the extent of excavation, there are institutional controls to prevent exposure and actions required to maintain the controls would be included as part of these alternatives. These controls are only effective if adequately monitored and enforced. WSA-3 has better long-term effectiveness than WSA-2, due to the additional removal of contaminated material in the northern half of the WSA. Among the alternatives, Alternative WSA-4 would provide the highest long-term effectiveness and permanence because the greatest removal of volume and mass of contaminants from the largest areal extent on the WSA. Conversely, this results in consolidation of more material in the onsite consolidation area and a larger permeable cap; however, when properly monitored and maintained, and protected by land use controls, this alternative still provides the highest level of long-term effectiveness and permanence.

Reduction of Contaminant, Toxicity, Mobility, or Volume through Treatment

None of the alternatives apply active treatment but all, except the no action alternative, require excavation and capping with either a soil cover or permeable cap which will reduce mobility of contaminated soil, to some extent, from current conditions of erosion and tidal surges. Since no treatment will be applied under any of the WSA alternatives, there will be no reduction in toxicity, mobility, or volume through treatment.

Short-Term Effectiveness

The short-term effectiveness of the remedial alternatives has been evaluated from five perspectives: risks to the community during implementation, risks to onsite workers during implementation, short term environmental impacts, short-term sustainability, and the time until remedial action objectives are achieved.

WSA-1, the no action alternative, has the greatest short-term effectiveness because it has the fewest impacts in all categories because no action will be taken. The remaining alternatives all include excavation and consolidation of contaminated soils, which will have some short-term impacts or risks. Alternatives WSA-2, -3, and -4 are all similar when evaluated for risks for community and onsite workers during implementation, as they all incorporate contaminated soil excavation, loading, transportation, temporary stockpiling, and on-site consolidation. These remedial action alternatives provide a means of potential exposure to the nearby community, on-site workers (via fugitive dust or the active work environment), and the nearby environment to contaminated media. The least amount of soil is handled by WSA-2, which means it creates less risk to the community, workers, and the environment. Alternatives WSA-3 and -4 address very similar soil volumes and therefore pose similar risks to the community, workers, and the environment. The short-term impacts may be slightly higher for WSA-4 because of slightly more volume of material excavated and handled.

Short-term impacts to the environment include emissions from on-site equipment, trucks delivering clean soil cover and/or capping materials, and potential transport of excavated material to the onsite consolidation area on the WSA. A majority of the current upland habitat and a smaller area of wetland will be destroyed to access surface and subsurface soils for consolidation, regardless of which alternative is selected. Following excavation, the upland and wetland areas would be restored to match original conditions. Short-term environmental impacts are considerable on the WSA but are similar for all alternatives evaluated.

Similar to the general environmental impacts, the relative sustainability of the three alternatives is most affected by the volume of materials to be handled (excavation, backfill, grading, consolidation); these factors are the most important variables in the amount of energy and fuel expended and materials required to implement the cleanup. Overall, WSA-2 is more sustainable than WSA-3 and WSA-4.

WSA-1 has the shortest implementation time; however, the alternative would not achieve RAOs. Implementation time is directly correlated with the amount of contaminated soil that is addressed in each alternative. Of the three remedial action alternatives the fastest time to achieve RAOs is Alternative WSA-2, addressing approximately 39,000 CY (including debris), followed by Alternative WSA-3, which would address 46,000 CY (including debris). The longest implementation time would be Alternatives WSA-4, excavating all soil above cleanup levels which are not beneath the consolidation cell, roughly 48,000 CY (including debris).

Implementability

WSA-1, the no action alternative, would not require any actions to be taken at the Site and therefore does not present any implementability issues. WSA-2, and -3 are relatively comparable given that they involve routine construction work. Demolition of the beamhouse debris and associated asbestos-containing material, while requiring special handling, is also conventional and available technology.

WSA-4 is comparatively the most difficult to implement compared to WSA-2 and -3 because it requires managing and consolidating the greatest amount of waste and presents more height and slope challenges during construction. Although the onsite consolidation area is not within a wetland or floodplains, all three of these alternatives would result in impacts to wetlands and floodplains during excavation activities (and for some, placement of soil covers); such impacts would need to be minimized to the extent possible and mitigation for unavoidable floodplain/wetland impacts would be required.

Cost

Estimated costs for the WSA alternatives are summarized in Table 2. The least costly is the No Action Alternative (WSA-1); however, the alternative would not achieve Site RAOs. Similar to time to achieve RAOs, the alternative costs are directly correlated with the amount of contaminated soil that is addressed in each alternative. The most expensive action alternative is Alternative WSA-4, which ultimately produces the most unrestricted land area on the WSA and removes the most amount of soil. The second most expensive alternative is WSA-3, followed by WSA-2.

State and Community Acceptance

Each will be evaluated once feedback is received during the public comment period.

WHY EPA RECOMMENDS THIS PROPOSED CLEANUP PLAN

Based on the results of the Remedial Investigations, human health and ecological risk evaluations, community concerns expressed so far, EPA has prepared the Feasibility Study for the ESA and WSA portions of the Site, and recommends this proposed cleanup plan because EPA believes it achieves the best balance among EPA's required criteria used to evaluate various alternatives. The Proposed Plan meets the cleanup objectives or Remedial Action Objections (RAOs) for the ESA and WSA. This proposed plan includes a summary in general terms of why EPA recommends the cleanup plan for each geographic area. For more detail, refer to other sections of the Proposed Plan and the Feasibility Study Report for the ESA and WSA portion of the Site.

EPA believes the proposed cleanup plan for the ESA and WSA portions of the Creese & Cook Superfund Site achieves the best overall balance among EPA's nine criteria (excluding State and community acceptance which will be considered following public comment) used to evaluate the various alternatives presented in the Feasibility Study.

In addition, EPA believes that this proposed cleanup approach is protective of human health and the environment through the use of proven cleanup technologies such as excavation, off-site disposal, onsite consolidation and capping, clean soil covers, 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 applicable federal and state environmental laws and regulations; does not reduce the toxicity or volume of the soil but does reduce the mobility of contaminants in soil to some extent through covering, consolidation and capping; utilizes permanent solutions; and uses land use restriction to prevent unacceptable exposures in the future to the remaining site-related wastes that will be contained onsite.

The preferred cleanup approach has the least impact to residents, require a lessor amount of time to reach RAO and would result in adverse impacts to floodplain and wetland areas. These impacts will be minimized to the extent practicable and restoration of unavoidable damages is included in the proposed cleanup.

WHAT IS A FORMAL COMMENT

EPA will accept public comments during a 30-day formal comment period, which runs from October 9 to November 9, 2018. EPA considers and uses these comments to improve its cleanup approach. During the formal comment period, EPA will accept written comments via mail, e-mail, and fax. Additionally, verbal comments may be made during the formal Public Hearing on October 25, 2018 during which a stenographer will record all offered comments during the hearing. EPA will not respond to your comments during the formal Public Hearing.

EPA will hold a brief informational meeting prior to the start of the formal Public Hearing on October 25, 2018. Additionally, once the formal Public Hearing portion of the meeting is closed, EPA can informally respond to any questions from the public.

EPA will review the transcript of all formal comments received during the hearing, and all written comments received during the formal comment period, before making a final cleanup decision. EPA will then prepare a written response to all the formal written and oral comments received. Your formal comment will become part of the official public record. The transcript of comments and EPA's written responses will be issued in a document called a Responsiveness Summary when EPA releases the final cleanup plan, in a document referred to as the Record of Decision (ROD). The Responsiveness Summary and ROD will be made available to the public on-line, at the Peabody Institute Library in Danvers, Massachusetts, and at the EPA Records Center (see addresses below). EPA will announce the final decision on the cleanup plan through the local media and on EPA's website.

FOR MORE DETAILED INFORMATION:

The Administrative Record, which includes all documents that EPA has considered or relied upon in proposing this cleanup plan for the Creese & Cook Superfund Site will be available for public review shortly before the start of the comment period at the following locations:

EPA Records and Information Center
5 Post Office Square, First Floor
Boston, MA 02109-3912
617-918-1440

Peabody Institute Library
15 Sylvan Street
Danvers, MA 01923
978-774-0554

Information is also available for review on-line at www.epa.gov/region1/superfund/sites/creese

KEY CONTACTS:

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Garry Waldeck
Massachusetts Department of Environmental Protection
Project Manager
617- 348-4017
garry.waldeck@state.ma.us

SEND US YOUR COMMENTS

Provide EPA with your written comments about the Proposed Plan for the Creese and Cook Superfund Site.

Please e-mail (golden.derrick@epa.gov), fax (617-918-0448), or mail comments, postmarked no later than November 9, 2018, to:

Derrick Golden
EPA Region New England
5 Post Office Square
Suite 100
Mail Code OSRR07-04
Boston, MA 02109-3912

ACRONYMS

ARARs	Applicable or Relevant and Appropriate Requirements
ft bgs	feet below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Contaminants of Concern
COPC	Contaminants of Potential Concern
CTE	Central tendency exposure
CY	Cubic yard
EPA	United States Environmental Protection Agency Management Agency
ESA	East Study Area
FS	Feasibility Study
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
ICs	Institutional Controls
IH	Imminent Hazard
MassDEP	Massachusetts Department of Environmental Protection
MADEQE	Massachusetts Department of Environmental Quality Engineering
MBTA	Massachusetts Bay Transportation Authority
MSL	Mean Sea Level
NPL	National Priorities List
O&M	Operation and Maintenance
PAH	polycyclic aromatic hydrocarbon
PCL	Proposed Clean-up Level
PDI	Pre-design investigation
PRG	preliminary remediation goal
RAO	Remedial Action Objective
RCRA-D	Resource Conservation and Recovery Act, Subtitle D
Rfd	Reference dose
RI	Remedial Investigation
RME	Reasonable maximum exposure
ROD	Record of Decision
ROW	Right-of-Way
RSL	Regional Screening Level
SI	Site Inspection
Site	Creese & Cook Tannery (Former) Superfund Site
SLERA	Screening Level Ecological Risk Assessment
TBC	To be Considered, CERCLA Guidance and Standards
TEQ	Toxicity equivalent
UCL	Upper concentration limit
µg/dL	micrograms per deciliter
µg/l	micrograms per liter
VI	vapor intrusion
WSA	WSA

Table 1
Proposed Soil Cleanup Levels
Creese & Cook Tannery (Former) Superfund Site
Danvers, Massachusetts

Contaminant of Concern	Proposed Soil Cleanup Levels for East Study Area		Proposed Soil Cleanup Levels for West Study Area	
	Concentration	Basis	Concentration	Basis
Arsenic*	**20** mg/Kg	Background[1]	**20** mg/Kg	Background[2]
Dioxin TEQ*+	**51** ng/Kg	Risk-based (HQ=1)	**51** ng/Kg	Risk-based (HQ=1)
Hexavalent Chromium	**40** mg/Kg	Background[1]	**30** mg/Kg	Background[2]
Benzo(a)pyrene	**7000** µg/Kg	Background[1]	**2000** µg/Kg	Background[2]
Benzo(a)anthracene	**9000** µg/Kg	Background[1]	--	Not a COC for this area
Benzo(b)fluoranthene	**8000** µg/Kg	Background[1]	--	Not a COC for this area
Dibenz(a,h)anthracene	**1000** µg/Kg	Background[1]	--	Not a COC for this area
Indeno(1,2,3-cd)pyrene	**3000** µg/Kg	Background[1]	--	Not a COC for this area
Lead	**600** [3] mg/Kg	Background[1]	--	Not a COC for this area

Notes:

HQ = Hazard Quotient for non-cancer risks

COC = Contaminant of Concern. COCs are contaminants that are major contributors to the actionable human health risks identified for the East and West Study Areas.

-- not applicable/no criterion

mg/Kg - miligrams per kilogram ng/Kg - nanograms per kilogram µg/Kg - micrograms per kilogram

1. MassDEP Ash fill background levels. Historic Fill / Anthropogenic Background Levels in Soil, Draft Technical Update. (MassDEP, May 2016).

2. MassDEP Natural background levels. Historic Fill / Anthropogenic Background Levels in Soil, Draft Technical Update. (MassDEP, May 2016).

3. Lead is a COC for the 20 Cheever Street Lead Hot Spot only.

* Primary COC - COC that most frequently exceeds PRGs and drives soil volume estimates. Other COCs are often co-located with the primary COCs.

+ The risk-based PRG for dioxins/furans was developed based on the EPA 2012 non-cancer reference dose (RfD) for 2,3,7,8 TCDD (IRIS, 2012) because EPA considers this to be the best available value RfD for use at Superfund sites. EPA anticipates that cleanup levels developed based on this RfD will be within the EPA target cancer risk range of 10^{-6} to 10^{-4}.

Table 2

	ESA Residential					ESA MBTA		
	1	**2A**	**2B**	**3A**	**3B**	**1**	**2**	**3**
	No Action	**Soil Excavation (0-3 ft bgs) and On-Site Consolidation, Soil Cover, and Institutional Controls**	**Soil Excavation (0-3 ft bgs) and Off-Site Disposal, Soil Cover, and Institutional Controls**	**Soil Excavation (0-8 ft bgs) and On-Site Consolidation, and Institutional Controls**	**Soil Excavation (0-8 ft bgs) and Off-Site Disposal, and Institutional Controls**	**No Action**	**Soil Cover and Institutional Controls**	**Soil Excavation (0-3 ft bgs) and Off-Site Disposal, Soil Cover, and Institutional Controls**
Protects human health and the environment	□	▣	▣	■	■	□	▣	■
Meets federal and state requirements	□	■	■	■	■	□	▣	■
Provides long-term protection	□	▣	▣	■	■	□	▣	■
Reduces toxicity, mobility, and volume through treatment	□	□	□	□	□	□	□	□
Provides short-term protection	■	■	■	▣	▣	■	■	▣
Implementable	■	■	■	▣	▣	■	▣	■
Capital Cost (millions)	$0.0	$2.5	$3.2	$4.2	$5.7	$0.0	$1.9	$5.2
Total Present Value O&M (millions)	$0.05	$0.2	$0.2	$0.2	$0.2	$0.05	$0.3	$0.1
Total Present Value Cost (millions)	**$0.05**	**$2.7**	**$3.3**	**$4.4**	**$5.8**	**$0.05**	**$2.2**	**$5.4**
State agency acceptance	To be determined after the public comment period					To be determined after the public comment period		
Community acceptance	To be determined after the public comment period					To be determined after the public comment period		

Notes:

■ = Highest rating, best meets the criterion (i.e. most protective, effective, or implementable)

▣ = Meets criterion, but another alternative(s) more protective, effective, or implementable

□ = Does not meet criterion

Table 2

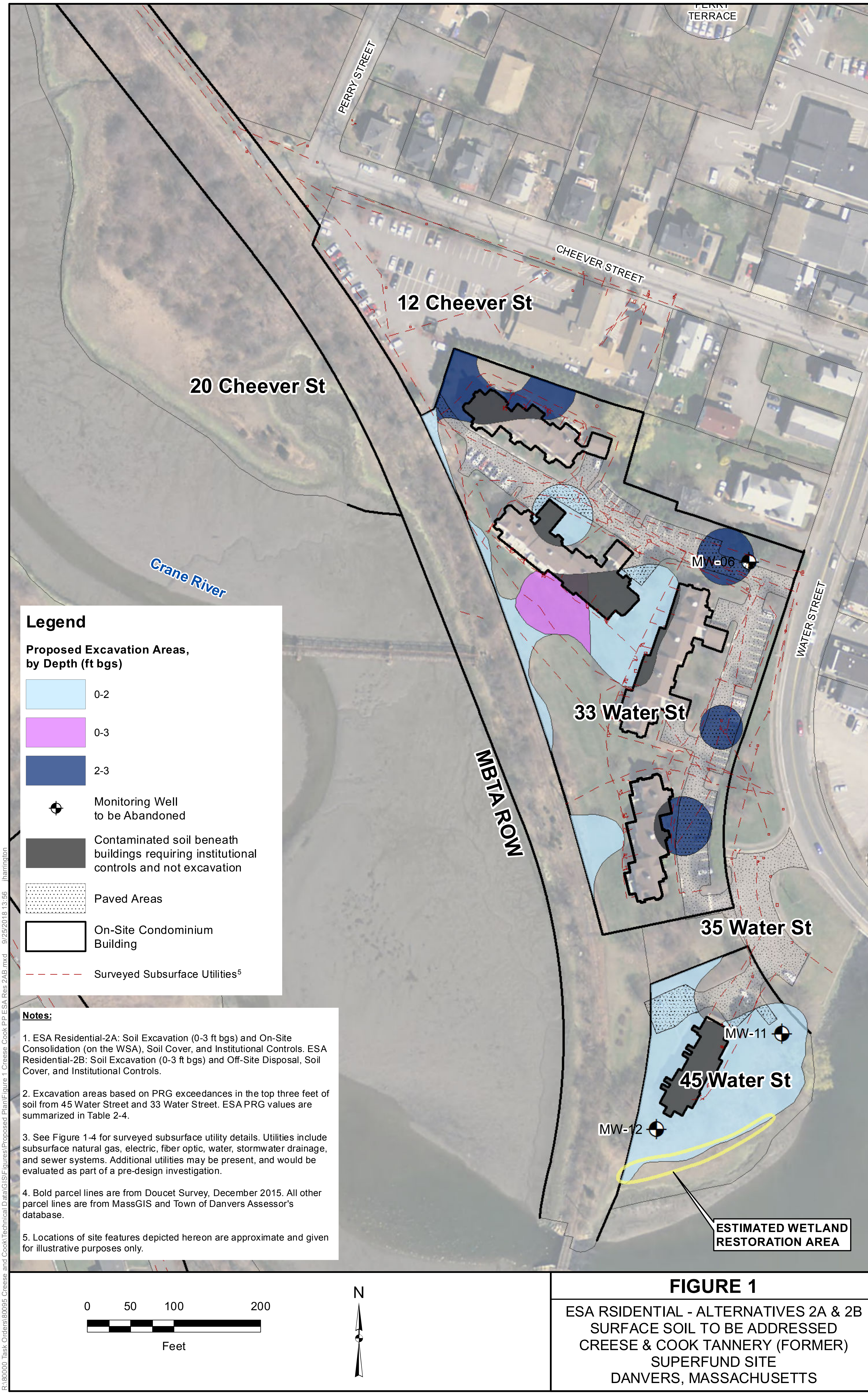
	ESA Riverfront			WSA			
	1	**2A**	**2B**	**1**	**2**	**3**	**4**
	No Action	**Soil Excavation (0-2 ft bgs) and On-Site Consolidation, Soil Cover, and Institutional Controls**	**Soil Excavation (0-2 ft bgs) and Off-Site Disposal, Soil Cover, and Institutional Controls**	**No Action**	**Comprehensive Excavation South of Former Beamhouse, Surface Excavation (0-3 ft bgs) of Remaining Area, On-Site Consolidation, Soil Cover, and Institutional Controls**	**Comprehensive Excavation South Sewer Easement, Surface Excavation (0-3 ft bgs) of Remaining Area, On-Site Consolidation, Soil Cover, and Institutional Controls**	**Comprehensive Excavation, On-Site Consolidation, and Institutional Controls**
Protects human health and the environment	□	■	■	□	▣	▣	■
Meets federal and state requirements	□	■	■	□	■	■	■
Provides long-term protection	□	■	■	□	▣	▣	■
Reduces toxicity, mobility, and volume through treatment	□	□	□	□	□	□	□
Provides short-term protection	■	■	■	■	■	▣	▣
Implementable	■	■	■	■	■	■	■
Capital Cost (millions)	$0.0	$2.6	$3.0	$0.0	$13.0	$15.5	$15.9
Total Present Value O&M (millions)	$0.05	$0.2	$0.2	$0.05	$0.5	$0.5	$0.5
Total Present Value Cost (millions)	**$0.05**	**$2.8**	**$3.2**	**$0.05**	**$13.5**	**$16.0**	**$16.4**
State agency acceptance	To be determined after the public comment period			To be determined after the public comment period			
Community acceptance	To be determined after the public comment period			To be determined after the public comment period			

Notes:

■ = Highest rating, best meets the criterion (i.e. most protective, effective, or implementable)

▣ = Meets criterion, but another alternative(s) more protective, effective, or implementable

□ = Does not meet criterion



Notes:

1. ESA Residential-2A: Soil Excavation (0-3 ft bgs) and On-Site Consolidation (on the WSA), Soil Cover, and Institutional Controls. ESA Residential-2B: Soil Excavation (0-3 ft bgs) and Off-Site Disposal, Soil Cover, and Institutional Controls.

2. Excavation areas based on PRG exceedances in the top three feet of soil from 45 Water Street and 33 Water Street. ESA PRG values are summarized in Table 2-4.

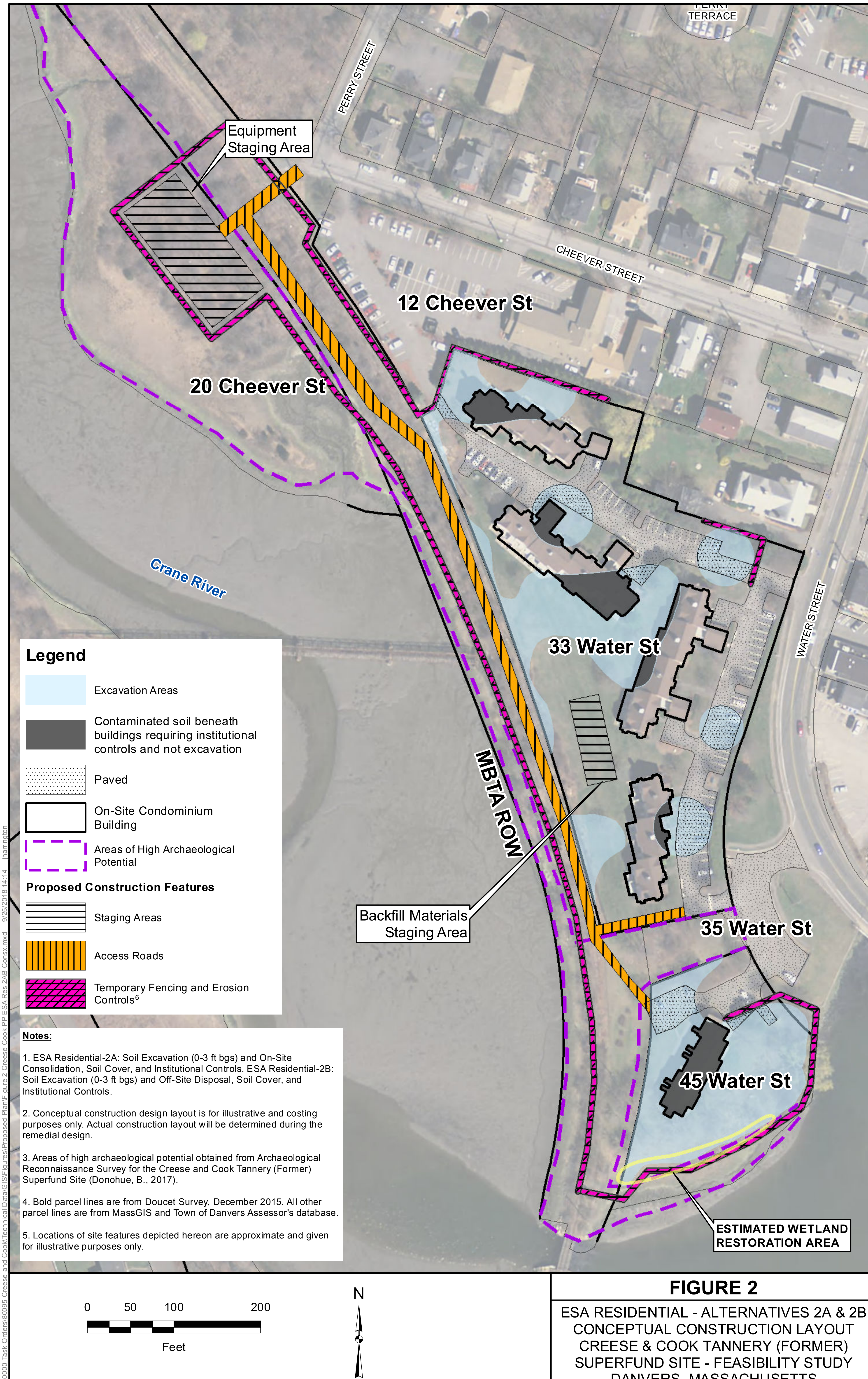
3. See Figure 1-4 for surveyed subsurface utility details. Utilities include subsurface natural gas, electric, fiber optic, water, stormwater drainage, and sewer systems. Additional utilities may be present, and would be evaluated as part of a pre-design investigation.

4. Bold parcel lines are from Doucet Survey, December 2015. All other parcel lines are from MassGIS and Town of Danvers Assessor's database.

5. Locations of site features depicted hereon are approximate and given for illustrative purposes only.

FIGURE 1

ESA RSIDENTIAL - ALTERNATIVES 2A & 2B
SURFACE SOIL TO BE ADDRESSED
CREESE & COOK TANNERY (FORMER)
SUPERFUND SITE
DANVERS, MASSACHUSETTS



Notes:

1. ESA Residential-2A: Soil Excavation (0-3 ft bgs) and On-Site Consolidation, Soil Cover, and Institutional Controls. ESA Residential-2B: Soil Excavation (0-3 ft bgs) and Off-Site Disposal, Soil Cover, and Institutional Controls.

2. Conceptual construction design layout is for illustrative and costing purposes only. Actual construction layout will be determined during the remedial design.

3. Areas of high archaeological potential obtained from Archaeological Reconnaissance Survey for the Creese and Cook Tannery (Former) Superfund Site (Donohue, B., 2017).

4. Bold parcel lines are from Doucet Survey, December 2015. All other parcel lines are from MassGIS and Town of Danvers Assessor's database.

5. Locations of site features depicted hereon are approximate and given for illustrative purposes only.

FIGURE 2

ESA RESIDENTIAL - ALTERNATIVES 2A & 2B
CONCEPTUAL CONSTRUCTION LAYOUT
CREESE & COOK TANNERY (FORMER)
SUPERFUND SITE - FEASIBILITY STUDY
DANVERS, MASSACHUSETTS

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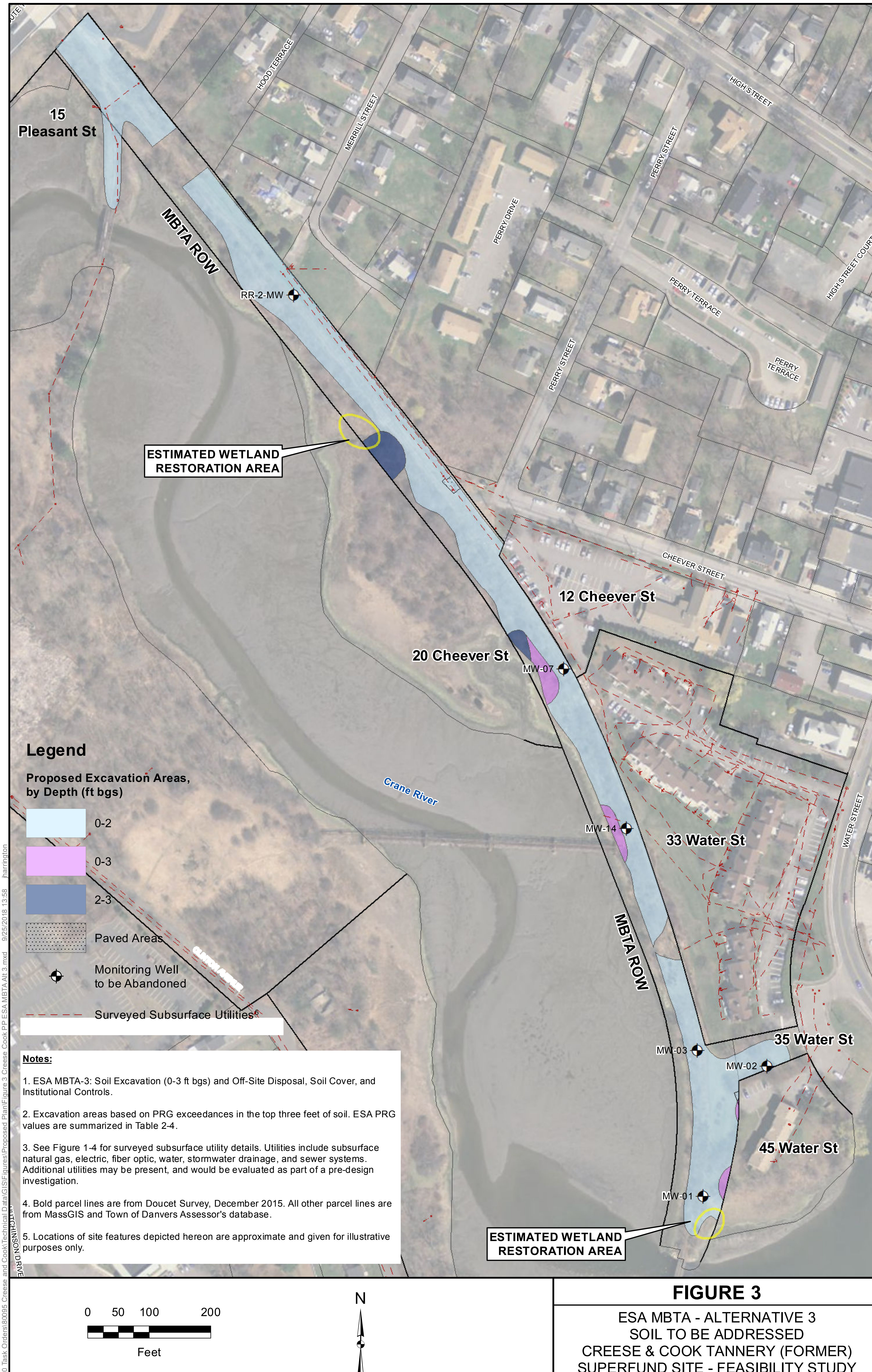

Notes:

1. ESA MBTA-3: Soil Excavation (0-3 ft bgs) and Off-Site Disposal, Soil Cover, and Institutional Controls.

2. Excavation areas based on PRG exceedances in the top three feet of soil. ESA PRG values are summarized in Table 2-4.

3. See Figure 1-4 for surveyed subsurface utility details. Utilities include subsurface natural gas, electric, fiber optic, water, stormwater drainage, and sewer systems. Additional utilities may be present, and would be evaluated as part of a pre-design investigation.

4. Bold parcel lines are from Doucet Survey, December 2015. All other parcel lines are from MassGIS and Town of Danvers Assessor's database.

5. Locations of site features depicted hereon are approximate and given for illustrative purposes only.

FIGURE 3

ESA MBTA - ALTERNATIVE 3
SOIL TO BE ADDRESSED
CREESE & COOK TANNERY (FORMER)
SUPERFUND SITE - FEASIBILITY STUDY
DANVERS, MASSACHUSETTS

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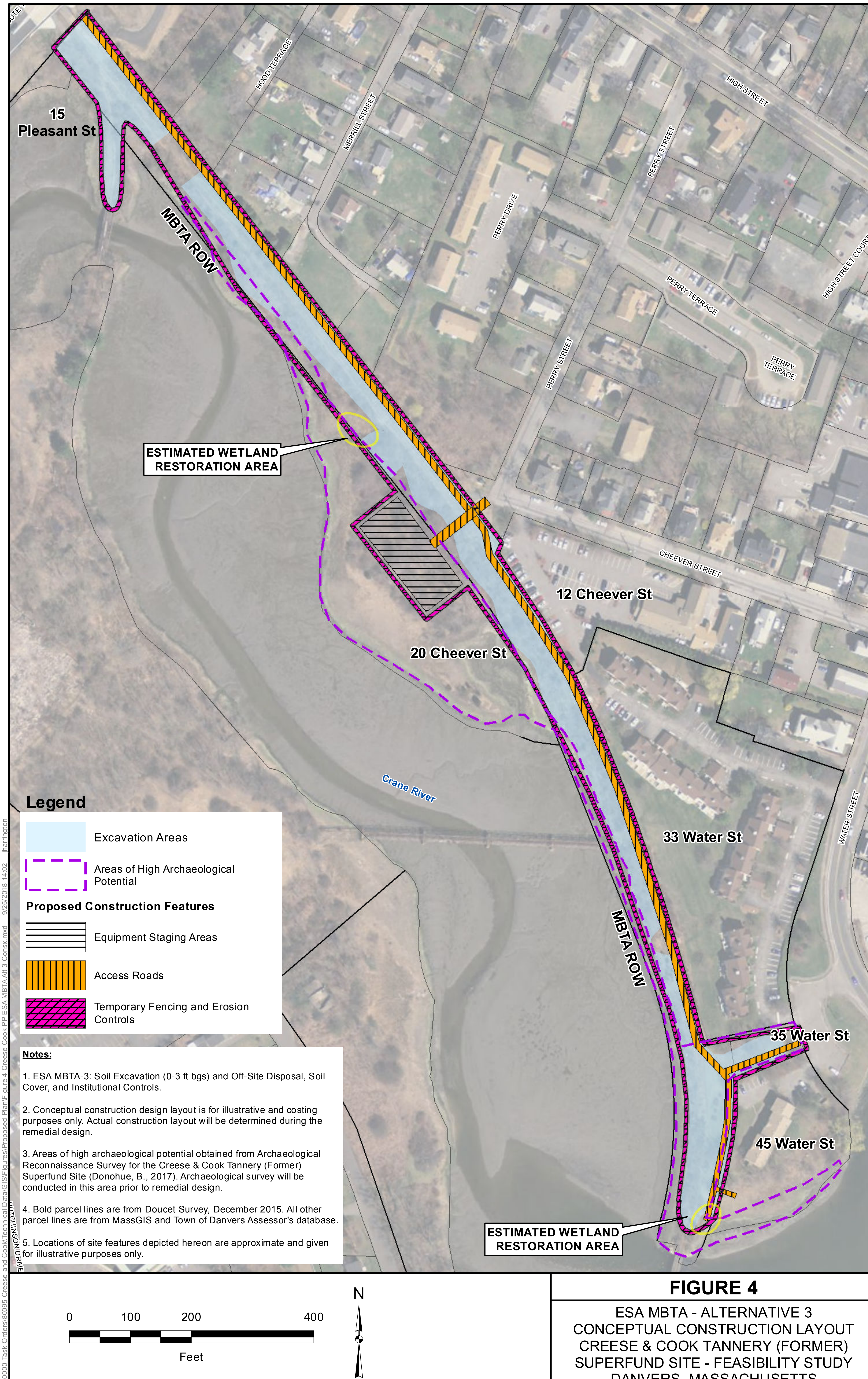


Notes:

1. ESA MBTA-3: Soil Excavation (0-3 ft bgs) and Off-Site Disposal, Soil Cover, and Institutional Controls.

2. Conceptual construction design layout is for illustrative and costing purposes only. Actual construction layout will be determined during the remedial design.

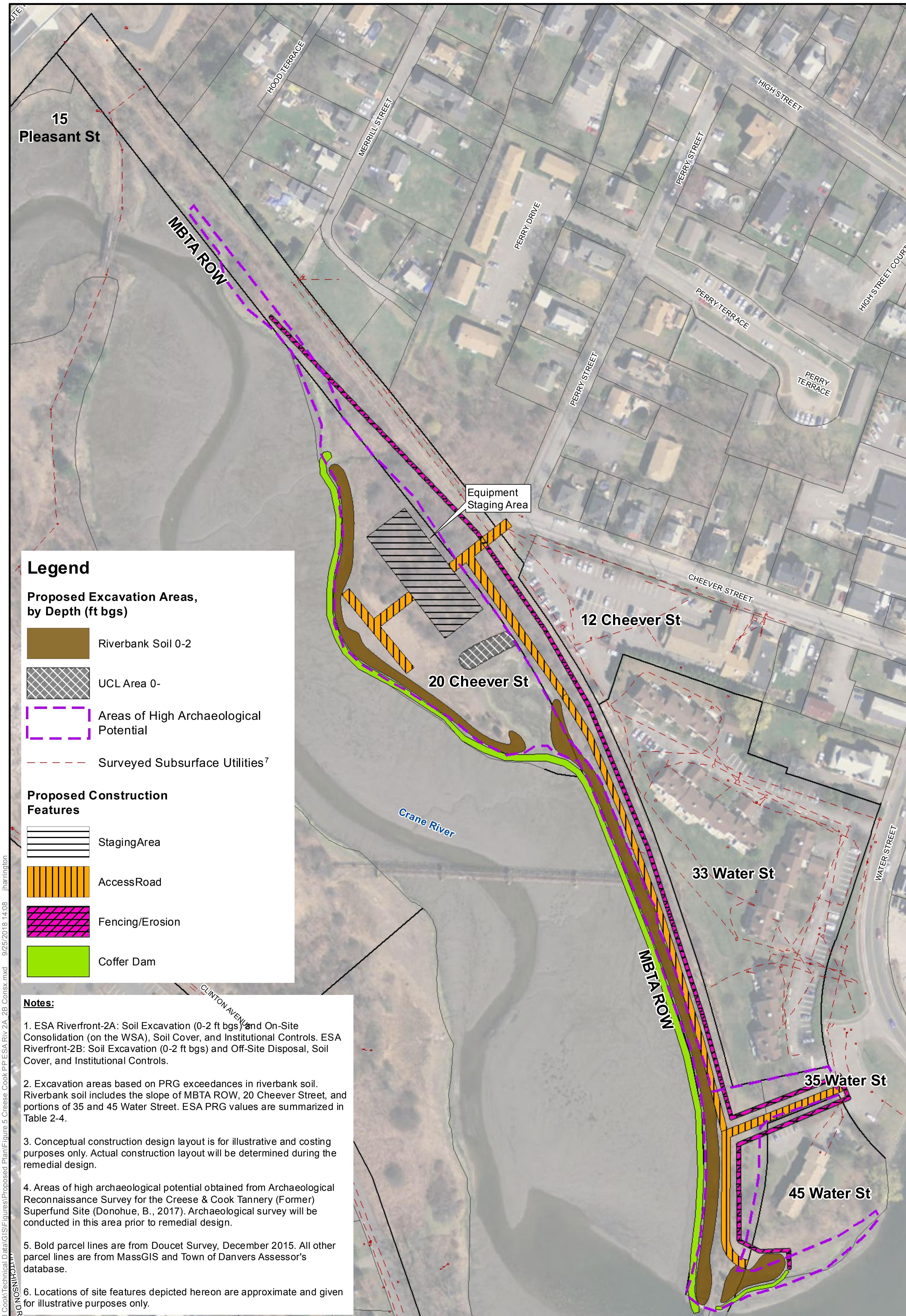
3. Areas of high archaeological potential obtained from Archaeological Reconnaissance Survey for the Creese & Cook Tannery (Former) Superfund Site (Donohue, B., 2017). Archaeological survey will be conducted in this area prior to remedial design.

4. Bold parcel lines are from Doucet Survey, December 2015. All other parcel lines are from MassGIS and Town of Danvers Assessor's database.

5. Locations of site features depicted hereon are approximate and given for illustrative purposes only.

FIGURE 4

ESA MBTA - ALTERNATIVE 3
CONCEPTUAL CONSTRUCTION LAYOUT
CREESE & COOK TANNERY (FORMER)
SUPERFUND SITE - FEASIBILITY STUDY
DANVERS, MASSACHUSETTS



Notes:

1. ESA Riverfront-2A: Soil Excavation (0-2 ft bgs) and On-Site Consolidation (on the WSA), Soil Cover, and Institutional Controls. ESA Riverfront-2B: Soil Excavation (0-2 ft bgs) and Off-Site Disposal, Soil Cover, and Institutional Controls.

2. Excavation areas based on PRG exceedances in riverbank soil. Riverbank soil includes the slope of MBTA ROW, 20 Cheever Street, and portions of 35 and 45 Water Street. ESA PRG values are summarized in Table 2-4.

3. Conceptual construction design layout is for illustrative and costing purposes only. Actual construction layout will be determined during the remedial design.

4. Areas of high archaeological potential obtained from Archaeological Reconnaissance Survey for the Creese & Cook Tannery (Former) Superfund Site (Donohue, B., 2017). Archaeological survey will be conducted in this area prior to remedial design.

5. Bold parcel lines are from Doucet Survey, December 2015. All other parcel lines are from MassGIS and Town of Danvers Assessor's database.

6. Locations of site features depicted hereon are approximate and given for illustrative purposes only.

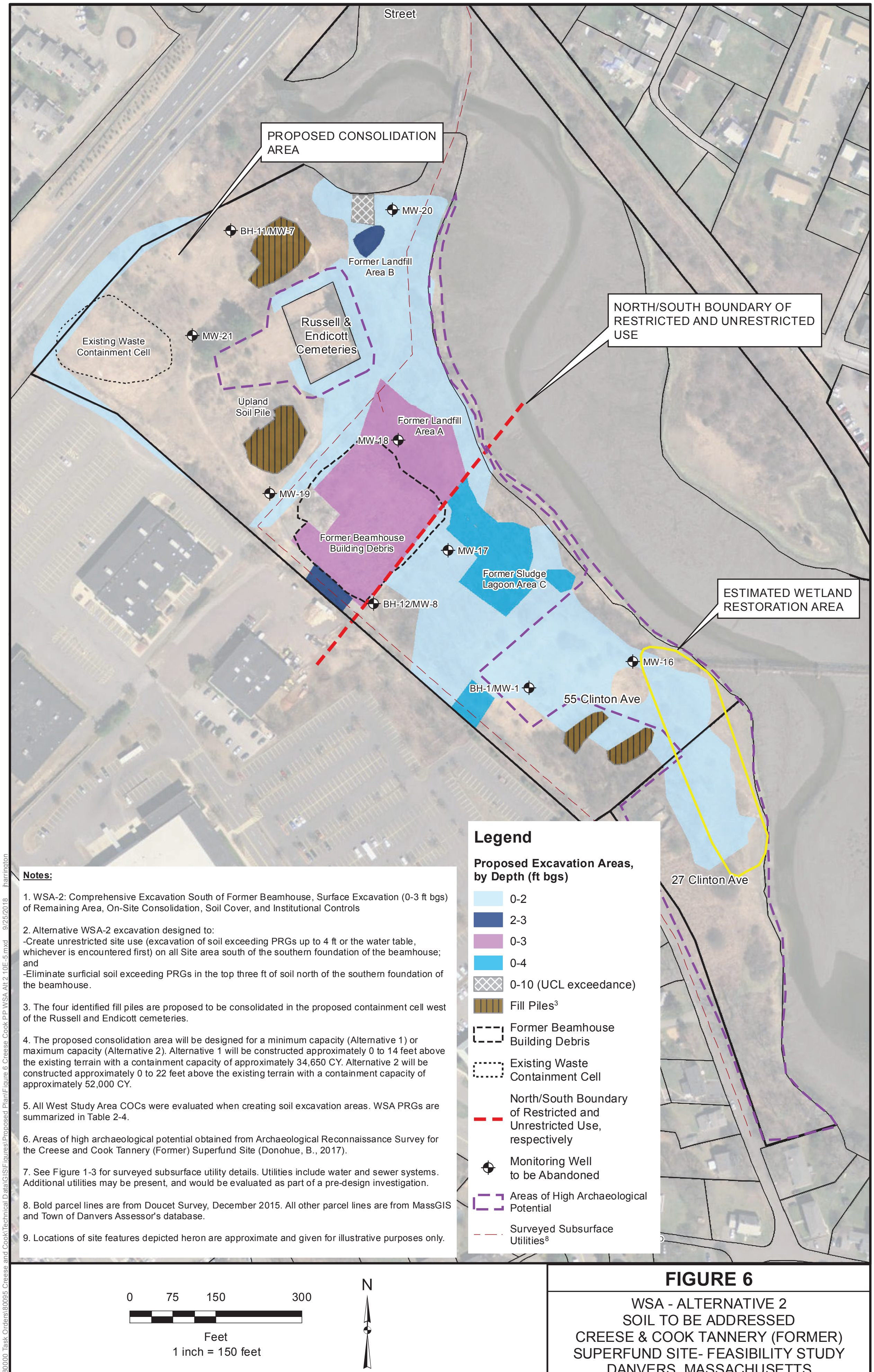
0 50 100 200

Feet

N

FIGURE 5

ESA RIVERFRONT - ALTERNATIVES 2A & 2B
CONCEPTUAL APPROACH
CREESE & COOK TANNERY (FORMER)
SUPERFUND SITE - FEASIBILITY STUDY
DANVERS, MASSACHUSETTS



Notes:

1. WSA-2: Comprehensive Excavation South of Former Beamhouse, Surface Excavation (0-3 ft bgs) of Remaining Area, On-Site Consolidation, Soil Cover, and Institutional Controls

2. Alternative WSA-2 excavation designed to:
-Create unrestricted site use (excavation of soil exceeding PRGs up to 4 ft or the water table, whichever is encountered first) on all Site area south of the southern foundation of the beamhouse; and
-Eliminate surficial soil exceeding PRGs in the top three ft of soil north of the southern foundation of the beamhouse.

3. The four identified fill piles are proposed to be consolidated in the proposed containment cell west of the Russell and Endicott cemeteries.

4. The proposed consolidation area will be designed for a minimum capacity (Alternative 1) or maximum capacity (Alternative 2). Alternative 1 will be constructed approximately 0 to 14 feet above the existing terrain with a containment capacity of approximately 34,650 CY. Alternative 2 will be constructed approximately 0 to 22 feet above the existing terrain with a containment capacity of approximately 52,000 CY.

5. All West Study Area COCs were evaluated when creating soil excavation areas. WSA PRGs are summarized in Table 2-4.

6. Areas of high archaeological potential obtained from Archaeological Reconnaissance Survey for the Creese and Cook Tannery (Former) Superfund Site (Donohue, B., 2017).

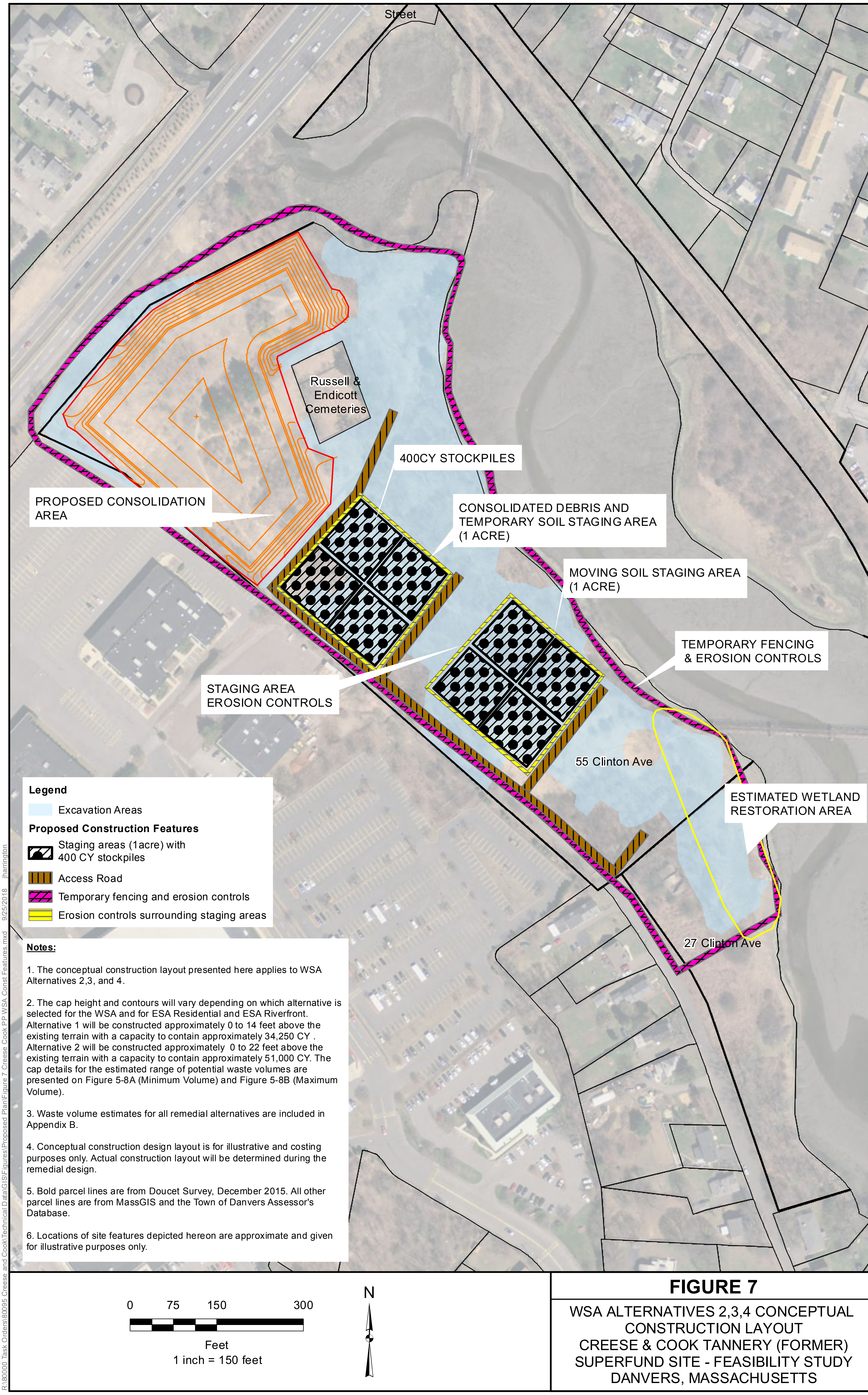
7. See Figure 1-3 for surveyed subsurface utility details. Utilities include water and sewer systems. Additional utilities may be present, and would be evaluated as part of a pre-design investigation.

8. Bold parcel lines are from Doucet Survey, December 2015. All other parcel lines are from MassGIS and Town of Danvers Assessor's database.

9. Locations of site features depicted heron are approximate and given for illustrative purposes only.

FIGURE 6

WSA - ALTERNATIVE 2
SOIL TO BE ADDRESSED
CREESE & COOK TANNERY (FORMER)
SUPERFUND SITE- FEASIBILITY STUDY
DANVERS, MASSACHUSETTS



Notes:

1. The conceptual construction layout presented here applies to WSA Alternatives 2,3, and 4.

2. The cap height and contours will vary depending on which alternative is selected for the WSA and for ESA Residential and ESA Riverfront. Alternative 1 will be constructed approximately 0 to 14 feet above the existing terrain with a capacity to contain approximately 34,250 CY . Alternative 2 will be constructed approximately 0 to 22 feet above the existing terrain with a capacity to contain approximately 51,000 CY. The cap details for the estimated range of potential waste volumes are presented on Figure 5-8A (Minimum Volume) and Figure 5-8B (Maximum Volume).

3. Waste volume estimates for all remedial alternatives are included in Appendix B.

4. Conceptual construction design layout is for illustrative and costing purposes only. Actual construction layout will be determined during the remedial design.

5. Bold parcel lines are from Doucet Survey, December 2015. All other parcel lines are from MassGIS and the Town of Danvers Assessor's Database.

6. Locations of site features depicted hereon are approximate and given for illustrative purposes only.

FIGURE 7

WSA ALTERNATIVES 2,3,4 CONCEPTUAL CONSTRUCTION LAYOUT
CREESE & COOK TANNERY (FORMER) SUPERFUND SITE - FEASIBILITY STUDY
DANVERS, MASSACHUSETTS

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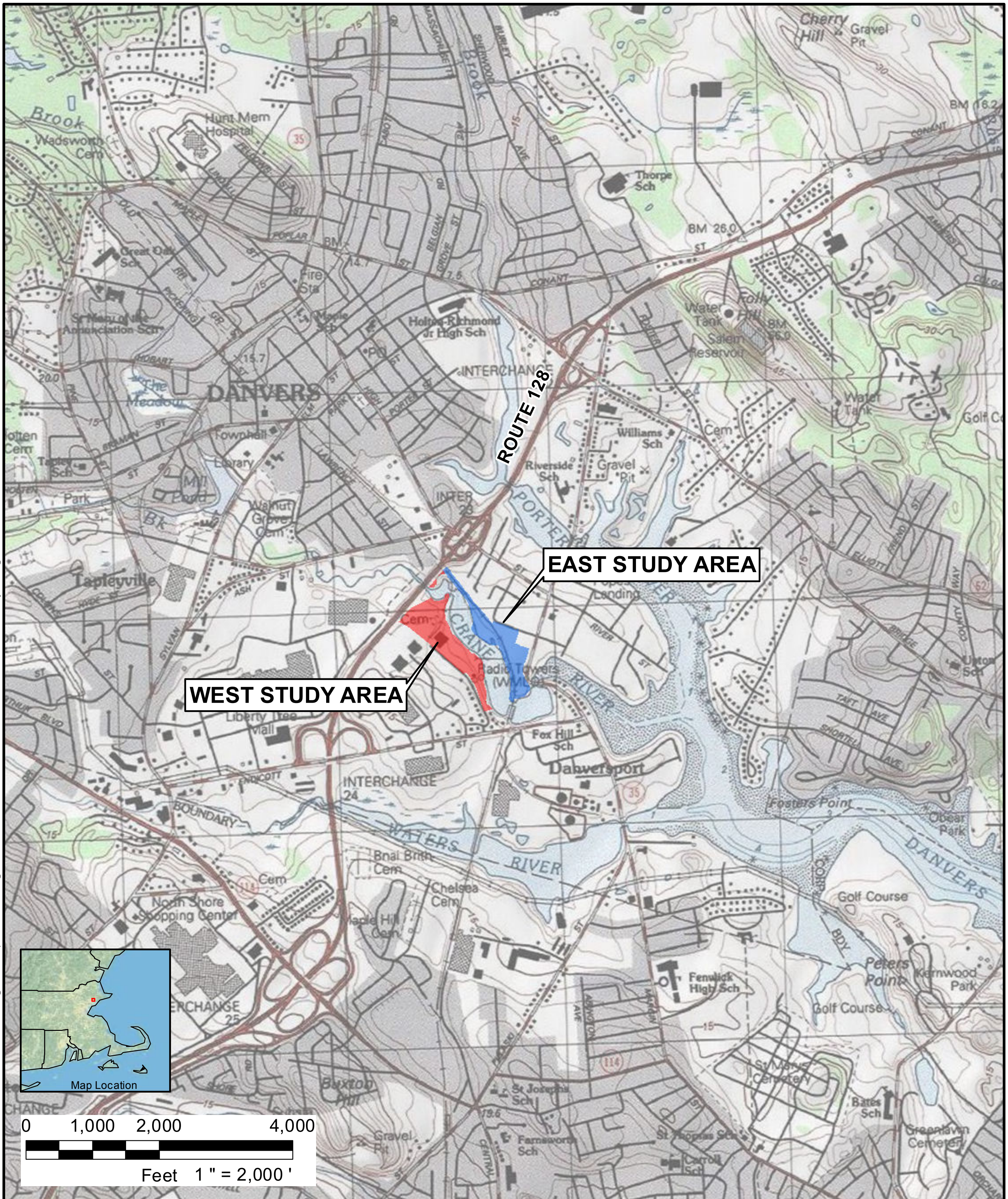

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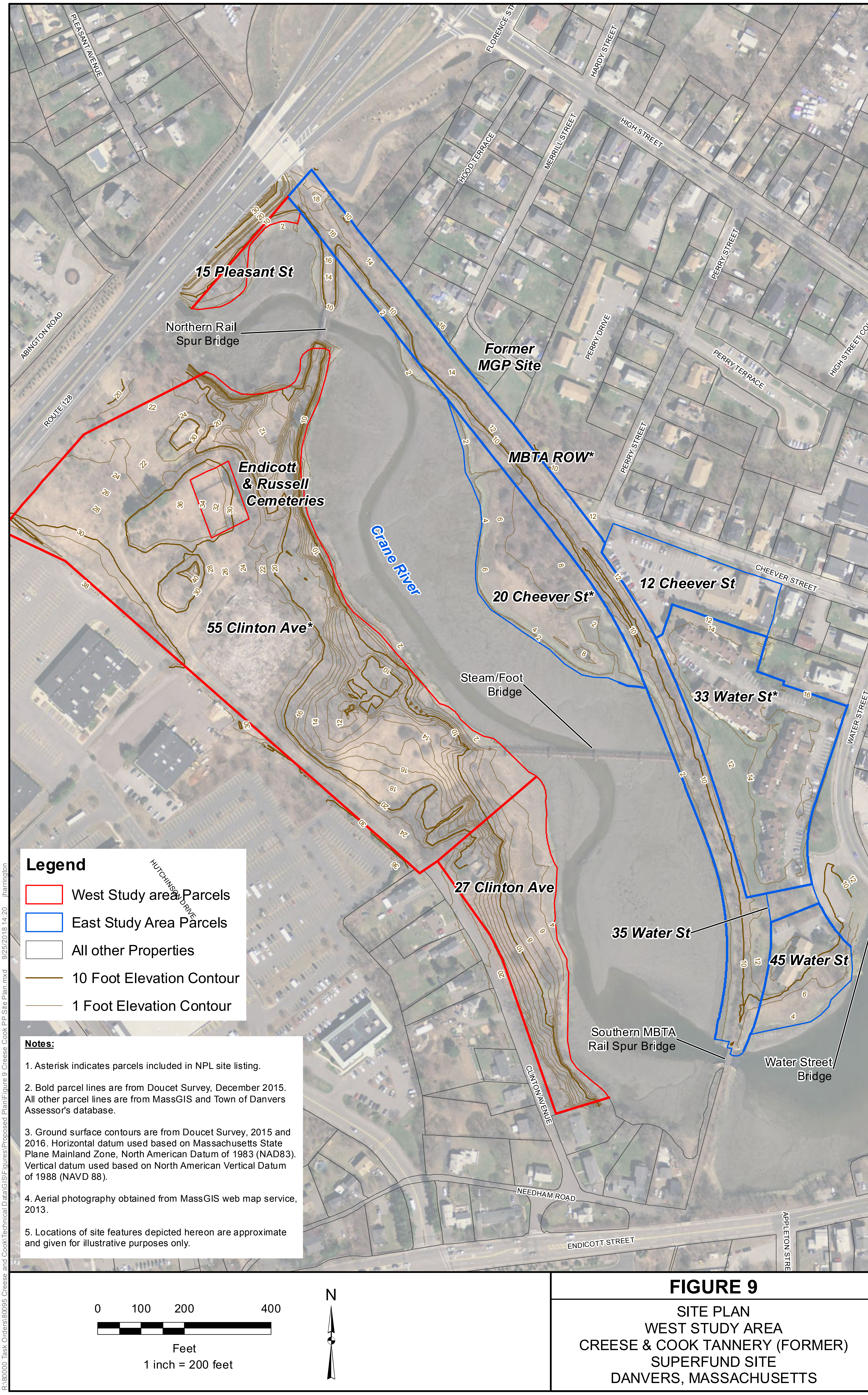
USGS Topographic Map
Salem, Massachusetts
Revised 1985

FIGURE 8

LOCUS MAP
CREESE & COOK TANNERY (FORMER)
SUPERFUND SITE STUDY AREAS
DANVERS, MASSACHUSETTS



Notes:

1. Asterisk indicates parcels included in NPL site listing.
2. Bold parcel lines are from Doucet Survey, December 2015. All other parcel lines are from MassGIS and Town of Danvers Assessor's database.
3. Ground surface contours are from Doucet Survey, 2015 and 2016. Horizontal datum used based on Massachusetts State Plane Mainland Zone, North American Datum of 1983 (NAD83). Vertical datum used based on North American Vertical Datum of 1988 (NAVD 88).
4. Aerial photography obtained from MassGIS web map service, 2013.
5. Locations of site features depicted hereon are approximate and given for illustrative purposes only.

FIGURE 9

SITE PLAN
WEST STUDY AREA
CREESE & COOK TANNERY (FORMER)
SUPERFUND SITE
DANVERS, MASSACHUSETTS