U.S. Army Corps of Engineers, New England District

PROPOSED PLAN FOR ENVIRONMENTAL RESTORATION

Stratford Army Engine Plant, Stratford Connecticut

Contract No. W912WJ-15-D-003

November 2019

DEPARTMENT OF THE ARMY ASSISTANT CHIEF OF STAFF FOR INSTALLATION MANAGEMENT, BRAC DIVISION ANNOUNCES PROPOSED PLAN

This Proposed Plan (Plan) presents the preferred alternative for remediating contaminated sediments associated with the Tidal Flats and Outfall-008 at the former Stratford Army Engine Plant (SAEP) property in Stratford, Connecticut (the Site). The Plan also summarizes the remedial alternatives studied in the detailed Focused Feasibility Study (FFS) and provides the rationale for selecting the preferred alternative considered for use at the Site. **Figure 1** shows the location of the Site at the mouth of the Housatonic River on Long Island Sound.

This Plan is issued by the U.S. Army, Corps of Engineers, New England District (USACE) representing the Headquarters, Department of the Army Assistant Chief of Staff for Installation Management, Base Realignment and Closure Division (BRAC Division) in accordance with the authority delegated to the Secretary of Defense under Executive Order 12580 and with the agreement of the Connecticut Department of Energy and Environmental Protection (*CT DEEP*).

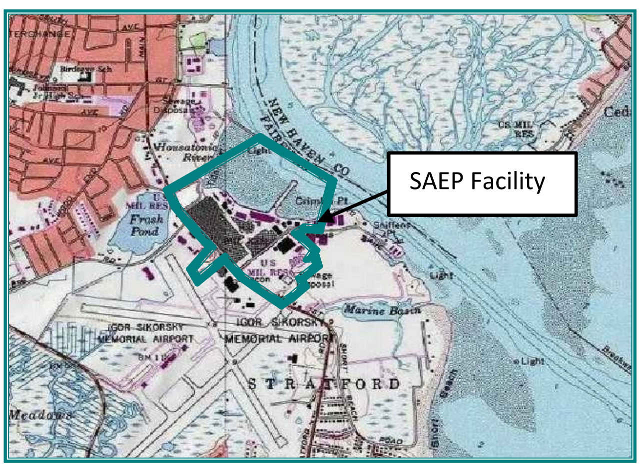

Figure 1 – Site Location

The preferred alternative may be modified, or another response action selected based on new information, including state and/or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this Plan.

USACE is issuing this Plan as part of its public participation responsibilities under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, 42 U.S.C. §9601 et. seq.) and in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300).

This Plan provides information that can be found in greater detail in the Remedial Investigation (*RI*) Report (ACSIM, 2004), the Sediment Remediation Endpoints Report (Amec Foster Wheeler, 2018a), the Addendum to the Sediment Remediation Endpoints Report (Amec Foster Wheeler, 2018b), the FFS Report (Amec Foster Wheeler, 2018c), and other documents contained

MARK YOUR CALENDAR!

PUBLIC COMMENT PERIOD:

November 11 – December 13, 2019
USACE will accept written comments on the Proposed Plan during the 30-day public comment period.

PUBLIC MEETING:

December 10, 2019 from 6:30-8:30 PM
USACE will hold a public meeting to explain the Proposed Plan and the alternatives presented in the Focused Feasibility Study Report. Verbal and written comments will also be accepted at the meeting. The meeting will be held at the Baldwin Center located at 1000 W Broad St, Stratford, CT 06615.

ADMINISTRATIVE RECORD FILE:

For more information on the former SAEP Property site, see the Administrative Record File at https://www.nae.usace.army.mil/Missions/Projects-Topics/Army-Engine-Plant-Environmental-Restoration-Project/

in the Administrative Record file for the Site. USACE and CT DEEP encourage the public to review these documents to gain a better understanding of the Site's history, characterization, and the investigations that have been conducted at the Site.

The former SAEP is located at 550 Main Street in Stratford, Connecticut on the Stratford Point peninsula in the southeast corner of Fairfield County. This Plan is solely focused on the Tidal Flats area (located between the former SAEP and the Housatonic River channel) and the Outfall-008 drainage ditch (**Figure 2**).

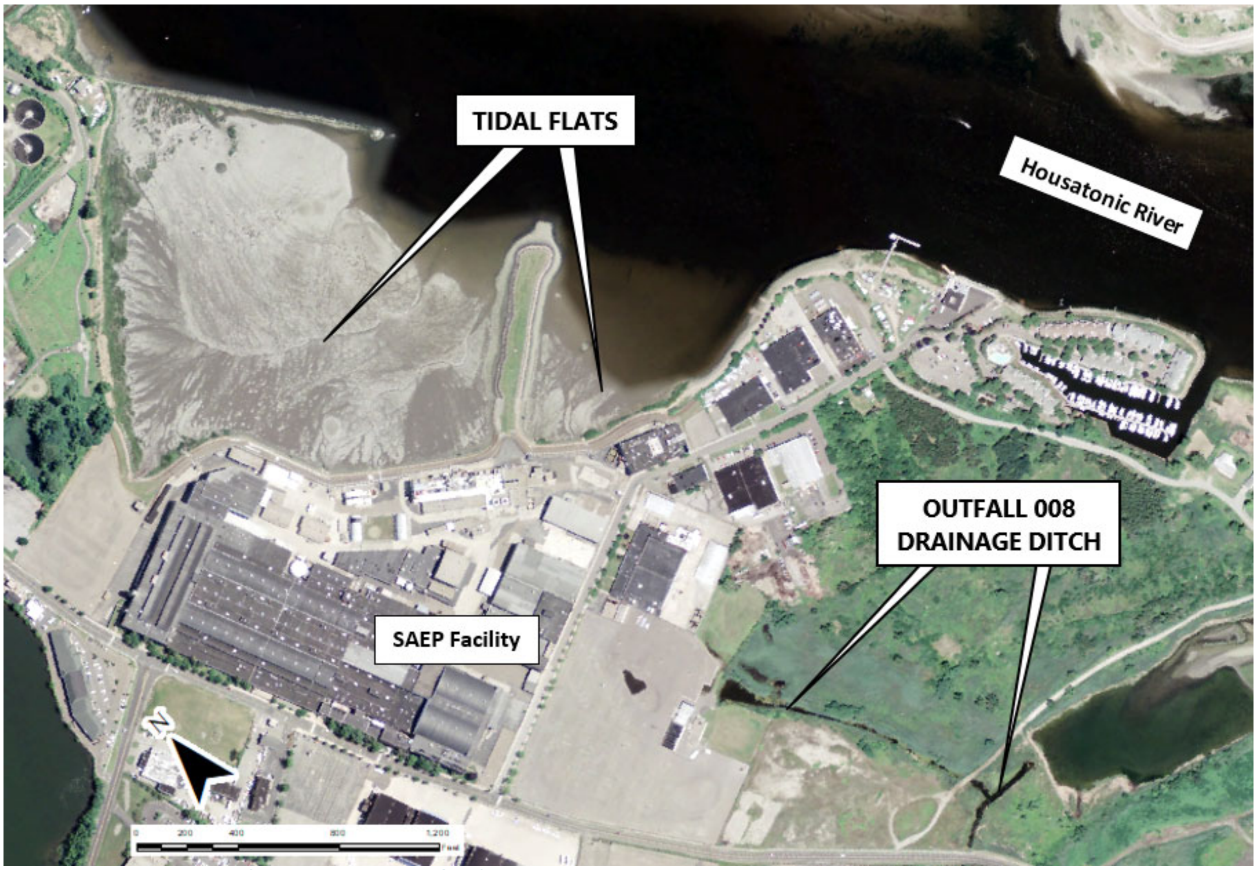

Figure 2 – Location of Tidal Flats and Outfall 008 Drainage Ditch

SITE BACKGROUND

The former SAEP property consists of approximately 124 acres, of which about 76 acres are improved land and 48 acres are riparian rights. The 76 acres of improved land contains 49 buildings, paved roadway and grounds, and five paved parking lots. The 48 acres of riparian rights property consist of tidal flats of the Housatonic River (**Figure 2**).

The property was initially developed in 1927 for Sikorsky Aircraft where aircraft and engines were manufactured from 1929 to 1948. The plant was expanded during World War II to accommodate mass production of the F4U Corsair fighter plane. During this time, the shoreline was extended to provide land area for new buildings. The plant was idle from 1948 until 1951. From 1952 until it closed in 1997, the plant was used to produce reciprocating aircraft engines and turbine engines for both commercial and military applications. The Site was owned by the United States (U.S.) Air Force until 1976, when ownership was transferred to the U.S. Army. In October 1995, SAEP was placed on the Base Realignment and Closure (BRAC) list, known as BRAC 95. Pursuant to the Defense Base Closure and Realignment Act of 1990 (P.L. 101-510), the BRAC Environmental Restoration Program mandates that environmental contamination on U.S. Army BRAC properties be investigated and remediated, as necessary, prior to divestiture or reuse.

Process wastes generated on-site included waste oils, fuels, solvents, metal plating solutions, and paints. An on-site chemical waste treatment plant operated from 1958 to the late 1990s to treat waste generated at the facility, and formerly released effluent to the Housatonic River under a National Pollutant Discharge Elimination System (NPDES) permit. Waste lagoons on the Site were regulated and evaluated under RCRA in the 1980s. The facility was cited in 1983 for violating the Toxic Substances Control Act (TSCA, 15 U.S.C. §2601 et. seq.) regarding reporting of polychlorinated biphenyl (PCB)-containing transformers.

Access to the Site is restricted by perimeter fencing and security personnel. The Site is bordered by a paved parking lot and wetlands to the north; the Housatonic River to the east; an open field, a drainage channel, and small businesses to the south; and hangar buildings, the Sikorsky Memorial Airport, several small businesses, and Frash Pond to the west. Land near the Site is zoned light industrial, business, commercial, or residential. There are several businesses located on Main Street across from SAEP, including a small strip mall, service stations, and a restaurant.

All facility manufacturing operations have ceased. Some office space is currently utilized for site security and building maintenance.

SITE CHARACTERISTICS

As part of the 2004 RI Report (ACSIM, 2004), the Site was organized into almost 70 AOCs. These AOCs were then consolidated into groups according to the type and location of each. These AOC groups were identified to include:

- Hazardous Waste Storage Area
- Chemical Waste Treatment System
- Manufacturing, Testing, Research and Development Area
- Stormwater and Wastewater System
- Miscellaneous Areas

From the list above, three primary AOCs are further discussed below and are the primary focus of this Plan.

- Chemical Waste Treatment System (CWTS)
  - AOC 25 (Outfall-008 Drainage Ditch)
- Stormwater and Wastewater System
  - AOC 24 (Discharge to the Housatonic River at Outall-007)
  - AOC 52 (Outfalls-001 through -006 and the Tidal Flats)

For the purposes of this Plan, AOCs 24 and 52 are combined to represent the Tidal Flats sediments.

The Tidal Flats and OF-008 define the Site as discussed in this Plan, the remainder of the SAEP is regulated under a Resource Conservation and Recovery Act (RCRA) Stewardship Permit and will be addressed under separate action(s).

SCOPE AND ROLE OF RESPONSE ACTION

The preferred remedial alternative for sediments in the Tidal Flats and Outfall-008 (see **Figure 2**), if selected, will address human and ecological receptor exposures to contaminants of concern which include PCBs, PAHs, and metals.

SUMMARY OF SEDIMENT INVESTIGATION

There have been numerous investigations of the sediments in the Tidal Flats and Outfall-008 areas which are summarized as follows:

- Sampling of the Tidal Flats and Outfall-008 drainage ditch sediments was conducted by the U.S. Army in 1992, 1994, and 1999 as part of a RI. These data are presented in the RI Report (ACSIM, 2004).
- Background/reference sediment sampling was conducted in 1994, 1999, 2009, and 2012.
- The CTDOT conducted sediment investigations in the Outfall-008 drainage ditch in August 2012.
- In April and May 2014, additional sediment sampling and toxicity testing were conducted in the Tidal Flats and Outfall-008 drainage area.
- In April 2015, additional sediment sampling was conducted in the Tidal Flats and Outfall-008 areas.
- In August 2017, limited pre-design investigations collected contaminated sediments from the Tidal Flats to conduct treatability studies for potential land-side reuse of sediments, as well as to characterize the sediments relevant to dredging, disposal, and treatment evaluations.
- In October 2017, additional sediment samples were collected for geotechnical parameter analysis at 10 locations across the Tidal Flats to provide a more comprehensive spatial representation of the material to be removed.
- In October 2017, additional sediment coring activities were completed to further evaluate locations where PCB concentrations historically exceeded 50 ppm.

Following these investigations, the sediments associated with the Tidal Flats and the

Outfall-008 drainage ditch portion of the Site have been determined to be impacted by the following:

- Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc);
- Polychlorinated biphenyls; and
- Polynuclear aromatic hydrocarbons (acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd) pyrene, naphthalene, phenanthrene, and pyrene).

SUMMARY OF SITE RISKS

Human health and ecological risk assessments were performed for the sediment portion of the Site as part of previous remedial investigations (ACSIM, 2004). The risk assessments generally showed limited risk to receptors, with a hazard index (HI) for human ingestion of oysters slightly greater than 1, and potential risk to sandpiper exposure to chromium. Based on the age of the sediment data (1992-1998) associated with the Human Health Baseline Risk Assessment (40 CFR 300.430(d)(4)) and Baseline Ecological Risk Assessment, the CT DEEP requested that, prior to establishment of remedial goals for sediment in the Tidal Flats and Outfall-008 drainage ditch sediments, additional sediment characterization be conducted. Sediment toxicity testing was performed for the 0 to 1 ft interval and all areas where results of sediment toxicity testing indicated failures are captured within the remedial footprint. Additional sediment characterization was conducted by the Army in 2014 and 2015 as discussed above, which ultimately led to CT DEEP's determination of remedial targets for site metals and PCBs. The remedial targets (including CTDEEP's risk-based preliminary remedial goals) are documented in the Final Sediment Remediation Endpoints Report (Amec Foster Wheeler, 2018a) and include the following:

- Eliminating sediments that pose a toxic risk to aquatic organisms. CT DEEP's recommendations focused on removing samples that showed toxicity in tests conducted with sediments collected from the site as well as removing sediments from locations with an average effects-range median quotient (ERM-Q) value greater than or equal to 0.5 for eight metals;
- Eliminating site-related impacts from chemicals that can accumulate in fish tissue, such as PCBs and mercury. When PCBs and mercury accumulate in fish tissue, people and wildlife that eat the fish can be affected. CT DEEP recommends that after remediation, PCB and mercury concentrations in sediments should closely approximate background conditions for these chemicals (determined by CT DEEP to be 0.2 mg/kg PCBs and 0.4 mg/mg mercury). CT DEEP evaluated the Army's proposal to remove sample locations with total PCB concentrations greater than or equal to 1 ppm and mercury concentration greater than or equal to 0.55 ppm and believes that approach to remediation, when combined with the removal of sediments to address sediment toxicity, will achieve the goal of consistency with CT DEEP determined background conditions.

REMEDIAL ACTION OBJECTIVES

Based on those preliminary remediation goals (PRGs), remedial action objectives (RAOs) were established for the site according to the following:

- Tidal Flats - Reduce risk to the environment by reducing sediment toxicity in the top 4 ft of sediment by removing sediment exceeding the following criteria:
    - ERM-Q of 0.5 for eight Site-related metals;
    - PCB concentrations exceeding 1 ppm; and
    - Hg concentrations exceeding 0.55 ppm.
- Outfall-008 Drainage Ditch - Reduce risk to the environment by reducing sediment toxicity in the top 4 ft of sediment through removal of all sediments along the entire length of the OF-008 drainage ditch (inclusive of the last third of the ditch (the "T" section) extending to Route 113 to the southwest and to the tidal gate which discharges to the Marine Basin to the northeast).

It is important to note that the RAOs incorporate the U.S. Army's overarching objective to eliminate to the extent feasible any long-term liability for contamination remaining on the Site within the Tidal Flats and the Outfall-008 drainage ditch. The U.S. Army has placed emphasis on remedial actions that reduce ecological risk through ***removal*** *of* sediment rather than those actions that rely upon containment, consolidation (e.g., confined aquatic disposal), or only in-situ treatment of sediments within the Tidal Flats and Outfall-008 Drainage Ditch. By removing sediments exceeding PRGs, the U.S. Army would eliminate any requirements to perform long-term monitoring and maintenance of the remedy.

SUMMARY OF REMEDIAL ACTION

Based upon these RAOs, approximately 139,500 cubic yards (cy) of sediment would require removal within the Tidal Flats (**Figure 3**). The sediments to be removed consist of approximately 8,500 cy of PCB-impacted sediments with concentrations equal to or greater than 1.0 ppm but less than 50 ppm (to be disposed of offsite in a RCRA Subtitle D landfill, RCRA Subtitle C landfill, or permitted TSCA facility), 500 cy of PCB-impacted sediments equal to or greater than 50 ppm (to be disposed of offsite in a TSCA landfill or a RCRA-permitted hazardous waste landfill), and the remaining 130,500 cy of sediments containing PCBs at concentrations less than 1.0 ppm, but still exceed ERM-Q and Hg RAOs. which are eligible for on-site beneficial reuse. For purposes of this Plan, the volumes and related horizontal and vertical delineation of the remedial footprint have been assumed to be sufficient for remedial implementation based upon the sample density and number of samples previously collected to support remedial footprint decisions presented in the Sediment Remediation Endpoints Report (Amec Foster Wheeler, 2018a).

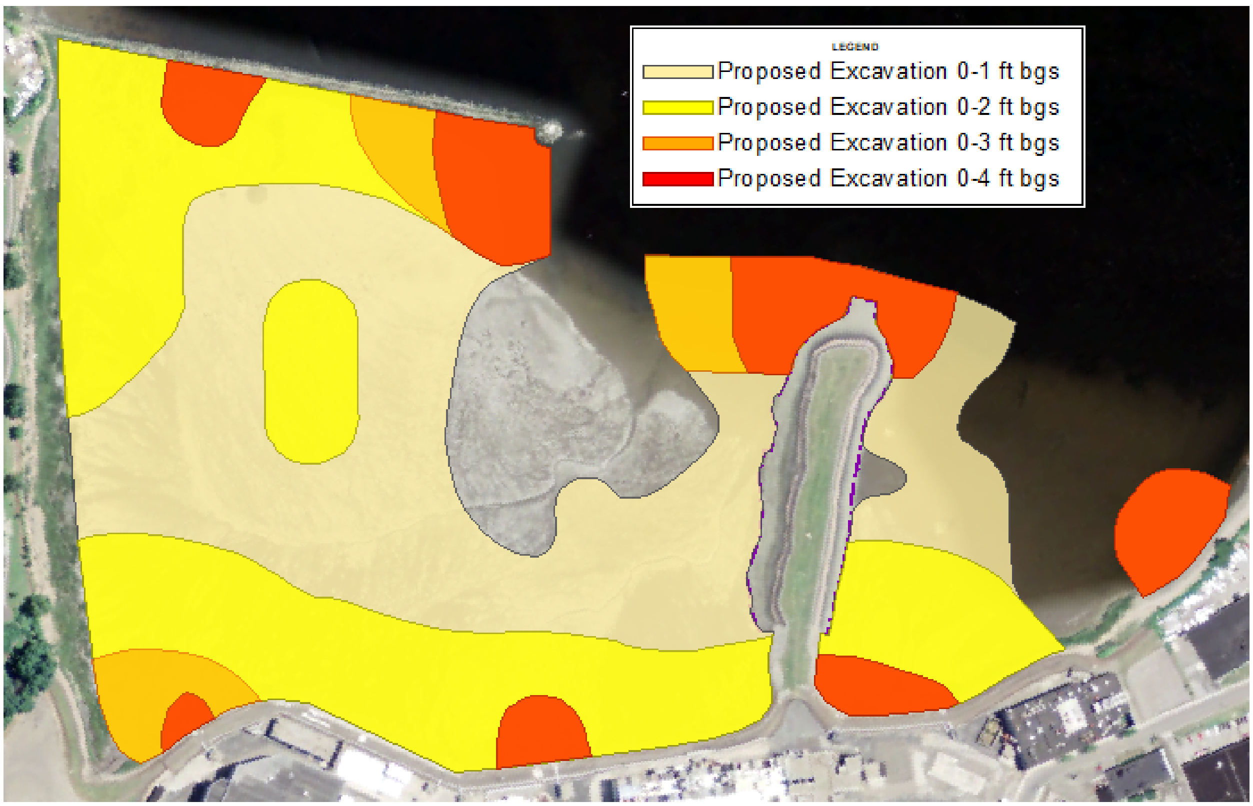

Figure 3 – Tidal Flats Remediation Area

For the OF-008 drainage ditch, a total of approximately 4,900 cy of sediments require remediation (**Figure 4**). The sediments to be removed consist of 1,100 cy of sediments containing PCBs at concentrations greater than or equal to 1.0 ppm but less than 50 ppm, and 3,800 cy of sediments containing PCBs at concentrations less than 1 ppm, which are eligible for on-site beneficial reuse.

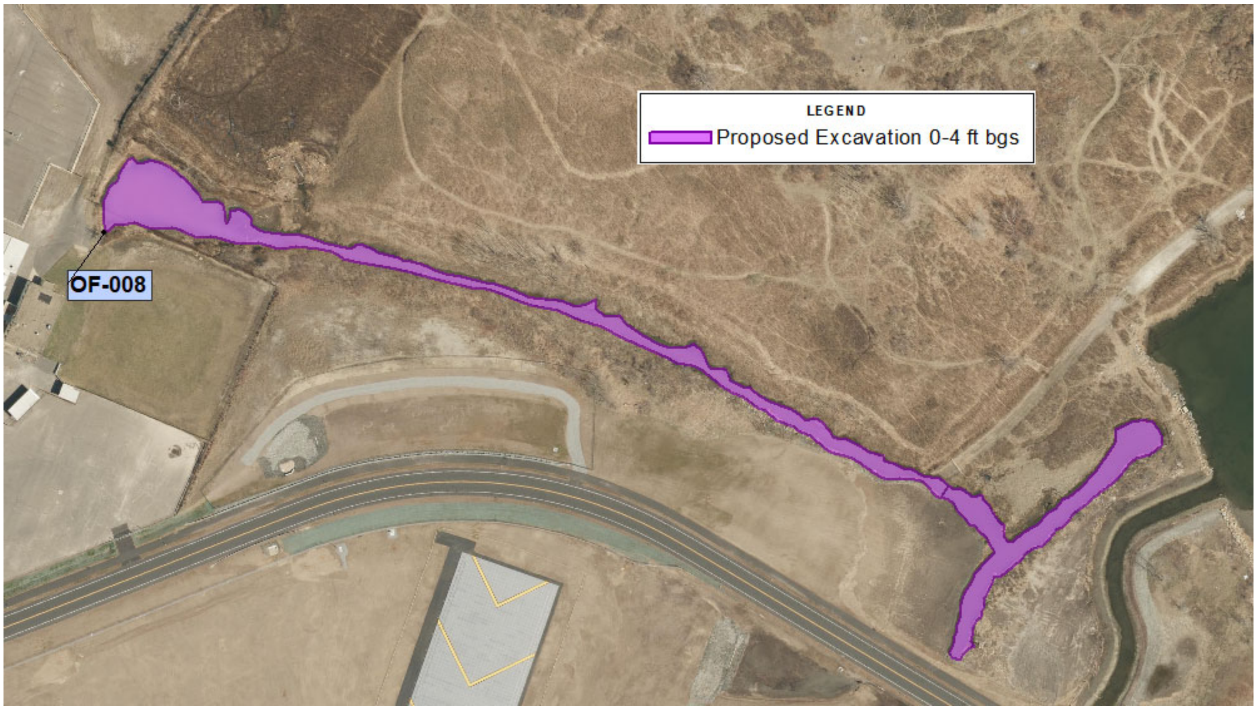

Figure 4 – OF-008 Remediation Area

SUMMARY OF REMEDIAL ALTERNATIVES

Eleven Remedial Alternatives were initially developed for evaluation and six were eliminated for further consideration based on limited effectiveness and impractical implementability.

The remaining five Remedial Alternatives evaluated in detail for this site cleanup are presented below and summarized in **Table 1**. The alternatives are numbered to correspond with the alternatives presented in the FFS (Amec Foster Wheeler, 2018c).

The five remedial alternatives for the site are presented in the text below and are also shown in **Table 1**. It is important to note that the remedial alterative for Outfall-008 remains the same for all alternatives, while only the Tidal Flats remedial alternative technologies vary from alternative to alternative. For the purposes of this proposed plan, the term TSCA refers to sediments with PCB concentrations ≥ 50 ppm.

Alternative	Dredge Method	Transport	Dewater Method	TSCA Disposal ≥50 ppm	Non-TSCA RCRA D Disposal (≥1 ppm and <50)	Non-TSCA Disposal (<1 ppm)
Alternative 2 Hydraulic Dredge to Hydraulic Transport with De-watering: Belt Press or Geotubes®	Hydraulic	Hydraulic	Belt Filter Geotube®	Truck Off-Site	Truck Off-Site	On-Site Beneficial Re-use
Alternative 3 Mechanical Dredge to Mechanical Transport with Solidification (Portland Cement)	Mechanical	Mechanical	Gravity and Solidification	Truck Off-Site	Truck Off-Site	On-Site Beneficial Re-use
Alternative 4 Mechanical Dredge to Hydraulic Transport with De-watering: Belt Press or Geotubes®	Mechanical	Hydraulic	Belt Filter Geotube	Truck Off-Site	Truck Off-Site	On-Site Beneficial Re-use

Alternative	Dredge Method	Transport	Dewater Method	TSCA Disposal ≥50 ppm	Non-TSCA RCRA D Disposal (≥1 ppm and <50)	Non-TSCA Disposal (<1 ppm)
Alternative 5 Mechanical Dredge to PFTM Transport and Solidification (Non-TSCA) and Barge Transport (TSCA and RCRA D)	Mechanical	PFTM (on-site) Barge (off-site)	Gravity and PFTM Solidification	Barge Off-Site	Barge Off-Site	On-Site Beneficial Re-use
Alternative 6 Mechanical Dredge to Mechanical Transport for Off-Site Process/Disposal (All)	Mechanical	Barge	Gravity and Off-Site Solidification	Barge Off-Site	Barge Off-Site	Barge Off-Site

Notes:
1. TSCA Disposal refers to sediments with PCB concentrations that are ≥ 50 ppm to be disposed of at a TSCA landfill.
2. Non-TSCA RCRA D Disposal refers to sediment with a PCB concentration ≥ 1 ppm but < 50 ppm to be disposed of at a RCRA D landfill
3. Non-TSCA Disposal refers to sediment with PCB concentrations < 1 ppm eligible for beneficial reuse onsite.

Table 1 – Remedial Alternative Summary

Alternative 2

- Tidal Flats: Hydraulic dredge to hydraulic off-load, filter press or Geotube® de-watering of excavated sediments, with mechanical backfill for restoration, and on-site beneficial reuse or off-site disposal

Alternative 2 includes hydraulic dredging of 139,600 cy (neat) of Tidal Flats sediment which ranges in thicknesses from 1 to 4 ft over approximately 47 acres. The hydraulic dredge slurry, which is anticipated to typically contain approximately 6% solids, would be pumped through a floating pipeline at a flow rate of approximately 1,250 gallons per minute (gpm) to the sediment processing area(s) on the SAEP facility. Two hydraulic systems as described above would have a combined average production of approximately 300 cy per 12-hour shift.

Two processing options were evaluated, belt filter press de-watering and Geotube® de-watering. For the belt filter press, mechanical separation equipment and a series of 2.2-meter belt filter presses were evaluated for de-watering. For the Geotube® option, the hydraulic slurry was pumped directly into the Geotube®. The incoming slurry would be dewatered in real time and would match the production of the dredge.

Fluids generated from de-watering processes would be collected and pumped to a water treatment system capable of treating influent to concentrations acceptable for discharge back into the Housatonic River adjacent to the Site.

The final step of dredged material processing is to dispose of or beneficially reuse on-site sediment with < 1 ppm PCBs and meeting CT residential direct contact criteria. All sediment ≥ 1 ppm PCBs would be dredged, processed, and stockpiled separately. Once dewatered, this sediment would be loaded onto haul trucks and sent off-site for disposal at a RCRA D (< 50 ppm PCBs) or TSCA-approved landfill (≥ 50 ppm PCBs).

Backfilling of the dredged area in this alternative would occur mechanically. Backfill material would be delivered and stockpiled near the Causeway. A Telebelt® or similar would be positioned at the base of the Causeway and would be used to load shallow draft sediment barges which would then be positioned next to the hydraulic dredge for backfill placement

- OF-008: Isolate and dewater area for mechanical dredge and truck transport to sediment processing area and on-site beneficial reuse or off-site disposal. Mechanical backfill and restoration.

To control stormwater entering the ditch from the outfall itself, a temporary pumping station would be constructed to divert water to the Marine Basin to the southeast. Water entering the drainage ditch from flood tides would also need to be controlled with an earthen berm or sheet pile wall.

Sediment within the drainage ditch would be excavated in the dry in sections utilizing the temporary sheet-pile walls. Once the sheets are installed and the water is diverted, all debris discovered within the Outfall-008 ditch would be removed and hauled to the staging area for off-site disposal. Sediment would then be excavated in the dry using a long reach excavator to a uniform depth of 4 ft below the mudline.

The sediment would be loaded into watertight off-road trucks which would drive to the staging area(s) where the sediment would be segregated and processed. For TSCA sediments, material would be staged for gravity drainage to allow for the maximum amount of de-watering. For non-TSCA sediments, gravity drainage is not necessary, and sediments can be solidified immediately following placement at the staging area with 6% Portland cement.

Water generated from the staging area would be collected and pumped to an on-site water treatment system consisting of settling, filtration, and carbon adsorption. Treated water meeting discharge requirements would be discharged back to the Marine Basin near the tidal gate at the end of the Outfall-008 drainage ditch.

All sediments containing less than 1 ppm PCBs would be placed in a stockpile located at the south parking lot for future beneficial on-site reuse by the developer. The stockpile would be protected against erosion through the installation of an impermeable cover or topsoil and grass seed, followed up by periodic inspections. As part of the Design, impacts to any active existing utilities would need to be assessed for the placement location. Sediments ≥ 1 ppm PCBs would be sent off-site for disposal at a RCRA D (< 50 ppm PCBs) or TSCA-approved landfill (≥ 50 ppm PCBs).

The work would be completed in cells and as the remediation is complete in each cell, the equipment would be decontaminated and the excavator and would place backfill material to the appropriate elevations before moving to the next cell. For purposes of the FFS, it has been assumed that the backfill material would include 3 ft of common fill overlain by a 1 ft layer of appropriate backfill material to meet restoration objectives.

Alternative 3

- Tidal Flats: Mechanical dredge to mechanical off-load, dewater and solidify, with mechanical backfill for restoration and on-site beneficial reuse or off-site disposal
- OF-008: Isolate and dewater area for mechanical dredge and truck transport to sediment processing area and on-site beneficial reuse or off-site disposal. Mechanical backfill and restoration.

This alternative includes mechanical dredging of 139,600 cy (neat) of Tidal Flats sediment which ranges in thicknesses from 1 to 4 ft over approximately 47 acres using a precision level cut environmental clamshell bucket which limits the amount of over-dredge and reduces the amount of excess water entrained in comparison to hydraulic dredging removal methods. Two mechanical systems would have an average production of approximately 475 cy total per 12-hour shift. This type of dredge has a typical vertical accuracy of 0.2 to 0.5 ft and can achieve an average over dredge of approximately 0.2 ft which has been used for purposes of cost estimating.

Dredged buckets of sediment would be loaded into shallow draft barges, with sump basins in the corners of the barges to facilitate de-watering. Barge capacities would range from 100 to 200 cy. Once a barge is loaded to capacity, it would be transported via push boat to the barge offloading area positioned at the end of the causeway where adequate draft is available during the entire tidal cycle. The barge would be docked against a floating temporary water treatment system to remove surficial de-watering water. Water collected would be treated by pumping through a water treatment system capable of treating the influent to levels acceptable for discharge back into the Housatonic River.

A crane, also positioned at the end of the Causeway, would offload sediment from the barges using a clamshell bucket and place the sediment into water tight dump trucks (or similar) positioned on the Causeway. The trucks would drive to the staging area where the sediment would be loaded into a pugmill to mix a precise ratio of Portland cement at a rate of 6% by weight of PC. TSCA sediments will be staged and allowed to gravity dewater and separate solid from liquid phase wastes to the extent practicable prior to being mixed with Portland Cement in accordance with 40 CFR Part 761.

Once mixed, sediment would be stockpiled and allowed to cure to pass the paint filter test. Sediment containing < 1 ppm PCBs would be stockpiled at the south parking lot for future beneficial reuse on-site by the developer. All sediment ≥ 1 ppm PCBs would be dredged, processed, and stockpiled separately. Once dewatered, this sediment would be loaded onto haul trucks and sent off-site for disposal at a RCRA D (< 50 ppm PCBs) or TSCA-approved landfill (≥ 50 ppm PCBs).

Backfilling of the dredged area in this alternative would occur mechanically. Backfill material would be delivered by truck to the end of the Causeway and stockpiled for loading onto barges via the crane. The shallow draft sediment barges would be pushed into position next to the mechanical dredge for backfill placement.

Alternative 4

- Tidal Flats: Mechanical dredge to hydraulic transport and filter press or Geotube® de-watering with mechanical backfill for restoration and on-site beneficial reuse or off-site disposal.

This alternative includes mechanical dredging technology as discussed in Alternative 3, with the ability to hydraulically transfer the dredged sediment.

Dredged buckets of sediment would be directly loaded into a slurry box with a screen located on the deck of the dredge barge. Water obtained adjacent to the operation would be used as makeup water for the slurry system. Once the material is in the slurry, it is handled the same way as Alternative 2 with the exception that the slurry would typically be at a higher percent solids. Sediments would be dewatered using either the belt filter press or Geotube®. It has been assumed that de-watering fluids would be treated and discharged back to the Housatonic River

All sediments containing less than 1 ppm PCBs would be beneficially reused onsite or disposed of off-site. All sediments ≥ 1 ppm PCBs would be sent off-site for disposal at a RCRA D (< 50 ppm PCBs) or TSCA-approved landfill (≥ 50 ppm PCBs).

Alternative 5

- Tidal Flats: Mechanical dredge to pneumatic flow tube mixing with mechanical backfill for restoration and on-site beneficial reuse

This alternative includes mechanical dredging technology as discussed in Alternative 3. Once the sediment barge is loaded to capacity, it would be transported via push boat to the barge offloading area positioned at the end of the Causeway where adequate draft is available during all tidal ranges. The barge would be docked against a floating temporary water treatment system to remove and treat surficial free-standing water as necessary. Once the barge is sufficiently decanted of de-watering water, it would be moved to a floating spudded crane barge. The crane would offload the sediment from the scow and place it into a hopper for initial screening of large debris. Material that passes the debris screen would enter the pneumatic flow tube mixing (PFTM) system where it would be mixed with Portland cement and transported via pipeline. The sediment would be conveyed via air pressure, which pushes the sediment in “plugs” with reduced friction in the pipeline. The end of the pipeline would be positioned to place the mixed sediment where it would be beneficially reused on site (sediment containing < 1 ppm PCBs). The material cures quickly and would be placed in lifts of desired thickness. PFTMs are capable of processing 2,000 to 3,000 cy per day, well in excess of the anticipated dredging rates in the Tidal Flats.

This alternative assumes that all sediment containing < 1 ppm PCBS would be beneficially reused on-site. Sediment ≥1 ppm PCBs would be dredged as described above, except the material would be trans-loaded from smaller hopper barges to large 2,000 cy barges. The material would be transported via barge to an off-site processing facility permitted to handle RCRA D and TSCA materials for off-site disposal at RCRA D and TSCA-approved facilities.

Backfilling of the dredged area would occur mechanically. Backfill material would be delivered and stockpiled near the Causeway. A Telebelt® or similar would be positioned at the base of the Causeway. The Telebelt® would load decontaminated sediment barges with backfill material which would then be positioned next to the mechanical dredge. The dredge would reverse operations and place backfill material to the designed elevations.

Alternative 6

- Tidal Flats: Mechanical dredge to barge off-site for processing with mechanical backfill for restoration and off-site disposal.

This alternative includes mechanical dredging technology as discussed in Alternative 3.

Once one of the barges is loaded to capacity, the loaded barge would be transported via push-boat to the barge offloading area positioned at the end of the Causeway. The barge would be docked adjacent to a floating temporary water treatment system to remove surficial free-standing water. Water collected would be treated by pumping through a water treatment system capable of treating influent to levels acceptable for discharge back into the Housatonic River. Once the barge is sufficiently decanted of free-standing water, it would be moved to a floating spudded crane barge. The crane would offload the sediment from the loaded scow and place into large (typically 2,000 cy) barges. The material would then be transported via barge and truck to an off-site processing facility permitted to handle RCRA

D and TSCA materials for off-site disposal at RCRA D and TSCA-approved facilities.

Backfilling of the dredged area would occur mechanically. Backfill material would be delivered and stockpiled near the Causeway. A Telebelt® or similar would be positioned at the base of the Causeway. The Telebelt® would load decontaminated sediment barges which would then be positioned next to the mechanical dredge. The dredge would reverse operations and place backfill material to the designed elevations.

Additional Components Common to All Alternatives

Each Alternative would include the following components not specifically discussed above:

Pre-Design Investigation Sampling: A limited pre-design investigation sampling program will be implemented to better define vertical limits of dredging in isolated areas below 4 feet bgs, where currently available data is insufficient to accurately define dredge limits. The proposed pre-design investigations are presented in Section 1.2.3 and Appendix A-3 of the Final FFS (Amec Foster Wheeler, 2018c). There are currently seven discrete areas shown in red in **Figure 3** that the Army proposes removal to a depth of 4 feet bgs. Six of these seven areas have ERM-Q values exceeding RAOs over the sampling interval 3-4 feet bgs. The Army proposes deeper interval sampling (from 4-6 feet bgs) to evaluate ERM-Qs relative to the RAO of 0.5. The Design will specify any additional excavation required to reduce risk to the environment within the tidal flat. The Army will not conduct any sediment excavation to depths greater than 6 feet, bgs in the Tidal Flats.

Odor Control: During dredging, there is potential for odor generation from the various components of dredging and dredged material management. Odor is generated by anaerobic bacteria which decompose organic matter and produce hydrogen sulfide (H_2S). Dredged material itself and exposed tidal flats will generate odors; however, as the exposed sediment is exposed to air, the potential to produce H_2S decreases. Other techniques to control odor would be employed in dredge material handling, including: increasing pH through the addition of Portland cement, lime, calciment, caustic soda, etc., to sediment; adding oxidizers such as permanganate, ferric chloride, ferric sulfate, peroxide, or chlorine bleach to sediment slurry or water treatment processes (these chemicals can have additional health and safety concerns); covering stockpiles with foaming agents to contain and mask odors; incorporating air release and air venting systems and air treatment for enclosed spaces or targeted air handling systems over operations.

Verification Sampling: Verification sampling will consist of real-time screening to demonstrate that the remediation approach is meeting the performance objectives for dredge depth and remedial action goals. The verification sampling approach will include hydrographic surveys, field and laboratory analysis of samples, and prescribed sampling frequencies and collection methods.

Confirmation Sampling: Following verification sampling, and any resulting additional removals required to remove the targeted sediment inventory, confirmation sampling will be performed. Confirmation would involve collecting core samples of the remaining exposed sediment surface and analyzing the samples for location-specific site contaminants. The number of samples to be collected for each confirmation area will be statistically derived and the results will be compared to site cleanup standards. Additional removals may be required based on these results.

Tidal Flats Backfilling: In general, and consistent with discussions held with CT DEEP, dredged areas within the Tidal Flats will be backfilled with sandy material to elevations that are approximately one foot below the pre-dredging mudline. Naturally deposited fine silts will gradually fill the remaining one foot over time to allow a natural substrate to return for re-establishment of biota.

Revegetation and Long-Term Monitoring: In areas where there are existing salt marsh grasses, the areas will be restored with in-kind vegetation. Elevation of the area will need to be carefully established to ensure proper inundation periods during the tidal cycle. A five-year monitoring and maintenance program would be implemented to ensure the re-establishment of the salt marsh. No other long-term monitoring is proposed for the Tidal Flats. Like the Tidal Flats, the Outfall 008 drainage ditch would be re-established with appropriate vegetation and a five-year monitoring and maintenance program would be implemented.

EVALUATION OF ALTERNATIVES

Nine NCP criteria (40 CFR 300.430(e)(9)(iii)) and the USEPA's preference for the use of green and sustainable practices are used to evaluate the different remedial response alternatives for selection of a remedy.

CERCLA and the NCP mandate that these criteria be used as the basis for selection of a proposed remedial action. The selected alternative must meet the threshold criteria, must be cost-effective, and must provide the best overall balance of the tradeoffs identified in the balancing criteria evaluations.

The modifying criteria, as well as state and community acceptance will be evaluated through review of the comments received from the CT DEEP, stakeholders, and the public in response to this Proposed Plan. The evaluation criteria are discussed below and summarized in **Table 2** and are based on the more detailed *Comparative Screening of Response Alternatives* of the FFS Report.

Additional sustainability criteria have been identified by USEPA Region I and CT DEEP and were evaluated based on the following policy and guidance:

The threshold criteria used in evaluating the remedial alternatives in the FFS include the following:

1. Overall Protection of Human Health and the Environment

All the alternatives would provide adequate protection of human health and the environment by eliminating, reducing, or controlling risk through removal of contaminated sediments.

2. Compliance with ARARs

All the alternatives comply with the identified ARARs.

The balancing criteria used in evaluating the remedial alternatives in the FFS include the following:

3. Long-Term Effectiveness and Permanence

Each of the alternatives would permanently remove contaminated sediments from Tidal Flats and OF-008, and place backfill materials to re-establish habitat. There is essentially no difference between alternatives with respect to this criterion.

However, when comparing options for on-site re-use and off-site disposal, off-site disposal has more permanence because the material would be placed in a secure off-site landfill facility rather than placed on-site.

Furthermore, on-site options that do not include solidification (Alternatives 2 and 4) and which rely on mechanical de-watering methods or Geotubes®, do not require the addition of additives for placement on-site. In this respect, the remediation may not be permanent because future solidification may be required to meet future re-use criteria with respect to strength, which are currently unknown.

4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

None of the alternatives have treatment as a principle element to permanently and significantly reduce toxicity, mobility, or volume of the contaminants identified in the sediments. However, all alternatives include some form of treatment to process dredged material or treat de-watering fluids. Alternatives that involve hydraulic transport of sediment significantly increase the volume of materials requiring processing/treatment due to the large volume of water entrained to move sediments in a slurry.

5. Short-Term Effectiveness

The main differentiating factor under this criterion is time to achieve RAOs. Alternatives that include mechanical dredging and mechanical transport (Alternatives 3, 5, and 6) have the highest dredging productivity, and therefore the shortest overall schedule, and are evaluated more highly in this regard. Mechanical dredging with hydraulic transport (Alternative 4) has a slightly longer schedule due to the more complex slurry component required to transport sediment to land. Alternative 2 (Hydraulic dredging) would have the longest overall schedule, and therefore is evaluated least favorably with regard to short-term effectiveness.

6. Implementability

Generally, the dredging technologies selected (mechanical and hydraulic) are widely available and proven. Therefore, the removal technologies are evaluated similarly for implementability. Alternatives 3 and 5 rely upon innovative technologies (mechanical dredging with hydraulic transport) or technologies that are not widely used (PFTM) and are therefore considered more difficult to implement given the scarcity of contractors able to perform the work. Alternatives

CRITERIA FOR EVALUATING THE ALTERNATIVES
THRESHOLD CRITERIA
Overall Protectiveness of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
Compliance with ARARs evaluates whether the alternative meets cleanup levels and remedial requirements based on relevant Federal and State environmental statutes or, regulations, or whether a waiver is justified.
PRIMARY BALANCING CRITERIA
Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
MODIFYING CRITERIA
Army Corps of Engineers and CT DEEP and/or EPA Acceptance considers whether the CT DEEP and/or EPA agrees with USACE's analyses and recommendations, as described in the FFS and proposed plan.
Community Acceptance considers whether the local community agrees with the USACE's analyses and preferred alternative. Comments received on the proposed plan are an important indicator of community acceptance.
OTHER CONSIDERATIONS
Green/Sustainable Practices evaluates the alternative for reduction of waste, conservation of energy, reuse of materials, and recycling.

Table 2 – Evaluation Criteria Summary

[1]

The above base assumptions presented in the FFS result in construction schedules that range from two to five seasons, given the shortened allowable dredge window and shortened work week. To reduce this timeframe down to a more practical period of time, cost sensitivities were

that rely on significant water treatment systems (Alternatives 2 and 4) are considered more difficult to implement given the additional complexity of mobilizing and operating large de-watering and water treatment systems. Alternative 5 (PFTM) has the added advantage of very little or no water treatment required for sediment with PCB concentrations <1 ppm. In addition, the Geotube® option is evaluated more favorably over the mechanical de-watering option (belt press) based on its simpler operation. However, both the belt filter press and Geotube® options require a larger footprint relative to alternatives that rely on gravity de-watering, complicating site logistics, particularly when considering on-site placement of fill materials.

7. Cost

The FFS presents cost estimates based on key initial conservative assumptions for the work schedule, including allowable months per year (based on "fish windows" for protected fish species, which protect the various species from possible harm during sensitive events occurring in their life cycles such as spawning and migration), hours per day, and days per week. The base assumptions in the FFS included dredging between July 1st and January 31st, a seven-month window, five days per week, and 12 hours per day. Both on-site beneficial re-use and off-site disposal were evaluated. For on-site re-use, Alternative 3, Mechanical Dredging and Alternative 4, Hybrid Dredging (mechanical dredging followed by hydraulic transport and geotextile dewatering) have the lowest estimated

costs at $79.4 ($70.5) and $78.4M ($69.6), respectively. Alternative 6 (off-site disposal via barge) had the highest overall cost at $93.5 ($83.0). It is important to note that all the alternatives, including on-site beneficial re-use of sediments and off-site disposal, have costs which fall within the -30%/+50% range established for a FS under CERCLA (USEPA 1988).

conducted assuming 12 months per year allowable dredging, seven days per week, and 24 hours per day, including some allowable downtime for weather-related events. Based on discussions with the relevant state and federal agencies regarding fish windows, and Town of Stratford officials, these expanded work periods are acceptable based upon the resulting

[1] Costs are presented in millions of dollars. All costs presented for the base case include construction escalation at 3% per year to reflect the anticipated increases in construction costs over the life of the project. The un-escalated costs are shown in parentheses after the escalated costs.

shortened overall schedule to complete the project. In addition, when these assumptions are used the estimated costs drop to $64.8M, $63.7M, and $78.5M for Alternatives 3, 4, and 6, respectively (not including escalation). Using these assumptions, the project can be completed within approximately 18 months continuous. The costs presented in this section include 20% contingency, 11% Project/Construction Management costs, and 5% Design costs, per USEPA FS (USEPA 1988) and cost estimating guidance (USEPA 2000).

Table 3 summarizes the costs presented in the FFS, and includes estimated costs based on an Expanded Work Window:

FFS Alternative	FFS Base Case Cost	Expanded Work Window Cost
2	$95.3 ($84.7)	$77.3 ($72.9)
3	$79.4 ($70.5	$68.8 ($64.8)
4	$78.4 ($69.6)	$67.6 ($63.7)
5	$82.1 ($72.9)	$72.7 ($68.5)
6	$93.5 ($83.0)	$83.2 ($78.5)

Note: All costs are in millions of dollars. Alts 2-5 assume on-site beneficial re-use of sediment; Alt 6 assumes off-site disposal. All costs include contingency, design, escalation, and management. Costs without escalation are noted in parentheses. Base Case: work window is 7 months per year, 12 hrs/day, and 5 days per week. Expanded Work Window: 12 months per year, 7 days per week, and 24 hrs/day.

Table 3 – Estimated Remedial Costs

The modifying criteria used in evaluating the remedial alternatives in the FFS include the following:

8. State Acceptance

This criterion is continually evaluated, as CT DEEP participates in evaluation and selection of a remedy. CT DEEP will issue an official position in a comment letter after the public comment period has ended.

9. Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the Decision Document for the site.

10. Other Considerations for Green and Sustainable Practices

Alternatives 2 through 5 are considered similar with respect to green and sustainable practices, with the exception that alternatives that minimize the amount of water requiring treatment are rated higher. In addition, on-site beneficial re-use is considered a more green and sustainable practice than off-site disposal. Therefore, Alternatives 3 and 5, mechanical dredging and PFTM technology, respectively, with on-site re-use of sediment are rated highest with respect to the use of green and sustainable practices. These options would generate less water relative to options that include hydraulic transport of sediments.

PREFERRED REMEDIAL ALTERNATIVE

The preferred alternative for remediation at the Site is Alternative 3, mechanical dredging and on-site beneficial re-use of sediments.

The preferred alternative is recommended over the other alternatives because it:

- has the highest anticipated productivity rates (and therefore shortest overall schedule)
- utilizes precision mechanical dredging to generate a smaller volume of dredged material than hydraulic dredging
- would generate a significantly lower volume of water requiring treatment relative to hydraulic dredging or transport options (Alternative 2 and 4)
- utilizes precision, level-cut environmental clamshell buckets to minimize over-dredge and the generation of re-suspended sediments
- results in less mixing of underlying clean sediments relative to hydraulic dredging
- utilizes mechanical dredging systems, which allow for conversion sediment holding barges to backfill and restoration barges, which reduces costs
- includes cement solidification processing of sediments which is a standard element of dredged material processing and not difficult to incorporate (Alternative 2 and 4 do not include Portland cement, so an additional cost for solidification would be realized to ultimately meet on-site strength requirements for beneficial re-use)
- provides these benefits at a relatively low overall cost that is like Alternatives 2 (Geotube®), 4, and 5, and represents the best combination of time to achieve a Permanent Solution, certainty of success (i.e., achieving a Permanent Solution), and reliability.

The following table summarizes the costs and schedule for Alternative 3:

	Base Case	Expanded Work Windows
Cost ($M)	$79.4 ($70.5)	$68.8 ($64.8)
Schedule	3-4 seasons (years)	18 months

Notes: costs include escalation, design and management except for costs noted in (), which do not include escalation.

Table 4 – Preferred Remedial Alternative (Alt 3) Cost and Schedule

Based on the information available at this time, the USACE representing the BRAC Division believes the preferred alternative would meet the threshold criteria, and that it is the best alternative with respect to the balancing criteria. The preferred alternative would be protective of human health and the environment, comply with established regulations and ARARs, be cost-effective, and completed within a reasonable timeframe.

USACE representing the BRAC Division may modify the preferred alternative in response to public comments or new information.

COMMUNITY PARTICIPATION

Historically, the USACE representing the BRAC Division has provided information and solicited public input to response actions at the Site through public meetings, the Administrative Record file for the Site (40 CFR 300.800), publication of this Plan, and announcements published in local newspapers. The USACE representing the BRAC Division will continue to work with the public to understand the proposed response actions necessary to mitigate Site risks associated with contaminated sediments.

The public comment period is provided on the front page of this Plan, as is the date, location, and time of the public meeting, and the location of the Administrative Record.

Comments and requests for further information regarding the SAEP site should be directed to:

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U.S. Army Corp of Engineers
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GLOSSARY OF TERMS

Specialized terms used in this proposed plan are defined below.

***Administrative Record**:* The body of documents USACE uses to form the basis for selection of a response.

Applicable or Relevant and Appropriate Requirements (ARARs): Cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility citing laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances found at a CERCLA site that a selected remedy for a site will meet.

Capital Costs: Expenses related to the labor, equipment, and material costs of construction.

Comprehensive Environmental Response, Compensation, and Liability Act: CERCLA established prohibitions and requirements concerning closed and abandoned hazardous waste sites, provided for liability of persons responsible for releases of hazardous waste at these sites, and established a trust fund to provide for cleanup when no responsible party can be identified.

Decision Document (DD): A document that is a consolidated source of information about the site, the remedy selection process, and the selected remedy for cleanup under the CERCLA process.

Ecological Risk Assessment (ERA): A study of the actual or potential danger to the environment from hazardous substances at a specific site. The ERA estimates nonhuman health risk if no response action is taken.

Feasibility Study (FS): The FS identifies and evaluates the most appropriate technical approaches to address contamination problems at a CERCLA site.

Groundwater: Water occurring within the subsurface.

Human Health Risk Assessment (HHRA): A study of the actual or potential danger to human health from hazardous substances at a specific site. The HHRA estimates the risk to human health at a site if no response action is taken.

Land Use Controls (LUCs): Actions taken by the USACE that help minimize the potential for human exposure to contamination by ensuring appropriate land or resource use.

National Oil and Hazardous Substance Pollution Contingency Plan (NCP): USEPA's regulations governing all cleanups under CERCLA.

Operations and Maintenance Cost: The cost and timeframe of operating labor, maintenance, materials, energy, disposal, and administrative components of the remedy.

Chemical of Potential Concern (COPC): Chemicals present at concentrations that exceed screening levels in one or more samples in a given environmental medium.

Preferred Alternative: The preferred alternative, of all the alternatives considered, is the alternative proposed by the USACE to remediate the site.

Proposed Remediation Goals (PRGs): Numerical goals set for a contaminated media to help meet the RAOs.

Proposed Plan: A document requesting public input on a proposed remedial alternative.

Remedial Action: Action taken to cleanup contamination at a site to acceptable standards.

Remedial Action Objectives (RAOs): Medium-specific objectives for protecting human health and the environment (for example, soil and groundwater).

Remedial Investigation (RI): A detailed study of a site. The RI may include an investigation of air, soil, surface water, and/or groundwater to determine the source(s) and extent of contamination at a site.

Resource Conservation and Recovery Act (RCRA): The Federal act that established a regulatory system to track hazardous wastes from the time they are generated to their final disposal. RCRA also provides for safe hazardous waste management practices and imposes standards for transporting, treating, storing, and disposing of hazardous waste.

Toxic Substance Control Act (TSCA):
A Federal act that provides regulations designed to gather health/safety and exposure information on, require testing of, and control exposure to chemical substances and mixtures.

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Amec Foster Wheeler, 2018b. Addendum - Final Sediment Remediation Endpoints Report, Stratford Army Engine Plant, Stratford, Connecticut. March 2018.

Amec Foster Wheeler, 2018c. Focused Feasibility Study, Stratford Army Engine Plant, Stratford, Connecticut. March 2018.

USEPA 1988. Guidance for Conducting Remedial Investigation/Feasibility Studies Under CERCLA. USEPA, Interim Final, October 1988.

USEPA 2000. A Guide to Developing and Documenting Cost Estimates During the Feasibility Study. USEPA and U.S. Army Corps of Engineers, July 2000.

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the proposed plan for the SAEP Property is important to USACE. Comments provided by the public are valuable in helping the USACE select a final remedy for the site.

You may use the space below to write your comments, then fold and mail to Erika L. Mark at the address on the bottom of Page 14. Comments must be postmarked by December 13, 2019. Those with access to e-mail may submit their comments to USACE at the following address: nae-pn-nav@usace.army.mil. If you have questions about the comment period, please contact Erika L. Mark at (978) 318-8250.

Name ____

Address ____

City ____

State, Zip ____

e-Mail ____

Comments: