14 Wall Street, Suite 4G
New York, New York 10005
tel: 212-785-9123

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Ms. Emily Wong
Task Order Contracting Officer's Representative
U.S. Environmental Protection Agency
290 Broadway – 19th Floor
New York, NY 10007-1866

PROJECT: EPA Region 2 RAC 2 Contract No.: 68HE0318D0003
Task Order No.: 68HE0220F0064

SUBJECT: Final Focused Feasibility Report
Wappinger Creek Superfund Site
Remedial Investigation/Feasibility Study
Wappingers Falls, New York

Dear Ms. Wong:

Please find an electronic copy of the Final Focused Feasibility Study Report for Remedial Investigation/ Feasibility Study at the Wappinger Creek Superfund Site.

If you have any questions regarding this submittal, please contact me at (303) 383-2477.

Very truly yours,

CDM FEDERAL PROGRAMS CORPORATION

Hans Johannes, P.E., PMP
Project Manager

cc: D. Duda, EPA Region 2
E.Gallerie, CDM Smith
G. Chen, CDM Smith
Project File, CDM Smith

FINAL REPORT JULY 2026

Focused Feasibility Study

WAPPINGER CREEK SUPERFUND SITE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
WAPPINGERS FALLS, NEW YORK

Prepared for:

U.S. Environmental Protection Agency Region 2

CONTRACT NO.: 68HE0318D0003

TASK ORDER NO.: 68HE0220F0064

CDM Smith

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Acronyms and Abbreviations

%	percent
°F	degrees Fahrenheit
AC	activated carbon
AE	assessment endpoints
ARAR	applicable or relevant and appropriate requirement
BAP	benzo(a)pyrene
BCY	bank cubic yards
BERA	baseline ecological risk assessment
bgs	below ground surface
bml	below the mudline
BMP	best management practice
bss	below sediment surface
CDM Smith	CDM Federal Programs Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CIL	chemical isolation layer
COC	contaminant of concern
COPEC	contaminant of potential ecological concern
CR	county route
CSM	conceptual site model
CWA	Clean Water Act
DCDH	Dutchess County Department of Health
DDE	4,4'-Dichlorodiphenyldichloroethylene
DDT	4,4'-Dichlorodiphenyltrichloroethane
ECL	Environmental Conservation Law
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency

FFS	focused feasibility study
FS	feasibility study
ft/sec	feet per second
GRA	general response action
HHRA	human health risk assessment
HRL	Hudson River Line
HRS	Hazard Ranking System
IC	institutional control
Industrial Park	Market Street Industrial Park
IPM	interim performance metric
IRA	interim remedial action
LCY	loose cubic yards
ME	measurement endpoint
MeHg	methylmercury
mg/kg	milligrams per kilogram
MGP	manufactured gas plant
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOAA	National Oceanic and Atmospheric Administration
NYCRR	New York State Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
O&M	operations and maintenance
OBG	O'Brien & Gere Engineers, Inc.
PAH	polycyclic aromatic hydrocarbon
PCBs	polychlorinated biphenyls
PDI	pre-design investigation
PM	particulate matter
PRAO	preliminary remedial action objective
PRG	preliminary remediation goal
PTW	principal threat waste
RAL	remedial action level

RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RD	remedial design
RG	remediation goal
RI	remedial investigation
RISC	remedial investigation screening criteria
RM	river mile
ROD	record of decision
SHPO	State Historic Preservation Office
Site	Wappinger Creek Superfund Site
TBC	to-be-considered
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	toxicity equivalence
THg	total mercury
Three Star Site	Three Star Anodizing Site
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UU/UE	unlimited use/unrestricted exposure
VOC	volatile organic compound
Weston	Weston Solutions, Inc.
yd^3	cubic yard

1.0 Introduction

1.1 Purpose and Report Objectives

This focused feasibility study (FFS) report evaluates an interim remedial action (IRA) for the upper portion of the Wappinger Creek Superfund Site (Site). CDM Federal Programs Corporation (CDM Smith) prepared this FFS for U.S. Environmental Protection Agency (EPA) Region 2 as part of Task Order No. 68HE0220F0064 under Contract No. 68HE0318D0003. CDM Smith developed this FFS in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations [CFR] 300.430(e)). Primary EPA guidance documents considered in the development of this FFS include EPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA 1988) and *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites* (EPA 2005). In addition, supplemental and/or superseding guidance considered for specific aspects of FFS development, such as cost estimates for remedial alternatives, are identified where pertinent in this FFS.

Wappinger Creek is a 41-mile freshwater creek that connects with the Hudson River south of Poughkeepsie, New York. The Site consists of an approximately 2-mile tidal section of the creek in the Village of Wappingers Falls, Dutchess County, New York (**Figure 1-1**). The Site was placed on the National Priorities List in 2016. A sitewide remedial investigation (RI), and human health and ecological risk assessments, have been completed and have identified the nature and extent of contamination at the Site, and risks associated with human and ecological receptors related to contamination at the Site, respectively. This prior work has guided EPA's request to evaluate the potential for an IRA to be undertaken in the upper portion of the Site. EPA has noted that an FFS, as opposed to a standard feasibility study (FS), would support the development of this IRA. An IRA would be consistent with EPA guidance on adaptive management to address immediate risks, prevent source migration, and accelerate the Superfund cleanup process, as described in the *EPA Superfund Task Force Recommendations* (EPA 2017).

The potential benefits of an IRA in the upper portion of the Site could include:

- Accelerate the sitewide remedy by undertaking a CERCLA response action in the upper portion of the Site.
- Reduce immediate risk and remove contaminant mass in a portion of the creek that could be a source for migration of contaminants further downstream.
- Gain remedial experience in the creek, including effectiveness and implementability of remedial technologies for consideration at the remainder of the Site.
- Undertake post-IRA monitoring to provide information to update the conceptual site model (CSM) and inform the development of a sitewide remedial strategy.

The objective of this FFS is to develop and evaluate remedial alternatives in the upper portion of the Site, where total mercury (THg) concentrations in sediments and streambank soils exceed an interim action level. The NCP sets requirements under CERCLA for the alternative evaluation process, including

the evaluation criteria, to address releases of hazardous substances, pollutants, and contaminants at Superfund sites. The FFS provides the justification for evaluating an IRA and the selection of THg as the main risk driver, identify preliminary remedial action objectives (PRAOs) consistent with the purpose of the IRA, present the action/performance levels for evaluating the IRA, discuss the important aspects of the CSM and their pertinence to the upper portion of the Site, develop remedial alternatives consistent with the IRA that could achieve the PRAOs, and perform a detailed evaluation (both individual and comparative analyses) of remedial alternatives against the NCP evaluation criteria for an FFS.

1.2 Approach for Development of an Interim Remedial Action in This Focused Feasibility Study

1.2.1 Rationale for Site Interim Remedial Action

Interim actions are defined in *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* (EPA 1999a) as those actions that are limited in scope and address contaminated areas or media that will also be addressed by a final remedial action. Reasons for taking interim actions include the need to:

- Take quick action to protect human health and the environment from an imminent threat in the short term, while a final remedial solution is being developed.
- Institute temporary measures to stabilize a site and/or prevent further migration of contaminants or further environmental degradation.

In addition, an important aspect of the IRA and the overall Site remediation strategy includes the consideration of an adaptive management approach consistent with EPA's adaptive management framework. Adaptive management is:

> . . .a formalized process to manage risks from contaminated sediment sites where iterations of remediation, monitoring, and progress evaluations are guided by a formalized adaptive management plan that establishes the goals of the project, sets expectations, uses monitoring data to evaluate progress towards those expectations, and adapts the remedy as necessary based on those evaluations (EPA 2022).

In consideration of an adaptive management approach for the Site and the potential benefit of an IRA to the overall site remediation, an IRA is being evaluated in this FFS to target significantly elevated concentrations of THg in the upper portion of the Site. These concentrations pose exposure risks and migration concerns to downstream areas of the Site. An IRA will also allow for subsequent monitoring to evaluate the performance of the IRA remedy components.

While this IRA will only apply to the upper portion of the Site, it will form a part of the overall Site remedial strategy, and a final remedial decision for the entire Site will be made in a subsequent record of decision (ROD).

1.2.2 Interim Remedial Action Remediation Strategy

The RI data and the risk assessment conclusions indicated that the CSM in the upper portion of the Site differs slightly from the rest of the Site. Consequently, a remedial action could be accelerated in the

upper portion of the Site, even while uncertainties in the sitewide CSM remain. These uncertainties include the complex biogeochemical dynamics of mercury cycling/methylmercury (MeHg) production within the tidal wetlands at the Site and subsequent bioaccumulation through the food web, changes in bathymetry over time, and sediment resuspension/recontamination processes occurring at the Site. In addition, upland areas that could represent sources and potential contaminant pathways to Wappinger Creek have not been fully characterized. **Section 2** provides further discussion of the CSM uncertainties.

The CSM aspects that support the premise for taking an IRA for the upper portion of the Site include:

- **THg Concentrations in Sediment**: Owing to the complex behavior, distribution, and toxicity of THg, it has been identified as the primary risk driver at the Site. THg-impacted sediments have been identified primarily in surface sediments (0 to 0.5 feet) and subsurface sediment (0.5 to 2.0 feet), with some impacted sediments below 2 feet in the upper shoal and embayment area. THg-impacted sediments are fairly extensive in the upper portion of the Site, and areas where shallow sediments are exposed during low tides can potentially provide conditions suitable for mercury methylation. If left untreated, these areas can lead to biotic exposure to the mercury. **Section 2** presents further discussion of the characteristics and transformations of THg in sediment.
- **Tidal Impacts from the Hudson River:** Multiple lines of evidence indicate that flood tides transport contaminated suspended solids from the Hudson River to the Wappinger Creek surface water and sediment bed. One particular line of evidence evaluated the distribution of Aroclor 1242 as a proxy to estimate the potential areal extent of Hudson River sediments depositing within the creek. The evaluation indicates that this solids deposition is less pronounced, and recontamination from depositing solids is less likely to occur in the upper portion of the Site. The FFS approximates this area as the Hudson River Line (HRL), as shown in **Figure 1-2**.
- **Depositional and Erosional Areas of the System:** While some uncertainties exist in the depositional and erosional nature of all portions of the channel, both a shallow embayment area next to the creek channel and multiple shoals are present in the upper portion of the Site. These areas are composed of deposits of finer-grained and potentially mobile sediments. Conversely, within the main channel, stream velocities are higher, depositing more coarse-grained material. These deposits mainly consist of gravel and sand, with minor amounts of fine-grained material. The presence of fine-grained deposits is a significant CSM consideration, as these are the materials that are more likely to be contaminated (owing to their higher organic carbon content) and more likely to be redistributed (with their associated contamination) within the system, should they be disturbed within the Site by anthropogenic activities or a higher energy episodic flow event.

The preceding bullets justify developing remedial alternatives focused on remediating THg source concentrations exceeding action levels (defined in **Section 3**) in the upper portion of the Site. This remediation will address immediate risks of THg and prevent source migration of THg in the upper portion of the Site.

Once targeted contaminated sediments and streambank soils are remediated in the upper portion of the Site, a post-IRA monitoring program would be implemented. The post-IRA monitoring program would verify the quality and completeness of the IRA's design and construction, establish post-construction conditions, document that the interim remedy is functioning as designed, and evaluate the effectiveness of the IRA in attaining the PRAOs for the remediation area. Owing to the potential for sediment recontamination from upland sources and/or the potential of solids disposition from the Hudson River, post-IRA monitoring will also include elements that evaluate the recontamination of the post-remedy surface sediment from the overlying water column. Data from the post-IRA monitoring will assist in updating the CSM.

Once the IRA is implemented and the interim performance criteria have been met, a site-wide long-term monitoring program would begin. This monitoring program would be designed to ensure that media are monitored such that trends in concentrations of site-related contaminants can be evaluated.

Using the results of the site-wide long-term monitoring, the subsequent trends and site characterization will be evaluated to identify the nature and extent and the fate and transport of contamination remaining at the site, and to conduct human health and ecological risk assessments based on the site conditions at that time. If the risk assessments identify unacceptable levels of risk, then remedial alternatives would be developed for a final site-wide risk based remedy.

Additionally, the data collected from the IRA performance monitoring program would be used to assess any remaining uncertainties in the CSM, identify any potential ongoing sources of contamination, and evaluate changes in the system over time. These data will also help guide the development of a sitewide remedial strategy.

1.2.3 Documentation Supporting Interim Remedial Action

EPA guidance on the NCP indicates that interim actions must have sufficient documentation to support the rationale for IRAs to fulfill the NCP's Administrative Record requirements (EPA 1992). These guidance documents indicate that data sufficient to support IRA decisions in an interim ROD can be extracted from the RI and evaluated in an FFS that includes a short analysis of a limited number of remedial alternatives.

EPA has elected to prepare this FFS to evaluate a limited number of remedial alternatives for mass removal or isolation of THg. Because the contemplated alternatives are limited in scope, the remedial technology/process option screening and alternative screening steps suggested in EPA RI/FS guidance (EPA 1988) for a comprehensive FS will also be limited in this FFS.

Information supporting this FFS includes the *Revised Final RI Report* (CDM Smith 2025), *Revised Final Human Health Risk Assessment* (CDM Smith 2022), and *Final Baseline Ecological Risk Assessment* (CDM Smith 2023). This supporting information was used to characterize conditions with respect to THg in sediment sources, determine the nature of THg contamination in these areas, and summarize unacceptable risks to human health and ecological receptors posed by the migration or methylation of THg in the Site sediment.

1.2.4 Overall Site Remediation Strategy

The IRA will form a part of the overall Site remedial strategy, and the sitewide remedy will be adapted based on the data from the IRA monitoring.

One component of a potential overall sitewide remediation strategy would include the assessment of natural recovery of the Wappinger Creek system as a whole or in part. This assessment would include monitoring to evaluate changes in sediment, surface water, and biota, and assess system response over time for the IRA remedial footprint and the entirety of the Site. The IRA and sitewide monitoring would also be used to assess sediment resuspension and deposition tendencies, and any sediment exchange occurring between the Hudson River and the creek.

A second component of an overall Site remediation strategy would be to address mercury methylation concern areas outside of the IRA footprint. Conditions suitable for mercury methylation have been identified in several areas of the Site, including downstream of the HRL. Treatability studies could be conducted to evaluate the addition of amendments to the downstream sediment bed for areas of higher mercury methylation potential. This would further reduce biotic exposure to the mercury contamination outside of the IRA footprint. Broadcast amendments such as activated carbon (AC) or other proprietary materials could be tested and evaluated as part of these studies for eventual use as a component of a sitewide remedial strategy.

The action levels and monitoring identified in this FFS are specific to the IRA. Ultimately, any action taken as part of this IRA will need to meet any remediation goals (RGs) selected in a sitewide ROD.

In addition, the future final remedy for the Site must comply with all federal and state environmental standards, requirements, criteria, or limitations unless they are waived under certain specific conditions. Compliance with federal water quality criteria, state water quality standards, and soil cleanup objectives are expected to be achieved with the eventual, final remedy for the Site.

Until a final remedy for the Site is selected, performance measures and monitoring would be used to assess whether the IRA is consistent with achieving the sitewide objectives, or whether additional remediation activities related to the IRA portion of the Site are needed.

1.3 Focused Feasibility Study Report Organization

This FFS report is organized as follows, with tables, figures, and appendices following **Section 8**:

Section 1 **"Introduction"** presents an overview of the Site and summarizes the objectives of the FFS, the site history, previous investigations, and report organization.

Section 2 **"Site Background"** describes the characteristics of the Site, including a summary of location, description, background, and history; the CSM; features and physical characteristics; nature and extent of contamination; and human health and ecological risks posed by contamination.

Section 3 **"Remedial Action Objectives and Goals"** describes the PRAOs and interim performance metric (IPMs). This section also identifies potential applicable or relevant and appropriate requirements (ARARs), and to-be-considered (TBC) information.

Section 4 **"Identification and Screening of General Response Actions, Remedial Technologies, and Process Options"** describes the general response actions (GRAs) pertinent to the contaminated media, and the screening and evaluation of different remedial technologies and process options used to develop remedial alternatives.

Section 5 **"Definition of Criteria Used in the Detailed Analysis of Retained Alternatives"** describes the threshold, balancing, and modifying criteria used to evaluate the identified alternatives during detailed analysis in **Section 6**.

Section 6 **"Detailed Analysis of Retained Alternatives"** presents an evaluation and detailed individual analysis of the remedial alternatives against the previously identified NCP FS evaluation criteria.

Section 7 **"Comparative Analysis of Retained Alternatives"** summarizes the comparative analysis of the remedial alternatives against NCP FS evaluation criteria.

Section 8 **"References"** provides a list of sources cited in preparing this report.

2.0 Site Background

2.1 Site Location and Description

The Site, located in the Village of Wappingers Falls, Dutchess County, New York, consists of an approximately 2-mile tidally influenced section of Wappinger Creek, beginning downstream of Wappingers Falls by the Market Street Industrial Park (Industrial Park) and extending downstream to its confluence with the Hudson River (**Figure 1-2**). Wappinger Creek is primarily oriented in a northeast-southwest fashion. The Site is bounded to the north and south by the creek banks and floodplain area.

The Industrial Park is located along the northwestern (northern) and southeastern (southern) banks of Wappinger Creek in the Village of Wappingers Falls, approximately 0.2 miles downstream of Wappingers Falls. Industrial activities have occurred in the Industrial Park next to the creek for more than 180 years. The Reese Audubon Sanctuary, managed by the Putnam Highland Audubon Society, makes up the northern bank of Wappinger Creek. Open space, Reese Park, residential properties, and a Department of Public Works facility make up the southern bank of Wappinger Creek. **Figure 2-1** shows the locations of the historical industrial facilities. Currently, the Industrial Park is home to several commercial facilities operating within the existing historical industrial buildings.

The Site was placed on the National Priorities List in 2016. The Site (New York State Department of Environmental Conservation [NYSDEC] Site Number 314127) was previously part of Operable Unit 2 of the Three Star Anodizing Site (Three Star Site; NYSDEC Site Number 314058), as defined by the NYSDEC (2009) ROD. Portions of the Site have been studied previously as part of the NYSDEC RI (O'Brien & Gere Engineers, Inc. [OBG] 2007) for the Three Star Site, and the EPA Region 2 Site Assessment Team's investigation. Both the Site and the Three Star Site have a classification level of 2 (significant threat to the public health or environment; action required) on the Registry of Inactive Hazardous Waste Disposal Sites in New York State (New York State 2025).

The lower section of Wappinger Creek, including Wappinger Lake, is currently designated as a Class C(T) Fresh Surface Water by New York State Codes, Rules, and Regulations (NYCRR) (6 CRR-NY, Chapter X, Subchapter B, Article 10, Part 857), meaning the creek is an active recreational warm-water fishery that may support a trout population and is suitable for contact recreation. It contains both wetland and riparian areas. An embayment area along the northern bank across from Reese Park is approximately 240,000 square feet (approximately 780 feet by 300 feet) and is fronted by palustrine freshwater forested/shrub wetland. Sediment within this embayment is primarily silt and organic matter and supports aquatic emergent and submerged plant growth.

The upper section of Wappinger Creek above Wappinger Lake, is currently designated as a Class C(TS) Fresh Surface Water by New York State Codes, Rules, and Regulations (NYCRR) (6 CRR-NY, Chapter X, Subchapter B, Article 10, Part 857), meaning the creek is a cold-water fishery that should support a trout population and is suitable for contact recreation. It is stocked each spring with brown and rainbow trout between Red Oaks Mill and Salt Point (NYSDEC, 2022).

2.2 Setting and General Features

Contained entirely within Dutchess County, New York, the 41-mile Wappinger Creek originates in extensive headwater wetlands and lakes in the Town of Pine Plains in northern Dutchess County. The Wappinger Creek watershed drains 134,871 acres in 11 towns and two villages and is fed by approximately 320 miles of tributaries. The topography of the Wappinger Creek drainage basin varies, ranging from approximately 1,400 feet above mean sea level—the highest point of the watershed—to sea level at the mouth of the creek. The gradient between the nearest upstream U.S. Geological Survey (USGS) stream gage of Wappinger Creek (Site Number 01372500) and the dam at Wappingers Falls is approximately 7.4 feet per mile. The tidal portion of the creek where the Site resides has no active USGS stream gages, so a gradient of 0.585 feet per mile was measured and calculated using surface water transducer data averages over a 1-month period during the RI.

Topography also varies within the Site extent, with steep slopes bounding the north side of the creek and developed land to the south. Surface water drainage in the Site area is toward the creek and its associated wetlands and tributaries (**Figure 2-2**). Historical information indicates excessively drained to well-drained soils are present along the portion of the creek within the Site, and the upland areas are subject to flooding (**Figure 2-3**). The overall drainage at the Site is toward the Hudson River through the mouth of Wappinger Creek. Wappinger Creek connects with the tidal portion of the Hudson River and experiences tidal fluctuations itself.

Based on a review of previous investigations and the characteristics of the creek, six sections of Wappinger Creek have been identified at the Site, including the background area of Wappinger Lake. These sections are referenced by transects as defined in the RI and are described below.

2.2.1 Industrial Park Section

The Industrial Park section of Wappinger Creek is directly next to the Industrial Park, generally beginning at the foot of Wappingers Falls near T1 and ending at the upper shoal section. This section of Wappinger Creek is approximately 2,300 feet long and includes Transects T1 through T11 (as shown in **Figure 2-4a**). There are two bridges in the Industrial Park section, one near Transect T3 and one near Transect T5. Neither bridge has any structural features extending into the creek that would need to be considered for any remedial action in these areas. Near the Industrial Park, the creek is relatively narrow, gradually widening from approximately 50 feet at T2 to 200 feet at Transect T11. It is bounded on each shore by retaining walls bordering the creek. The retaining walls are only present as far downstream as the bridge next to Transect T5. Historical documents and site reconnaissance from the RI suggest that retaining wall materials, including rock, stone block, concrete, and steel sheet piles, are indicative of the different time periods during which they were installed. Several drainage pipes were observed during reconnaissance of the creek, along both the north and south retaining walls.

Downstream of the retaining walls within the Industrial Park section lies an unnamed tributary that flows intermittently into the creek during and after precipitation events. A short distance upstream of the unnamed tributary, there is an erodible area where storm flows have resulted in streambank soils slumping into the creek. This unnamed tributary is directly north across the creek from the former Three Star Lagoon. The lagoon is between the former Axton-Cross building to the east and the former manufactured gas plant (MGP) site to the west. The Three Star Lagoon served as the mouth of a former

raceway that connected the creek from above the easternmost bridge, near the hydroelectric plant (OBG 2007). The raceway flowed to the south of the former Dutchess Bleachery and Three Star Site. The former raceway is now backfilled and used for storing tractor trailers. The land on the north side of the creek is undeveloped, containing a steep bank with exposed bedrock.

Generally, the creek profile is shallowest on the south side of the creek, with water depths ranging from approximately 7.5 feet during high tide and approximately 3.5 feet during low tide (i.e., a tidal range approximating 4 feet). As the creek cross section progresses to the northern shore, water depth increases to approximately 8 to 12 feet, indicating the main channel, which is most prominent at Transects T6 and T9 through T11. The cross section at T6 shows the initial deepening of the channel, with gravelly sediments at the bottom and sandy stream banks.

2.2.2 Upper Shoal Section

The upper shoal section is approximately 700 feet long and includes Transects T12 through T14 (as shown in **Figure 2-4b**). At Transect T13, the Wappinger Creek widens to approximately 250 feet before curving back to the southwest. Hunter Creek flows into Wappinger Creek at Transect T14. Hunter Creek is designated as a Class C Fresh Surface Water by NYSDEC (6 CRR-NY, Chapter X, Subchapter B, Article 10, Part 857), meaning it is suitable for fishing and contact recreation. The northern bank of the upper shoal section is more low lying than the western bank upstream because the Wappinger Creek floodplain has widened in this section. However, approximately 300 feet west of the northern bank in the upper shoal section, the land surface slopes steeply, and bedrock is exposed. Generally, water depth of the main channel ranges from 12 to 8 feet from high tide to low tide. The water depth of the shoal area is 3 to 4 feet during high tide and less than 1 foot during low tide.

2.2.3 Embayment Section

The embayment section is approximately 780 feet long and includes Transects T15 through T17 (as shown in **Figure 2-4b**). A shallow embayment, defined here as recess or indentation of the Wappinger Creek shoreline, is along the northern shore of the creek downstream of the upper shoal section, following a bend directing the creek to the southwest and slightly southwest of Hunter Creek. This feature, referred to throughout this report as the embayment area, measures approximately 240,000 square feet (approximately 600 by 400 feet) and includes intertidal areas next to freshwater forested/shrub wetlands that are bounded by steep slopes with exposed bedrock to the northwest and a peninsula, referred to throughout this report as the embayment peninsula, to the southeast. The embayment peninsula contains established trees and vegetation. The ground surface at the midpoint of the embayment peninsula is low enough that it is sometimes submerged during high tide, allowing for additional hydraulic connection to the creek. The main flow of the creek bypasses the embayment area because of the embayment's position outside of the channel. The embayment area experiences minimal water velocity and can be described as quiescent and depositional in nature. Within the embayment area, water depths range from approximately 3 feet during high tide and less than 1 foot during low tide. Water depth of the main channel ranges from approximately 8 to 12 feet from low tide to high tide.

2.2.4 Lower Shoal Section

The lower shoal section is approximately 2,600 feet long and includes Transects T18 through T25 (as shown in **Figures 2-4b and 2-4c**). Downstream of the embayment section, Wappinger Creek varies in width, ranging from approximately 400 feet to approximately 900 feet near T23. Generally, the main flow in this section of the tidal creek occurs along the creek channel, with water depths up to 14 feet. Shallow intertidal areas occur along both the northern and the southern shores throughout this section; approximately half of the area in this section of the tidal creek is at water depths of less than 3 feet. A narrow island 200 to 400 feet long, depending on the tide, is north of T23 in the western half of the creek. The creek channel shifts from the south side of the creek to the north side of the creek between Transects T21 and T24.

2.2.5 Confluence Section

The confluence section of Wappinger Creek is approximately 2,600 feet long and includes Transects T26 through T30 (as shown in **Figure 2-4d**). In this section, the creek narrows to around 300 feet across before traveling below a bridge at an engineered peninsula carrying County Route (CR) 28 over the creek, approximately 1,200 feet upstream of the Hudson River. The creek then widens to approximately 800 feet before constricting again at the fixed railroad bridge crossing located at the confluence of Wappinger Creek and the Hudson River.

Channel depths of the creek range from 12 feet to approximately 26 feet under the CR 28 bridge. Upstream of the CR 28 bridge, shallow areas of the creek are typically the same as the previous sections of the creek. Water depths range from 5 feet during high tide to less than 3 feet during low tide. The fixed railroad bridge constriction occurs approximately at the confluence of the tidal creek and the river, and the CR 28 bridge constriction occurs approximately 1,200 feet upstream of the river. Downstream of the CR 28 bridge, large sediment deposits are located to the north and south of the main channel. These sediment deposits lie within the intertidal zone and are highly vegetated.

2.2.6 Wappinger Lake

Wappinger Lake, which serves as the background sampling area for the Site, includes Transects B1 and B2 (as shown in **Figure 2-4e**). Wappinger Lake is upstream of the Site, and a dam and spillway control the lake level. The lake extends northeast, past State Route 9 and continues upstream as Wappinger Creek. Wappinger Lake discharges at Wappingers Falls and continues downstream toward the Site underneath East Main Street. Part of the discharge is diverted from Wappingers Falls through piping to a hydroelectric plant (**Figure 2-1**) near T1 in the Industrial Park section, which discharges directly into Wappinger Creek. The dam and spillway maintain the lake level to fluctuate between the lake crest (top of the dam) and just below the dam most of the time. When lake water levels become high enough, the dam releases the water via the spillway. Periodically, flow over the dam spillway is diverted through the hydroelectric plant at the base of the dam.

2.3 History

Industrial activities have occurred in the Industrial Park next to Wappinger Creek for more than 180 years. Historical industrial activities included textile dyeing operations, an MGP, a metal plating facility,

plastic mold injecting, chemical and ammunition production, felt hat productions, and other industrial activities. Tenants who have historically operated at the Industrial Park include:

2.3.1 Dutchess Print Works (Dutchess Bleachery)

This company operated next to Wappinger Creek under several ownerships from 1832 to 1955. Plant buildings were associated with dye operations, manufactured acids and chemicals, and aniline dye production during World War I. Textiles were bleached and dyed at the bleachery, and wastewater was reportedly discharged into a raceway that emptied into the Three Star Lagoon and subsequently into Wappinger Creek. Mercuric chloride and arsenic pentoxide may have been used to dye cloth at the facility.

2.3.2 Wappinger Water, Gas, and Electric Company

This company cooperated an MGP with the Dutchess Bleachery, located on the southern bank of Wappinger Creek to the west of the current Industrial Park from the late 1800s to approximately 1913. During the MGP operation, coal was barged up the creek from the Hudson River and stored in large coal sheds on the northern and southern banks of the creek as early as the 1870s. Approximately 16 acres of land beyond the industrial properties were filled with coal cinders associated with MGP operations. Coal cinders were used as fill behind the retaining wall built on the southern bank of the creek. Coal is known to naturally contain mercury, which is emitted during coal burning operations.

2.3.3 The Three Star Site

Later known as Watson Metals Products Corporation, the company operated a metal plating facility next to Wappinger Creek from 1958 to approximately 1995. From 1958 to 1980, plating waste was discharged to the lagoon and subsequently to the creek at a rate of 20,000 to 60,000 gallons per day. Along with metal plating, the facility began reconditioning electronic equipment in 1972. Plating processes included the use of mild non-etching alkali cleaners, a proprietary mix of sodium dichromate or chromic acid, sulfuric acid with the addition of soda ash, and a dyeing process that required ferric ammonium oxide and synthetic dyes. The paint stripping operation reportedly used chlorinated solvents in addition to fluoride, caustic soda, and kerosene.

2.3.4 Axton-Cross Company

This company manufactured and distributed bulk chemicals in the building located east of the lagoon in the 1960s. This building reportedly had floor drains that discharged to the lagoon.

2.3.5 Other Industrial Park Tenants

- Fabricare Products occupied the Axton-Cross building in the 1970s. The dry well and former drum storage area located south of the Axton-Cross building contains a source of volatile organic compounds (VOCs) to groundwater. The soil next to the west side of the Axton-Cross building contained elevated levels of nickel in surface soil and lead in subsurface soil relative to other areas of the Three Star Site (OBG 2007).
- Felt hat manufacturing reportedly took place at a building on the southern bank of the Industrial Park at the same time Dutchess Bleachery was operating. Mercury(II) nitrate has historically been used in felt hat production (Weston Solutions, Inc. [Weston] 2016).

- Page Print Systems, a printing company, occupied a building on the southern bank of the Wappinger Creek in the Industrial Park. They reportedly discharged rinse water from photographic development sinks onto the ground next to the building (Dutchess County Department of Health [DCDH] 1971).
- Hanover PrintWorks, a printing company, occupied a building on the northern side of the Industrial Park. They reportedly discharged approximately 3 quarts of paint per day to a lagoon (North Lagoon) located on the northern side of the Industrial Park that was located next to the building (DCDH 1967). The lagoon no longer appears to be present, but it is suspected to be a potential source of lead to the creek.
- Olah Associates, a metal plating and stripping operator, occupied the northern side of the Industrial Park. They reportedly discharged rinse water from plating tanks directly into the creek (OBG 2007).
- Kemp & Beatley and International Business Machines were also known occupants on the northern side of the Industrial Park (OBG 2007).

2.4 Summary of Physical Characteristics

2.4.1 Climate

The closest weather station for climate data is at the Hudson Valley Regional Airport, which is approximately 3.4 miles northeast of the Site. The climate is humid with warm, moist summers and moderately cold winters. Prevailing winds in the area are generally from the southwest at a moderate velocity (4.5 miles per hour). Temperature, precipitation, and snow fall records for the following information begin in 1931 (National Oceanic and Atmospheric Administration [NOAA] 2021).

The mean annual temperature is 57.0 degrees Fahrenheit (°F), with July being the warmest month (84.3°F) and January the coldest month (17.8°F). The record high temperature was 104°F in August 1933; the lowest was -30°F in January 1961. The mean annual precipitation is approximately 47.3 inches, with monthly averages ranging from 2.9 inches in February to 4.6 inches in July. The record maximum daily precipitation was 7.57 inches on October 8, 2005. The mean annual snowfall is 44.0 inches, with the maximum monthly average occurring in January at 13 inches (NOAA 2021).

Future projections show that average temperatures are likely to increase in all seasons across all regions of New York State. Averaged over the entire year, temperatures in the South Hudson region are projected to increase between 4.1°F and 6.1°F by the 2050s and between 5.7°F and 10°F by the 2080s compared with the 1981 to 2010 average (Stevens and Lamie 2024).

Total precipitation is projected to increase in the region between 4 percent (%) and 11% by the 2050s and between 7% and 17% by the 2080s relative to the 1981 to 2010 average. This precipitation could increasingly come from heavy storms, which can lead to flooding (Stevens and Lamie 2024).

Sea level along the tidal Hudson is projected to increase by 12 to 17 inches by the 2050s and by 25 to 46 inches by the 2100s compared to a 1995 to 2014 baseline. Freshwater tidal marshes along the Hudson River are likely to experience changes in habitat with sea level rise. Wetland habitats can migrate inland in response to changing weather and climate-related factors, depending on the rate of increasing tide

elevations and the amount of available undeveloped land. The Hudson River could experience a net increase in the wetland area if marshes are not blocked from migrating into areas higher up the riverbanks (Stevens and Lamie 2024).

2.4.2 Geology

2.4.2.1 Site Geology

Wappinger Creek sits above glacial and fluvial deposits bound on either side by bedrock outcrops (as shown in **Figure 2-5**) at the Site. The overburden was deposited above shale/graywacke bedrock, which ranges from depths of 0 to 66 feet below ground surface (bgs). Previous investigations at the Three Star Site found nonnative material (i.e., fill) above much of the glacial and alluvial deposits in the oxbow (the meandering cutoff portion of the creek that at one time formed the raceway) of the creek within the Industrial Park area. Fill is composed mostly of sandy gravel containing cinders, concrete, and brick, and extends to approximately 4 feet bgs. The fill is underlain by approximately 16 feet of alluvium, consisting of coarse to fine-grained sand with gravel and silt.

2.4.2.2 Site Sediment Characteristics

Very little surface sediment is present upstream of Transect T5 at the Site, where flow velocities are high and the creek bottom has eroded down to the bedrock surface. Downstream of Transect T5, the bottom of the creek channel primarily consists of hard sediments, such as gravel, cobbles, and sand, and increasing thicknesses of surface sediment are present outside of the main creek channel. Dredge samples collected from 0 to 0.5 feet within the shallow portions of the creek (shoals and embayment) mainly consist of silt and organic materials (as shown in **Figure 2-6**). Below the silty surface sediment, coarse-grained fluvial sediments are also present outside of the channel in the upper shoal section. Further downstream, increasing thicknesses of the silty sediment was observed in the lower sections of the creek and confluence sections. Silty sediments are up to 10 feet thick in the embayment section of the creek and 5 feet thick in the lower shoal and confluence sections of the creek. Below or within the fluvial and alluvial sands and gravels, lower plasticity clay and/or silt is also present within the creek (CDM Smith 2025).

2.4.3 Hydrogeology

A shallow unconsolidated aquifer of glacial/alluvial origin on either side of Wappinger Creek is the primary aquifer that interacts with the creek. Fill materials and alluvium were present at depths ranging from 6 to 12 feet bgs. The groundwater elevation observed in wells was close to the surface water elevation in the creek, and largely mirrors topography, with wells on higher banks showing a greater gradient toward the creek. Groundwater flow direction next to the creek is primarily perpendicular toward the creek, including in the Industrial Park area where radial flow was observed within the oxbow. There is a slight component of southerly flow in the direction of creek flow. This is apparent in several of the contours, which show slight divergence from the creek as they extend downstream. Seepage planes were also observed on some creek banks.

The tidally influenced portion of Wappinger Creek extends from the base of Wappingers Falls, just upstream of the Industrial Park section, to the confluence with the Hudson River. During the tidal cycle of the Hudson River, water levels in Wappinger Creek can fluctuate as much as 4 feet. The magnitude of

tidal groundwater-level change was approximately half that of surface water, indicating a highly transmissive groundwater system well connected to Wappinger Creek. Long-term monitoring data indicates the lateral hydraulic gradient from groundwater is toward the creek for most of the tidal cycle.

The entire length of Wappinger Creek, up to Wappingers Falls, is a characteristic gaining stream based on its setting at sea level and being surrounded by elevated topography. Deep groundwater may discharge to the creek in areas where the bedrock surface is shallow after traveling through the fractured bedrock beneath the creek.

Significant precipitation events have caused water elevation surges in the creek. One significant event occurred on September 1, 2021, where the remnants of Hurricane Ida passed through the site, recording 11.73 inches of rainfall over a 24-hour period. Surface water levels peaked during the next day's high tide, approximately 1 to 1.5 feet higher than expected. The low tide immediately following the precipitation event had a more dramatic response with the upper section of the creek having little effect from the lower tide and remaining elevated. The lower sections of the creek lowered with the tide approximately 1 foot but remained above normal. The lack of a lower tide at the upper section indicates that discharge to the creek was overcoming the tidal drainage capability of the creek. In general, the surface water levels in the upper sections were impacted more than those in the downstream sections of the creek (CDM Smith 2025).

2.4.4 Site and Surrounding Surface Hydrology

Streamflow for Wappinger Creek is measured and recorded at the USGS station at the dam at the west end of Wappinger Lake (USGS 01372500). While flow is dependent on regional rainfall and the season, the average daily flow rate is 84 cubic feet per second (cfs), with a nonpeak range of 6.1 to 1,060 cfs reported. Periodically, flow over the dam spillway is diverted through the hydroelectric plant at the base of the dam, which can temporarily increase creek flow and sediment transport.

The RI measured creek discharge during baseline flow conditions at low tide for both dry and wet conditions. During baseline dry conditions, stream discharge increased from 504 cfs at Transect T6 to 713 cfs at Transect T15, then increased to 1,081 cfs at Transect T24. The increase in discharge observed between Transects T6, T15, and T24 indicates groundwater and surface water from tributaries is discharging to the creek along its length. These measurements also confirm that creek velocities are significantly higher in the channel than in the shallow areas of the creek, especially during times with lower creek levels, with the highest measured flow velocity being 0.72 feet per second (ft/sec) in the channel at Transect T24, compared to flow velocities less than 0.3 ft/sec outside of the channel.

During baseline wet conditions, water levels were higher in the creek, leading to greater discharge and higher flow velocities. Groundwater discharge decreased slightly from 643 cfs at T6 to 525 cfs at Transect T15, then increased to 1,440 cfs at Transect T24. The overall increase in discharge is likely caused by deeper, faster flowing water and more input from tributaries and overland flow. The decrease observed between Transects T6 and T15 may have been caused by a tidal variation that was inadvertently captured in the measurement. Creek velocities only showed slightly higher velocities in the channel compared to the shallow areas of the creek. The highest channel velocity was 0.67 ft/sec at Transect T24, compared to flow velocities less than 0.55 ft/sec outside of the channel.

2.4.5 Site and Surrounding Ecology

New York State designated Wappinger Creek as a Significant Coastal Fish and Wildlife Habitat between the creek's confluence with the Hudson River and the dam in Wappingers Falls (New York State Department of State 2012). This section of the creek supports protected species, provides habitat for migratory and resident warmwater fisheries and wildlife species, and serves as a fish spawning, nursery, and wintering habitat.

The Site is within areas that provide habitat for the endangered Indiana bat (*Modalistodalis*), threatened northern long-eared bat (*Myotis septentrionalis*), and a species of concern, the monarch butterfly (*Danaus plexippus*). The U.S. Fish and Wildlife Service (USFWS) listed avian species of concern that occur on the USFWS Birds of Conservation Concern list and are known to have vulnerabilities near the project area, including the bald eagle (*Haliaeetus leucocephalus*), black-billed cuckoo (*Coccyzus erythropthalmus*), blue-winged warbler (*Vermivora pinus*), Canada warbler (*Cardellina canadensis*), cerulean warbler (*Dendroica cerulea*), evening grosbeak (*Coccothraustes vespertinus*), lesser yellowlegs (*Tringa flavipes*), prairie warbler (*Dendroica discolor*), red-headed woodpecker (*Melanerpes erythrocephalus*), and the wood thrush (*Hylocichla mustelina*).

Wappinger Creek is home to many species of fish. During the RI investigation and as part of the BERA, fish species collected for tissue sampling in the creek included channel catfish (*Ictalurus punctatus*), common carp (*Cyprinus carpio*), largemouth bass (*Micropterus salmoides*), and smallmouth bass (*Micropterus dolomieu*). In the lake, fish species collected included brown bullhead (*Ameiurus nebulosus*), common carp, and smallmouth bass. No fish species were collected in the nontidal portion of the creek upstream of the lake. Other species of fish identified in the lake, as noted on the NYSDEC website[1], include chain pickerel *(Esox niger*), yellow perch *(Perca flavescens*), and black crappie *(Pomoxis nigromaculatus*). The creek bottom in the Industrial Park section is rocky, with little sediment and little structure for fish habitat. However, large carp were observed in the shallows near the hydroelectric plant, and local residents have been observed fishing for catfish and bass in this section.

According to the New York State Department of State (NYSDOS 2012), the tidal portion of Wappinger Creek is an important spawning area for coastal migratory fish, including:

- Alewife (*Alosa pseudoharengus*)
- Blueback herring (*Alosa aestivalis*)
- American eel (*Anguilla rostrata*)
- Atlantic tomcod (*Microgadus tomcod*)
- Striped bass (*Morone saxatilis*)

These species enter Wappinger Creek between April and June (though Atlantic tomcod enter in December and January); the adults leave shortly after spawning and within several weeks, the eggs hatch and larval fish begin moving to nursery areas in the lower creek channel and the Hudson River.

Additionally, NYSDOS (2012) states that a substantial warmwater fish community occurs in Wappinger Creek throughout the year. Resident species include:

[1] https://dec.ny.gov/places/wappinger-lake

- Largemouth bass (*Micropterus salmoides*)
- Bluegill (*Lepomis macrochirus*)
- Pumpkinseed (*Lepomis gibbosus*)
- Red-breasted sunfish (*Lepomis auritus*)
- White sucker (*Catostomus commersoni*)
- Brown bullhead (*Ameiurus nebulosus*)

The tidal portion of the creek is also a wintering site for adult largemouth and smallmouth bass (*Micropterus dolomieu*).

Stainbrook and Limburg (2001) also found gizzard shad (*Dorosoma cepedianum*) larvae in Wappinger Creek, indicating that the creek provides them with a nursery area.

USFWS (1997) describes Wappinger Creek as a tidally influenced large warmwater perennial creek at Hudson River Mile 108, serving as the southernmost extent of sizable freshwater tidal marsh in the Hudson. Wappinger Creek serves as an important spawning area for anadromous fish including alewife, blueback herring, tomcod, and white perch (*Morone americana*). The area is within a reach of the Hudson River identified to be important for the endangered Atlantic sturgeon (*Acipenser oxyrinchus*) spawning.

Because the Wappinger Creek habitat includes freshwater tidal marsh, intertidal mudflats, aquatic beds, sandbars, and rocky shore, it provides favorable habitat for herons, waterfowl, furbearers, and turtles. Additionally, even though the area has been extensively invaded by water chestnut (*Trapa natans*), a number of rare plant species are known to occur in the tidal estuary, including grassleaf arrowhead (*Sagittaria graminea*), spongy arrowhead (*Sagittaria montevidensis*), kidneyleaf mud-plantain (*Heteranthera reniformis*), and southern estuarine beggar ticks (*Bidens mitis*) (USFWS 1997).

The upper shoal and embayment sections are choked with the invasive European water chestnut (*Trapa natans*) during the warmer months. The water chestnut fills in the entire creek, except for a narrow channel in the deepest portion of the creek, providing plenty of cover for forage fish (e.g., minnows and juveniles) and larger fish. Water lilies dominate the embayment area within the embayment and confluence sections.

The creek has a diverse variety of apparently healthy riparian vegetation. Both banks of the creek are steep, but the southern bank is generally less than 20 feet high and supports development of some municipal buildings and residences, while the northern bank is quite steep and rocky and not suitable for development.

2.4.6 Cultural Resources

A Phase 1A cultural resources assessment was conducted as part of the RI (CDM Smith 2025). The Phase 1A results indicate that the overall area of potential effects has a moderate to high sensitivity for the presence of 19th and early 20th central archaeological deposits associated with the Dutchess Print Works and the industrial history of the Wappingers Falls. If present, archaeological resources within the area of potential effects have the potential to yield information related to the industrial history of

Wappingers Falls. The assessment concluded that, dependent on the scope and location of future remedial activities, a Phase 1B field investigation may be recommended.

2.5 Remedial Investigations and Current Site Status

There are likely ongoing contaminant inputs to Wappinger Creek originating from historically contaminated material (creek banks and floodplain soils) within and next to the Industrial Park and MGP area. Historical operations have acted as sources of contamination to Wappinger Creek, and have contributed contaminants to sediment, the banks of the creek, and the soils within the Industrial Park and MGP areas of the Site. Based on currently available information, the limited new contaminant mass inputs are primarily from the erosion of contaminated banks and overland flows transporting impacted soils and sediments into the creek. While current point source discharges to the creek were not evaluated as part of the RI, there is currently no active industry contributing direct discharges, and current point source discharges are limited to storm drains. Further characterization of point source/storm drain discharges is needed to determine whether they constitute a significant contamination pathway to the creek (CDM Smith 2025).

NYSDEC completed several investigations to evaluate sediment, surface water, soils, and groundwater in and next to the creek. These investigations are documented in the RI report (CDM Smith 2025). In addition to the NYSDEC investigations, EPA collected soil samples in the approximate location of the former North Lagoon, and soil, surface water, and sediment samples near the Industrial Park along the creek as part of the Hazard Ranking System (HRS) evaluation. The HRS investigation identified mercury and benzo(a)pyrene (BAP) as the key contaminants in Site sediment.

After the HRS evaluation, EPA placed the Site on the National Priorities List on September 9, 2016. A sitewide RI (CDM Smith 2025), and human health and ecological risk assessments, have been completed and have identified the nature and extent of contamination at the Site, and risks associated with human and ecological receptors related to contamination at the Site, respectively.

2.6 Conceptual Site Model

This section discusses the CSM, which includes the current understanding of Site conditions (the physical characteristics of the Site and surrounding area, including topography, drainage and surface water, geology, and hydrogeology), site history, contaminant release mechanisms, and fate and transport of the Site contaminants, as they relate to the Site-specific conditions (**Figures 2-7 and 2-8**). The RI provides details related to the general summary of the nature and extent of contamination, including general details regarding the transformation and transport of mercury and non-mercury contaminants (CDM Smith 2025).

2.6.1 Potential Sources of Contamination

Historically, the Industrial Park portion of the Site was bordered by heavy industrial operations. The creek, at times, has also served as a stormwater drainage and direct discharge structure, historically receiving manufacturing waste and by-product from select industrial facilities operating on the land next to the upper part of the Site.

The following are primary sources of historical contamination to Wappinger Creek:

- Direct and overland discharges to the creek via two wastewater raceways and wastewater lagoons associated with the Dutchess Print Works (Dutchess Bleachery) and the Three Star Site metal plating facility likely contributed inorganic contaminants, including, but not limited to, mercury, chromium, lead, arsenic, and cyanide.
- Variable fill material consisting of coal cinders from MGP operations associated with Dutchess Print Works and Wappinger Water, Gas, and Electric Company is a likely historical source of polycyclic aromatic hydrocarbons (PAHs) and mercury (coal is known to naturally contain mercury) contamination at the Site.
- A fire destroying three buildings associated with the Three Star Site exposed metal plating vats to the environment, potentially contributing to inorganic contaminants at the Site such as mercury, chromium, lead, arsenic, and cyanide.
- Direct discharges and leaching of coal tar separation by-product into the creek, surrounding soils, and groundwater associated with historical MGP operations is a suspected source of PAHs in Site media. Considering the timing of historical discharges, the timing of the sediment sampling performed during the RI, and the complex hydrodynamic system at the Site, it is possible that coal tar has been immobilized in the underlying sediments. However, no coal tar nonaqueous phase liquid has been observed as part of the RI.
- The Three Star Site RI (OBG 2007) reported the presence of storage tanks formerly located on the north property, opposite the Three Star Site, which may have contained materials with PAHs in them, contributing to PAH impacts in Site media.

2.6.2 Extent of Contamination

Key contaminants identified in the RI were selected to provide a clear and succinct evaluation of contaminant nature and extent in each of the Site media (sediment, surface water, groundwater, and pore water). These key contaminants include THg, methyl mercury (MeHg), lead, arsenic, chromium, cyanide, PAHs (with BAP as a representative PAH), polychlorinated biphenyls (PCBs), pesticides, and dioxins/furans.

2.6.2.1 Sediment

Both inorganic (THg, lead, chromium, cyanide, and arsenic) and organic (PAHs, PCBs, BAPs, pesticides, and dioxins/furans toxicity equivalence [TEQ]) are observed at high concentrations exceeding applicable RI screening criteria (RISCs) in the outer margins of the Wappinger Creek channel at the Site, where water velocities are lower and the sediment bed contains softer, fine-grained material (shoal and embayments). The lateral distribution of contamination within the creek is generally observed to shift from the southern bank toward the northern bank, following areas of directional change in the creek's geomorphology. A detailed discussion of these contaminants, frequency of RISC exceedences, and distribution of those contaminants within Wappinger Creek can be found in **Section 4** of the RI Report.

In general, the highest concentrations of inorganic contaminants in the creek were detected in areas near the former business operations in the Industrial Park, particularly along the southern bank. This area is directly next to the historical Industrial Park footprint, where sediment point bars and shoals (i.e., depositional areas) are present. Concentrations of key inorganic contaminants are generally highest in

the sediment samples collected from shallower depths (0 to 1 feet below sediment surface [bss]), and concentrations generally decrease vertically below 2 feet bss. However, elevated contaminant concentrations at depths below 2 feet bss are present in sediments near historical industrial operations and in depositional areas of the Site (e.g., along the embayment peninsula and in deeper shoals within the upper and lower shoal sections).

Bank and floodplain materials along the embayment area are heavily impacted, with multiple inorganic and organic contaminants, including THg, lead, arsenic, chromium, cyanide, PAHs, and PCBs, exceeding applicable RISCs. While contaminant concentrations in downstream bank and floodplain soils are generally lower than upstream banks and soils, they are not consistently below the applicable RISCs, which were used for evaluating soil contamination at the site during the RI.

The embayment area is notably one of the most contaminated areas within the Site, and the highest concentration of THg was found in this portion of the Site. Physical processes likely allow suspended contaminant mass within the water column to slowly disperse from the main channel into a "protected" area where extensive particle settling occurs. This depositional tendency is evidenced by the consistently high concentrations of inorganic and organic contaminants in the riverbank soils along the embayment peninsula, within the embayment area itself, and in the floodplain material within the wetlands bordering the northern bank of the embayment area. Downstream of the embayment area, bank and floodplain concentrations are below background levels. The sections that follow summarize key inorganic and organic species.

Total Mercury

THg contamination is most prevalent in shoal areas and the channel's outer margins, with the highest concentrations in the embayment and upper and lower shoal sections. Elevated THg is primarily within the top 2 feet of sediment in the creek, with the most significant impacts between 0.5 and 2 feet bss. Below 2 feet, concentrations generally decline, except at Transects T6, T16, T18, T21, and T22, where levels remain high up to 8 feet bss. THg was detected in bank and floodplain sediment samples, exceeding the RISC, with the maximum concentration detected in the embayment section at Location BKFP-17, within the 0 to 2 feet bss interval. Limited data were collected from areas outside the bank and floodplain. Currently, there are no relevant background data for comparison. **Figure 2-7** presents the CSM for the nature and extent of THg contamination at the Site.

Methylmercury

MeHg is an organic contaminant. However, it is in a constant state of flux, transitioning between inorganic and organic mercury phases and converting between inorganic and MeHg species (**Figure 2-9**). Considering its state of flux, it is presented here with inorganic constituents. Concentrations are highest in the embayment and confluence sections owing to elevated THg levels compared to the shoal zones (**Figure 2-10**). These areas likely support greater microbial activity, which promotes mercury methylation more effectively than the coarser material in the main channel. As a result, they exhibit higher MeHg concentrations (**Figure 2-11**). However, the MeHg-to-THg ratios in these zones are lower than those in background sediments, suggesting that background sediments in Wappinger Lake have a greater potential for mercury methylation (**Figure 2-12**).

Despite this, MeHg levels in the creek remain elevated relative to background levels because THg concentrations are an order of magnitude higher than those in Wappinger Lake. This implies that while the lake sediments offer more favorable conditions for methylation, the availability of THg is the primary driver of MeHg concentrations in the creek. In contrast, the main channel's sand and gravel substrate shows only a few shallow MeHg detections and likely supports minimal methylation owing to its low suitability for microbial activity.

Lead, Chromium, and Cyanide

Lead, chromium, and cyanide follow a similar contamination pattern to THg, with the highest concentrations between 0.5 to 2 feet bss, generally decreasing below 2 feet bss. Instances where the surface sediments exhibit higher concentrations are typically found further downstream in the lower shoal section and confluence section. Lead is detected at its highest concentrations within the Industrial Park section (greater than 800 milligrams per kilogram [mg/kg]); chromium is detected at its highest concentrations (greater than 1,300 mg/kg) near the embayment area; and cyanide is detected at high concentrations less frequently, exceeding its regional screening level (50 mg/kg) at only one location within the embayment area.

Arsenic

Unlike THg, lead, chromium, and cyanide, arsenic levels are similar between the 0 to 0.5-foot and 0.5- to 2-foot bss intervals, though the top 2 feet of sediment is most affected compared to deeper sediment. Arsenic contamination is concentrated in shoal areas and downstream of the Industrial Park, with limited impact outside the creek, mainly in the Hunter Creek tributary and Three Star Lagoon.

Except for lead, bank and floodplain contamination is most severe along the embayment area wetlands, where sediment exchange likely occurs. Arsenic concentrations increase noticeably from the southern bank toward the northern bank, where the embayment area is located. Locations exhibiting the highest impacts are next to the point of the embayment peninsula and the southern bank of the embayment area, which form the boundary between the main channel and the embayment area along the northern bank of the creek. Chromium and arsenic reach peak concentrations in this area.

Polycyclic Aromatic Hydrocarbon

PAHs are the most prevalent organic contaminants in Site sediments. BAP is selected to represent PAHs owing to its prevalence of detections and magnitude of concentrations. BAP is observed at its highest concentrations between 0.5 to 2 feet bss, with concentrations decreasing below 2 feet. The most elevated BAP impacts occur between Transects T10 and T17, spanning bank to bank, with additional elevated levels along the northern bank of the upper shoal and embayment areas. No clear concentration trend is observed downstream of Transect T17.

Shoal areas also show elevated BAP, particularly along the northern bank from Transects T18 to T22, and the southern bank from Transects T22 to T28. Bank and floodplain impacts are most significant along the southern bank of the Industrial Park and upper shoal sections.

Polychlorinated Biphenyls

PCB Aroclors exceed RISCs (0.014 and 0.005 mg/kg for Aroclors 1242, 1248, 1254, 1260, and 1268) throughout Wappinger Creek, with the highest concentrations in the Industrial Park and lower shoal

sections. Aroclor 1254 peaks at Sample Location T8-C, near the former MGP, downstream of Three Star Lagoon. Unlike other key contaminants, PCB detections are more frequent in the lower shoal and confluence sections than the upper sections. Aroclor signatures also vary, with Aroclors 1248, 1254, and 1260 dominant upstream, while Aroclors 1242 and 1254 are more prevalent downstream. **Section 2.6.3.4** provides additional discussion on the tidal exchange with the Hudson River as a potential cause of this.

Pesticides and Dioxins/Furans

Pesticide and dioxins/furans TEQ levels peak in the Industrial Park section near the Axton-Cross building, MGP, and Three Star Lagoon. Alpha-chlordane exceeds the RISC by two orders of magnitude, while 4,4'-Dichlorodiphenyltrichloroethane (DDT), 4,4'-Dichlorodiphenyldichloroethylene (DDE), gamma-chlordane, and dieldrin are within the same order.

BKFP-19, along the northern embayment area bank, is the most affected creek bank and floodplain site. Dioxins/furans TEQ concentrations are elevated in shoal areas, ranging from twice to over five times the site-specific background value, though most of the creek remains below twice the site-specific background value.

2.6.2.2 Surface Water

Key contaminants in surface water are present at low concentrations. Lead was the only key inorganic contaminant detected above its RISC in surface water samples. Lead concentrations exceeding the RISC were detected in all sections of Wappinger Creek. Concentrations and the numbers of detections are generally higher in unfiltered samples, indicating that inorganic material is primarily present in the particulate phase.

THg and MeHg concentration data in surface water immediately over shoal areas prior to low tide flushing remains a data gap. Concentrations of MeHg are potentially elevated in surface water over shoal and embayments, as these areas have been observed to have the highest concentrations of MeHg in sediment at the Site. Surface water samples from the creek were collected from the main stem of the channel and shoal areas from midpoints of the water column. These areas receive contributions from upstream and shoal and embayments during tidal withdrawal. The resulting data are likely diluted compared to water that is immediately overlying the shoal and embayments, which represents water that is in active contact with aquatic biota. THg in surface water was not evaluated using trace-level methods; therefore, the THg data are inconclusive. However, MeHg was detected at concentrations above background levels. MeHg is likely enriched in surface water immediately above the shoal and embayment sediments.

2.6.2.3 Groundwater and Pore Water

Lead, mercury, and chromium exceeded RISCs at one pore water sample site (WC-GWS-01) in the Industrial Park section of the creek. The RI documents the general process fundamentals of the biogeochemistry and physical form and function pertaining to these transformations and transport (CDM Smith 2025).

2.6.3 Fate of Contaminants

2.6.3.1 Integrated Mercury and Methylmercury Transport and Transformation Summary

THg at the Site exists primarily in its inorganic form, strongly bound to organic matter and fine particulates in sediments. While elemental mercury was not detected, legacy industrial discharges, particularly from the former Axton-Cross facility and Dutchess Bleachery, have likely contributed significant THg loading to the creek. The subsequent fate of this THg is governed by coupled physical transport and biogeochemical transformation processes within the aquatic environment.

Transport of Total Mercury

THg behaves predominantly as a particle-associated contaminant. It binds strongly to fine-grained sediments and is redistributed through hydrodynamic mechanisms such as tidal fluctuation, storm-driven resuspension, and sediment deposition. These processes have facilitated the downstream migration and long-term burial of THg-rich sediments, particularly within depositional zones such as the shoals and embayments. Flood events may spread contaminated particulates onto adjacent floodplain soils and banks, which can serve as secondary sources through erosion and runoff. THg has been detected at sediment depths up to 8 feet bss, though this distribution is attributed to historical burial rather than active vertical migration. Groundwater sampling indicates that THg transport via groundwater is negligible at the site. THg may be transported in from the Hudson River because of tidal influence.

Transformation and Cycling of MeHg

Within shallow anaerobic sediments, inorganic THg is microbially transformed to MeHg, primarily through activity by sulfate-reducing bacteria. This process is most active in the top 0 to 4 centimeters of organic-rich sediments, especially in shoals and vegetated embayments, where tidal cycles expose and then flood sediments on a daily cycle. MeHg formed in these zones likely diffuses into pore water and upward into the water column, where it can enter the aquatic food web. Shallow pore water and surface water above these MeHg production areas were not collected, so the extent of this diffusion is not quantified in the RI. Shallow pore water and colocated surface water is a current data gap. MeHg readily bioaccumulates in algae and primary consumers and biomagnifies in higher trophic levels, including sportfish species. Although not specifically evaluated at the Site, periphyton has been shown in literature to be a key methylation vector in some aquatic ecosystems. The role of periphyton as a contributor to MeHg in Wappinger Creek is currently a data gap.

MeHg production is not typically active in deeper sediments owing to the insufficiency of electron acceptors (oxidized substrate) and methylating microbial activity. MeHg detected at depth likely reflects historical production and subsequent burial. Demethylation processes, including microbial degradation and limited photodegradation, occur but are constrained by dense aquatic vegetation in the summer (e.g., water chestnut) that limits light penetration. Demethylation is likely enhanced in surface waters in the winter when the vegetation cover is gone.

Fish tissue data confirm bioaccumulation of MeHg, with concentrations exceeding those observed in the Wappinger Lake background levels. However, the fish data for both Wappinger Creek and Wappinger Lake are insufficient for piscivorous species—those at the top of the food chain that typically accumulate the highest THg concentrations. This absence of data limits the ability to characterize the extent of MeHg biomagnification fully and may underestimate potential risks to higher trophic-level consumers, including wildlife and humans. The lack of piscivorous fish tissue data is a data gap for the Site. Additionally, benthic macroinvertebrate data are needed to help characterize the magnitude of MeHg bioaccumulation in the base of the food web, which is also a current data gap.

While THg mobility is driven by sediment dynamics, MeHg transport is governed by internal biogeochemical cycling and trophic transfer. MeHg does not exhibit significant lateral or vertical migration beyond its zone of production. No MeHg was detected in groundwater or pore water samples, further supporting that it is a product of localized, in situ processes rather than external or advective sources.

Summary

The behavior of THg and MeHg at the site reflects a two-phase dynamic: historical sediment loading and redistribution of THg, and localized microbial generation in surface sediment and bioaccumulation of MeHg in surface sediment and surface water zones (**Figure 2-9**). Effective remediation and risk mitigation efforts must therefore account for both the long-term stability of mercury-contaminated sediments and the biogeochemical conditions that control MeHg formation and bioavailability.

2.6.3.2 Other Inorganic Contaminant Transformations and Transport

Inorganic contaminants other than THg at the Site, including lead, arsenic, chromium, and cyanide, exhibit limited aqueous mobility and are predominantly associated with particulates and organic matter in sediments. Under prevailing geochemical conditions, these metals are retained within the solid phase and generally persist in depositional sediment.

Transformation processes are largely controlled by chemical speciation, redox sensitivity, sorption behavior, and complexation. Metals such as lead and chromium occur in multiple oxidation states that influence their solubility and environmental reactivity. For example, lead is typically present as lead(II), strongly bound to sediment matrices, while arsenic may alternate between arsenate and the more mobile arsenite under reducing conditions. Redox transformations are important for both arsenic and chromium; oxidized forms tend to be less mobile and more strongly sorbed, whereas reduced species may partition into pore water under localized anaerobic conditions. Sorption to organic matter, mineral surfaces, and iron, manganese, or aluminum oxides further limits inorganic contaminant mobility. Higher organic carbon or oxide content in sediments enhances metal sequestration. Certain metals, such as cyanide, may form stable complexes (e.g., ferrocyanide), but transformation of these species is generally limited owing to low biological activity.

Transport is predominantly particle-bound. Erosion, resuspension, and subsequent deposition of fine-grained sediments serve as the primary means by which metals are redistributed within the Wappinger Creek system. These processes are episodic, typically driven by stormwater runoff, tidal movement, or flooding. Floodplain areas may receive inputs of metal-laden sediments during overbank events, and

later act as secondary sources through bank erosion or surface runoff. Historically contaminated sediments are also present at depth, with limited mobility under current conditions because of reduced geochemical gradients and strong sorption to surrounding media. Groundwater pathways are not considered significant, as metals were not detected in monitoring wells and conditions are not favorable for leaching. Exchange with surface water in the dissolved phase is uncommon under low-flow conditions, though suspended sediment concentrations may transiently increase during high-energy events. Inorganics may also be transported in from the Hudson River because of tidal influence.

Overall, the fate of inorganic metals at the site reflects long-term sediment retention, limited transformation, and redistribution largely tied to physical sediment dynamics rather than aqueous migration.

2.6.3.3 Organic Contaminants Transformation and Transport

Organic contaminants at the Site include semi-volatile and volatile compounds, specifically PAHs, PCBs, pesticides, and dioxins/furans. These contaminants display diverse environmental behaviors, but their fate and transport are generally characterized by persistence in sediments, strong affinity for particulate matter (PM), and limited mobility in aqueous phases.

Transformation processes vary among organic contaminant classes. PAHs, such as BAP, exhibit strong sorption to sediments and degrade slowly under anaerobic conditions. Although aerobic biodegradation and photooxidation may occur at or near the sediment-water interface, such processes are limited by redox conditions and light availability, and summer vegetation cover in shoal and embayments may limit light exposure to surface sediments. PCBs are chemically stable and degrade slowly, primarily through anaerobic dechlorination in reducing sediments. Aerobic degradation is limited because of their low solubility and strong sediment binding. Pesticide behavior depends on chemical structure, but many organochlorine compounds (e.g., 4,4’-DDT and its metabolites) resist degradation in anoxic sediments. Dioxins/furans are highly persistent and chemically stable, with negligible abiotic or biotic breakdown under Site conditions. VOCs show greater potential for degradation through aerobic microbial processes and volatilization, but their presence at the site is generally limited to select upland areas next to historical source zones.

Transport mechanisms for organic contaminants are largely governed by sediment dynamics. Sorption to fine-grained particulates facilitates movement during episodic events, such as storm-driven resuspension events or tidal exchanges. Contaminated sediments may migrate downstream and upstream, and they may accumulate in lower-energy depositional settings, including shoals and embayments. Flood events also contribute to the deposition of contaminated particulates on creek banks and floodplain soils. These areas can subsequently act as secondary sources through erosion and surface runoff. The tidal swing can also bring organic contaminants into Wappinger Creek from the Hudson River. PCB Aroclors found in the downstream reaches of the creek, not associated with the Site, have been used to create a general understanding of how particulate influences from the Hudson River may extend upstream of the creek to the upper embayment area. Considering PCBs are primarily transported via suspended sediments, tidal influence from the Hudson River may introduce additional contaminants that are chemically similar to those already present at the Site. This dynamic presents a potential risk of recontamination in remediated areas where backflow from the Hudson River reaches into the lower segments of the creek.

2.6.3.4 Determination of the Hudson River Line

As noted in the previous subsections, tidal influence from the Hudson River presents a potential risk of recontamination in remediated areas where backflow from the Hudson River reaches into the segments of the creek. Although the extent of tidal exchange with the Hudson River has not been directly quantified, Aroclor 1242 distribution was used as a proxy evaluation for estimating the potential extent of depositing sediments from the Hudson River into Wappinger Creek.

Aroclor 1242 is the most detected Aroclor in Hudson River sediments, and Aroclor 1242 is only detected in the creek sediments downstream of Transect T15, with its number of detections and concentrations increasing moving downstream toward the confluence with the Hudson River (as shown in **Figure 2-13 and 2-14**). Sediment cores collected from the mainstem of the Hudson River during previous investigations (Bopp et al. 1984, 1981; Rodenburg and Ralston 2016) found that the PCB composition of sediments collected at depth from River Mile (RM) 53.8 (Foundry Cove) and RM 0 (NY Bight), resembles that of Aroclors 1242 and 1016. The Bopp et al. (1984, 1981) study also shows that PCBs present in lower Hudson River sediments are more persistent and resistant to degradation. The presence of PCBs at depth, with compositions most similar to Aroclors 1242 and 1016, in the lower Hudson River provides potential evidence that the sediments in Wappinger Creek exhibiting elevated Aroclor 1242 concentrations originated from the surface sediments in the upper Hudson River (Bopp et al. 1981). This correlation of Aroclor signatures could partially explain the role of the Hudson River's contribution to PCB Aroclor 1242 impacts through the deposition of impacted suspended sediments into the creek during periods of tide fluctuation, storm events, and shifts in seasonal flow regimes, where historically buried contaminated sediments have been potentially resuspended and transported into the creek.

Considering the findings of the RI and the proxy evaluation of Aroclor 1242 distribution, an approximate HRL was established to estimate this zone of sediment exchange between the Hudson River and Wappinger Creek, rather than a discrete boundary, within Wappinger Creek. This zone, identified between Transects T15 and T16 in the upper portion of the creek, is expected to fluctuate spatially in response to Hudson River conditions and seasonal influences, consistent with the dynamic nature of sediment transport processes describe above. For evaluation purposes, the HRL is used to approximate a boundary that divides the creek into an area where below the HRL, there is a higher potential for recontamination and above the HRL, there is a lower potential for recontamination. Even though the Aroclor data indicate the Hudson River impact may be between Transects T15 and T16, the embayment area, which extends between Transects 15-17, while not prone to the most significant channel flows, is considered to be the most heavily impacted area at the Site, and is deemed, in its entirety, to be a priority area for early risk reduction through implementation of an IRA. Consequently, the HRL boundary for this FFS was moved just south of the embayment area, between Transects T17 and T18 (**Figure 1-2**).

2.6.3.5 Conceptual Site Model Aspects for Interim Remedial Action

The aspects of the CSM for consideration of an IRA in the upper portion of the Site include the fate, transport, and complex biogeochemical dynamics of THg cycling/MeHg production within the tidal wetlands; the spatial extent of the impacted THg in sediments (including the Industrial Park section, upper shoal section, and embayment section); and the approximate location of the HRL and resultant FFS footprint. While additional site related organic and inorganic contaminants may not have similar fate and transport behavior as mercury, the sediment dynamics including erosion, resuspension, and

subsequent deposition of fine-grained sediments serve as the primary means by which site-related contaminants are redistributed within the Wappinger Creek system, resulting in colocation of many contaminants.

2.7 Summary of Risk Assessment

2.7.1 Human and Ecological Receptors

Contaminants of potential concern (COPECs) were identified in the human health risk assessment (HHRA) (CDM Smith 2022) and the baseline ecological risk assessment (BERA) (CDM Smith 2023).

Human receptors may be exposed to Site contamination in the surface water and sediment of Wappinger Creek via incidental ingestion or dermal contact while swimming or during other recreational activities. The HHRA was performed to characterize the potential human health risks associated with the Site. Elevated potential cancer risks and/or noncancer hazards were identified for fish consumption from Wappinger Creek for both bottom and predatory fish. Risks/hazards were higher for consumption of bottom fish (channel catfish and common carp) than for consumption of predatory fish (largemouth bass and smallmouth bass). It is worth noting that risk estimates for predatory fish were based on analytical results from only two samples; therefore, limited conclusions can be drawn from this data set. Additionally, fish other than predatory and bottom fish might be consumed. Direct contact with surface water and sediment were not associated with elevated risks to human receptors.

Noncancer hazards were associated primarily with the PCBs Aroclor 1260 and Aroclor 1254 and THg (as MeHg in fish tissue). Cancer risks were primarily associated with carcinogenic PAHs (especially BAP) and the PCBs Aroclor 1260 and Aroclor 1254. There is some uncertainty in the risk estimates from carcinogenic PAHs, which were strongly influenced by a single fish tissue sample with elevated concentrations.

Ecological receptors may be exposed to chemicals in soil, sediment, sediment pore water, and/or surface water in Wappinger Creek, the tributaries, and the wetland areas, via direct contact and ingestion. Ecological receptors also may be exposed to chemicals that are transferred through different trophic levels of the food web and may be bioaccumulated. Chemicals found in sediment and soil may bioaccumulate or bioconcentrate in food or prey and then be passed up the food web to impact organisms at higher trophic levels. Ecological receptors may ingest plant tissues that contain contamination from bioaccumulation of mercury through the root system and/or other organisms that contain contamination from bioaccumulation of mercury through ingestion of other plants or contaminated soil and sediment. These plants or animals, in turn, may be consumed by animals at higher trophic levels.

A BERA was performed to evaluate the potential ecological impact of contaminants at the Site. A series of six BERA assessment endpoints (AE) were evaluated, with each AE evaluating the survival, growth, and reproduction of a different ecological trophic level and representative ecological receptors. AE 1 evaluated risks posed to ecological receptors through direct exposure to contaminated media, whereas AEs 2 through 6 evaluated risks through the consumption of potentially exposed prey by the primary predator at each trophic level. Each AE was evaluated using one or more measurement endpoints (MEs),

which evaluated different lines of evidence to support each AE. All AEs and MEs were then taken together to develop a weight of evidence approach to ecological risk.

The BERA determined that the observed impacts on the benthic macroinvertebrate community were not related to the Site. However, Site-related COPECs in sediment, fish tissue, and benthic macroinvertebrate tissue pose a risk to upper trophic-level ecological receptors using the Site. The primary ecological risk driver is THg. Other drivers of toxicity include aluminum, antimony, and lead.

2.8 Risk Management Strategy for Interim Action

EPA determined that an IRA (to be performed prior to a final remedy) that addresses the most severe areas of risk in the upper portion of the Site, through receptor exposure reduction, would be the most efficient remedial strategy. The IRA will focus on THg in sediments approximately upstream of the HRL (midpoint between RI Sampling Transects T17 and T18), inclusive of the embayment area.

Owing to the complex behavior, distribution, and toxicity of THg—and the findings of the HHRA and BERA—it has been identified as the primary risk driver at the Site, especially for ecological receptors, and will be identified as the contaminant of concern (COC) for this FFS. While several contaminants in the RI exceed RISC values and are colocated with THg, for this FFS, they will be considered site-related contaminants and will not be classified as COCs, because specific action levels or preliminary remediation goals (PRGs) have not been fully developed and these site-related contaminants are not specifically targeted for remediation within this IRA.

THg-impacted sediments are fairly extensive in the upper portion of the Site, above the HRL. Areas where shallow sediments are exposed during low tides can provide conditions suitable for mercury methylation. If left unaddressed, these areas can lead to biotic exposure to THg and MeHg. THg can also biotransform to MeHg in ecological receptors, such as fish. THg is generally considered representative of the released source contamination while MeHg formation and bioavailability can vary widely across locations and time. Furthermore, owing to the colocation of THg with other contaminants, an IRA targeting THg-contaminated sediments will also incidentally reduce the mass of other site-related contaminants in sediment. Based on these discussions, it was determined that the most appropriate remedial measure was to perform an IRA that targeted THg-contaminated sediments.

It is anticipated that remediating THg-contaminated sediments in the upper portion of the Site will reduce THg contaminant concentrations in sediment, reduce the potential for mercury methylation and bioaccumulation in the food web and incidentally remove other potentially collocated contaminants, thereby reducing risks to human and ecological receptors.

2.9 Summary of Uncertainties

While the current understanding of the CSM and the nature and presence of THg within the Wappinger Creek system was well documented for the RI, there are several uncertainties where additional information may aid in the remedial process. Data collection for each item is expected to be initiated prior to implementing the IRA; however, data for several uncertainties will continue to be collected as part of post-IRA performance monitoring. **Section 6.3** discusses the purpose and timing of data

collection for these uncertainties and the specific data that may be collected for a remedial design (RD) with respect to the remedial alternatives conceptualized for evaluation within this FFS.

2.9.1 Trace-Level Pore Water and Surface Water Sampling

Shallow sediment pore water was not sampled for THg and MeHg; therefore, partitioning between the solid phase and liquid phase for THg and MeHg cannot be assessed. Limited surface water data exists for THg and MeHg in the shoal and embayments. The shoal areas include the upper shoal and lower shoal sections of Wappinger Creek, as defined in **Section 2.2**. These areas exhibit thicker sediment beds because of the slower water velocities that flow along the inside of the creek bends and support organic-rich soft sediments with either water chestnut or, in very shallow areas, water lily vegetation. Surface water in these areas is potentially the highest for the Site and primarily represents the MeHg sourced from the sediment that can enter the food web. Trace-level THg data are also not available for surface water, and even in contaminated systems like Wappinger Creek, THg concentrations can range into the single-digit parts per trillion, which is below the detection limits achieved in the RI sampling. The concentration of THg in surface water is key to understanding the diffusion of THg from sediment to overlying water, which will be an important input in the remedial process. It is recommended that any future sampling of aqueous phase media at the site use trace analytical techniques. Dissolved THg in pore water represents the fraction that is potentially available for methylation, and dissolved MeHg represents the fraction that can diffuse into overlying water and subsequently be taken up in the food web. Filling the data gap of MeHg concentrations in the pore water may help to identify subareas of sediment that are more conducive to impacting surface waters and enhancing food web uptake.

2.9.2 Periphyton Sampling

Periphyton, a potentially significant mercury sink and methylator, was not sampled within the scope of the RI field program. Periphyton growth is best facilitated on the hanging roots in the water chestnut area. Periphyton has the potential to release MeHg to surface water, and it can also be predated by grazing benthic macroinvertebrates, illustrating potential bifurcation of the food web pathways that may be present. These multiple pathways converge and intensify as mercury biomagnifies up the food web, ultimately concentrating in apex predators such as large fish and birds. Remedies that address the invasive water chestnut in the shoal areas may also address periphyton. However, as it is pervasive in Wappinger Lake above the Site, active management would be needed to keep water chestnut from reseeding in the reclaimed areas. If a more detailed pathway of MeHg exposure to the food web is needed (e.g., direct exposure to grazing benthic macroinvertebrates or diffusion into the surrounding surface waters), then understanding the nature and extent of periphyton would aid in that effort.

2.9.3 Fish Tissue Sampling

The fish tissue data set lacks sufficient representation of top trophic-level species (e.g., largemouth and smallmouth bass), which are critical for evaluating biomagnification of MeHg end points in the food web. This gap restricts the ability to assess human and ecological risks associated with fish consumption. There is also no tissue data for benthic macroinvertebrates, which are key vectors for MeHg transfer from sediment or periphyton to higher trophic levels. This data gap hinders the evaluation of early-stage bioaccumulation and food web dynamics, which is a very site-specific governed process based on the biogeochemistry and benthic community within different sites.

Furthermore, considerations are needed for development of future THg and/or MeHg PRGs related to fish consumption because of the complex and site-specific nature of biogeochemical dynamics of mercury cycling and MeHg production within the tidal wetlands at the Site and subsequent bioaccumulation through the food web (CDM Smith 2023). There are also challenges in comparing mercury methylating conditions in the background sampling area (Wappinger Lake), which has quiescent and lower flow lentic body of water, relative to the more lotic conditions within the tidal wetlands in the creek, which experience daily tidal fluxes and higher velocities.

2.9.4 Deposition and Erosion Rates

The depositional and erosional nature of the channel, including rates of deposition and scouring, have not been quantified. The interaction and influence of the Hudson River on Wappinger Creek sediment transport is not fully understood. This includes quantifying the extent of the Hudson River's tidal exchange with Wappinger Creek, sediment resuspension and deposition tendencies, and any sediment exchange occurring between Hudson River and Wappinger Creek. Additional bathymetry surveys and the application of a comprehensive hydrodynamics model will help to inform the RD process and ultimately further characterize the Hudson River's role in contributing to Site impacts and refine the understanding of sediment resuspension processes occurring at the Site. Applying this information will support remedial decisions, including evaluating the recontamination potential of remediated areas.

2.9.5 Floodplain Soil Contamination

Soil contamination in the floodplain has not been fully investigated and could serve as ongoing sources for sediment contamination. The floodplain soil could include areas next to the embayment area and floodplain fill/soil along the upper portions of the site. Additional investigations in the floodplain will help to inform the RD process, further characterize the extent of contamination in the floodplain areas, and refine the remedial extent of streambank soils in the floodplain areas.

3.0 Remedial Action Objectives and Goals

Section 300.4(e) of the NCP requires the remedial alternative development process be initiated by developing PRAOs and specifying contaminants and media of concern, potential exposure pathways, and RGs.

This section presents the ARARs and TBC information, PRAOs, the remedial criteria for THg, and the potential remediation zones identified for the IRA to address the specific contaminant exposure and migration issues being considered in this FFS. Final ARARs and remedial action objectives (RAOs), will be developed as appropriate from evaluations presented within this FFS and set forth in the interim ROD.

3.1 Current and Reasonably Anticipated Future Land and Resource Uses

The current and reasonably anticipated future land uses for this Site are an important consideration for the development of PRAOs and remedial criteria. This ensures that the remedial alternatives supporting an interim action can be designed to provide interim protection for human health and the environment. The current land use within the identified site boundary (Wappinger Creek and 50 feet of bank from the mean high water line) is predominantly characterized as a mix of commercial and recreational uses. Shorelines include retaining walls bordering the creek in the industrial area; steep slopes bounding the north side of the creek in the upper shoal area; the Wappinger Greenway, which includes the Wappinger Greenway Trail, located along the northern bank of Wappinger Creek; and the embayment section, next to the Wappinger Greenway, which is fronted by palustrine freshwater forested/shrub wetland.

NYSDEC classified the lower section of Wappinger Creek, including Wappinger Lake, as a NYSDEC Class C(T) stream, meaning its waters are best suited for primary and secondary contact recreation and fishing, and are also suitable for fish propagation and survival. Existing fish species that are present for recreational warm-water fishing and fish propagation. The site is also within areas that provide habitat for some endangered and threatened species and avian species on the USFWS Birds of Conservation Concern list as discussed in **Section 2.4.5**.

Waterway traffic consists primarily of small watercraft boats, canoes, and kayaks. Public access is provided by the boat launch on Creek Road.

Beyond recreation, the section of the creek between the Hudson River confluence and the dam in Wappingers Falls is protected open space and designated as a Significant Coastal Fish and Wildlife Habitat (New York State Department of State 2012). This section of the creek supports protected species, provides habitat for migratory and resident warmwater fisheries and wildlife species, and serves as a fish spawning, nursery, and wintering habitat. The USFWS Information for Planning and Consultation website (https://ipac.ecosphere.fws.gov/) reported that the Site is located within areas that provide habitat for the endangered Indiana bat (*Modalistodalis*), threatened northern long-eared bat (*Myotis septentrionalis*), and a species of concern, the monarch butterfly (*Danaus plexippus*). Any in-

creek construction will require coordination with EPA, other Federal partners and stakeholders around fish and habitat protection windows.

The future land use of the Site is likely to remain similar to current conditions because the nature of the associated activities is not anticipated to change.

3.2 Basis for Response Action, Key Contaminants, and Contaminated Environmental Media

As discussed in **Section 1**, the key contaminant and environmental media to be addressed as part of this IRA is THg in sediment and streambank soils. While other contaminants have been identified in sediment and streambank soils, owing to the complex behavior, distribution, and toxicity of THg, it has been identified as the primary risk driver at the Site, and is considered the COC for this IRA. THg-impacted sediments are fairly extensive in the upper portion of the Site and have been identified primarily in surface sediments (0 to 0.5 feet) and subsurface sediment (0.5 to 2.0 feet), with some impacted sediments below 2 feet. Areas where shallow, soft depositional sediment have accumulated, which also are the areas that become exposed during low tide, can potentially provide conditions suitable for mercury methylation. If left unaddressed, these areas can lead to biotic exposure to THg. In addition, the presence of THg in deeper sediments can contribute to contamination in shallower depths over time, by upward advection and diffusion of pore water.

This IRA will target THg in sediment and streambank soils upstream of the approximate HRL, which includes the downstream extent of the embayment area. The HRL, as discussed in **Section 2**, marks the upstream end of the embayment area where deposition of suspended solids originating from the Hudson River extends, based on the PCB Aroclor signature. The proposed action includes the embayment area because it is heavily impacted compared to the shoals. Because of their potential to erode and serve as a contaminant source to the remediated sediment bed, streambank soils have also been included in this IRA.

Although the IRA will focus on THg in sediment and streambank soils, it is assumed to have some incidental benefits for any non-mercury contaminants that are colocated with THg in sediment, and other impacted media, including surface water, by controlling a primary site contaminant source in the sediment bed. Based on the focused objectives of this IRA, groundwater, surface water, and upland sources not associated with the sediments or streambank soils are excluded from remediation for this IRA.

3.3 Applicable Relevant and Appropriate Requirements

Identification and evaluation of ARARs and TBCs are integral components of the FFS process to determine whether remedial alternatives can protect human health and the environment, consistent with CERCLA Section 121(d). The information in this subsection was developed from EPA's *Introduction to Applicable or Relevant and Appropriate Requirements* (EPA 1998); it gives an overview of why ARARs must be identified and evaluated as part of the CERCLA process.

CERCLA and the NCP establish a standardized process through which EPA must respond to spills and clean up the nation's most dangerous hazardous waste sites. While the CERCLA response process sets

acceptable risk-based goals for cleanups, it does not impose specific restrictions on the various activities (such as treatment, storage, and disposal of wastes; construction and use of remediation equipment; and release of contaminants into air, soil, and water) that may occur during a response. EPA instead relies on other eligible federal and state environmental laws and regulations to govern response activities through the ARARs selection process.

ARARs fill in the substantive gaps in CERCLA's risk-based response framework to adequately address protection of human health and the environment. The CERCLA response may also incorporate environmental policies or proposals that are not ARARs but do address site-specific concerns. Such TBC information, presented in **Section 3.3.1.4**, may also be used in determining the cleanup levels necessary to protect human health and the environment.

3.3.1 Applicable Relevant and Appropriate Requirements Identification Process

ARARs are designated as either "applicable" or "relevant and appropriate," according to EPA guidance, and may stem either from federal or state law or regulations.

ARARs must be identified on a site-specific basis and involve a two-part analysis. A determination must first be made as to whether a given requirement is applicable. If it is not applicable, then a second determination must be made as to whether it is both relevant and appropriate. When the analysis determines that a requirement is both relevant and appropriate, such a requirement must be complied with to the same degree as if it were applicable (EPA 1998). Compliance with ARARs is a threshold criterion that any selected remedy must meet unless a legal waiver, as provided by CERCLA Section 121(d)(4), is invoked. **Section 3.3.3** provides discussion regarding CERCLA ARAR waivers.

Determining exactly which laws and regulations will affect a CERCLA response is somewhat different from determining the effect of laws and regulations on activities that take place outside the boundaries of a site remediated under CERCLA. For on-site activities, CERCLA requires compliance with both applicable requirements (i.e., those that would apply to a given circumstance at any site or facility) and those that EPA deems relevant and appropriate (even though they do not apply directly), based on the unique conditions at a site. However, off-site response actions must comply solely with applicable requirements within laws and regulations, including administrative requirements.

3.3.1.1 Applicable Requirements

Section 300.5 of the NCP defines "applicable requirements" as cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state environmental laws that specifically address a hazardous substance, pollutant, contaminant, removal action, location, or other circumstances at a CERCLA site.

3.3.1.2 Relevant and Appropriate Requirements

Section 300.5 of the NCP defines "relevant and appropriate requirements" as those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal or state environmental or facility siting laws. These requirements are not directly applicable to hazardous substances, pollutants, contaminants, remedial actions, locations, or other circumstances at a CERCLA site. However, they address problems or situations sufficiently similar (relevant) to those

encountered at the CERCLA site, making their use well suited to the particular site. It is possible for only part of a requirement to be considered relevant and appropriate.

3.3.1.3 Consideration of State Requirements as ARARs

State requirements are potential ARARs for CERCLA response actions if they meet the following eligibility criteria:

- State law or regulation
- Environmental or facility siting law or regulation
- Promulgated (of general applicability and legally enforceable)
- Substantive (not procedural or administrative)
- More stringent than federal requirements
- Identified in a timely manner
- Consistently applied

Many state requirements listed as ARARs are promulgated with identical or nearly identical requirements to federal law, pursuant to delegated environmental programs administered by federal agencies and the state. The preamble to the NCP provides that such a situation results in citation to the state provision and treatment of the provision as a federal requirement. Occasionally, state regulations or programs are more stringent or have a greater scope of coverage than the federal equivalent. In this case, the state requirement would be cited as the potential ARAR in lieu of the potential federal requirement (EPA 1998).

3.3.1.4 To-Be-Considered Information

In addition to ARARs, the NCP states that where ARARs do not exist, agency advisories, criteria, or guidance are to be considered useful "in helping to determine what is protective at a site or how to carry out certain actions or requirements" (55 Federal Register 8745). These sources of information are called TBC information and are not mandatory to identify or use.

However, the NCP preamble states that provisions in the TBC category "should not be required as cleanup standards because they are, by definition, generally neither promulgated nor enforceable, so they do not have the same status under CERCLA as do ARARs." Although not enforceable requirements, these documents are important sources of information that EPA and the state may consider during selection of the remedy (especially regarding the evaluation of public health and environmental risks, which will be referred to, as appropriate, in selecting and developing cleanup actions) (40 CFR Section 300.400(g)(3), 40 CFR Section 300.415(I)).

3.3.1.5 Other Statutory or Regulatory Requirements Not Considered ARARs

There are other laws and regulations that require substantive compliance for on-site responses but do not constitute ARARs for the site because they are not specifically related to environmental cleanup or facility siting.

3.3.2 Categories of ARARs

Environmental laws and regulations fit into three categories:

- Those that pertain to certain chemicals
- Those that restrict activities at a given location
- Those that control specific actions

Thus, there are three primary types of ARARs: chemical-, location-, and action-specific. An ARAR can be one or a combination of all three types of ARARs.

Chemical-specific requirements address chemical or physical characteristics of compounds or substances on sites. These values establish acceptable amounts or concentrations of contaminants that may be found in, or discharged to, the ambient environment.

Location-specific requirements are restrictions placed on the concentrations of hazardous substances or the conduct of cleanup activities because they are in specific locations. Location-specific ARARs relate to the geographical or physical positions of sites rather than the nature of contaminants at sites.

Action-specific requirements are usually technology- or activity-based requirements or limitations on actions taken with respect to hazardous substances, pollutants, or contaminants. A given cleanup activity will trigger an action-specific requirement. Such requirements do not themselves determine the cleanup alternative but define how chosen cleanup methods should be performed.

3.3.3 Waivers of Specific ARARs

CERCLA Section 121 (d)(4) authorizes that any ARAR may be waived per one of the following six conditions if the protection of human health and the environment is ensured:

- It is part of a total remedial action that will attain such level or standard of control when completed (i.e., interim action waiver).
- Compliance with the ARAR at a given site will result in greater risk to human health and the environment than alternative options that do not comply with the ARAR.
- Compliance with such a requirement is technically impracticable from an engineering perspective.
- The remedial action will attain a standard or performance equivalent to that required by the ARARs through use of another method or approach.
- The ARAR in question is a state standard, and the state has not consistently applied (or demonstrated the intention to consistently apply) the ARAR in similar circumstances at other sites.
- For fund lead sites, in meeting the ARAR, the selected remedial action will not ensure a balance between the need for protection of public health and welfare and the environment at the site and the availability of Superfund monies to respond to other facilities.

3.3.4 Substantive Requirements and CERCLA Permit Exemption

CERCLA Section 121(e)(1), 42 United States Code (U.S.C.) Section 9621(e)(1), states, "No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely on-site, where such remedial action is selected and carried out in compliance with this section." The on-site activities must, however, comply with substantive permit requirements. The term "on-site" is defined in the NCP as "the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action" (40 CFR Section 300.5).

State and federal requirements must be substantive in nature to qualify as ARARs. On-site portions of response actions only need to comply with "substantive" aspects of ARARs rather than any corresponding "administrative" requirements. Superfund sites are not required to comply with administrative requirements associated with the permitting process for on-site actions. However, remedies selected must be protective of human health and the environment and must meet substantive requirements under any federal environmental or facility siting law, or more stringent promulgated state environmental or facility siting law, that are identified as applicable or relevant and appropriate.

For this FFS, it is assumed that the horizontal extent of the contamination in environmental media impacted by CERCLA releases from the site would be considered on-site. Other areas close to the extent of site-related contamination in environmental media and necessary for implementation of the remedial alternatives (e.g., equipment staging areas), could also be considered on-site for ARAR identification and the permit exemption.

While no permits will be obtained for any response actions conducted on-site, EPA, in consultation with the state, will evaluate the substantive requirements that would otherwise be included in any such permit and determine which substantive provisions the remedial activities must comply with. In most cases, the classification of a particular requirement as substantive or administrative will be clear, but some requirements may fall in an area between provisions related primarily to program administration and those concerned primarily with environmental and human health goals.

Once remedial actions are conducted off-site, the action must comply with both the substantive and administrative aspects of all applicable laws and regulations. For example, if remediation waste is transferred off-site for transportation and disposal, all federal and state (and local) laws and regulations would need to be complied with, including obtaining or complying with any required permits. Off-site legal requirements are not considered ARARs, and all off-site actions must comply with all legally applicable requirements, both substantive and administrative. No analysis of relevant and appropriate requirements is needed for off-site actions, and no CERCLA waivers are available (i.e., only applicable requirements are required for off-site actions).

3.3.5 Identification of Potential ARARs for Remedial Alternatives

The tables in **Appendix A** list the potential chemical-, location-, and action-specific ARARs and TBCs for the contemplated IRA. The tables list potential federal or State of New York ARARs and TBCs, which are identified by a statutory or regulatory citation, and provide a preliminary ARAR determination as to whether the cited statute or regulation is applicable or relevant and appropriate. These tables also provide a brief description of the potential ARAR and comments explaining of how, and to what extent, the ARAR is expected to be pertinent to site contaminants, locations, or actions.

The ARARs and substantive requirements identified are preliminary and include both federal and state requirements. These may not have been fully reconciled through a stringency comparison and determination process with potential state ARARs. Additionally, the identification of substantive requirements from ARARs in the FFS is broad to accommodate the range of potential actions contemplated in remedial alternatives, but the ARARs identification itself is narrowly tailored to the scope of the IRA. Final ARARs and TBCs will be documented for the selected remedy in the interim ROD.

3.4 Preliminary Remedial Action Objectives

PRAOs are media-specific goals achieved through completion of a remedial action that is protective of human health and the environment. These objectives are typically expressed in terms of the contaminant, the concentration of the contaminant, and the exposure route and receptors.

The PRAOs developed for this FFS provide the specific objectives of what the IRA is expected to accomplish, focusing on reducing the unacceptable risks to human health and the environment by remediating THg source mass in sediments and streambank soils. The PRAOs are not intended to address all potential human health and/or ecological risks at the Site. Instead, the IRA aims to reduce overall mass of THg in the more upstream portion of the Site that contributes to unacceptable human health and ecological risks, and migration to and within impacted environmental media at the Site. While the IRA may provide incidental reduction of human health and ecological risks and reduce migration of other site-related contaminants to source media and impacted environmental media, that is not a focus of this IRA for the Site. The final remedial decisions at the Site will address all unacceptable human health and ecological risks.

The following PRAOs were identified for the IRA:

Exposure-Related PRAOs

1. PRAO 1: Control contaminated sediment that is a source of unacceptable human health risks from ingestion of contaminated fish by addressing THg at levels above the remedial action level (RAL) in sediment and streambank soils at locations upstream or above the HRL.

2. PRAO 2: Control contaminated sediment that is a source of unacceptable ecological risks (via direct contact, ingestion, and uptake into the food chain) by addressing THg at levels above the RAL in sediment and streambank soils at locations upstream or above the HRL.

Migration-Related PRAO

1. PRAO 3: Control contaminated sediment that is a source to Wappinger Creek and could migrate to downstream environmental media by addressing THg at levels above the RAL in sediment and streambank soils at locations upstream or above the HRL.

At the conclusion of the IRA, the PRAOs would be expected to be achieved by reducing THg in sediments below the RAL, as identified in **Section 3.6**. Monitoring will measure the extent by which ecological and human health risks associated with contamination at the Site have been reduced by the IRA. It is anticipated that remediating contaminated sediments and streambank soils at the Site will directly reduce THg contaminant concentrations in sediment and streambank soils and may indirectly reduce

contaminant concentrations over time in other environmental media such as pore water, surface water, groundwater, and biota.

MeHg is the form of mercury that ultimately bioaccumulates through the food web; however, its concentration is related to conditions conducive to methylation and not assigned an action level. Although MeHg does not have an action level, it will still be monitored and tracked over time to evaluate the effectiveness of removing THg in sediment to reduce MeHg in sediment and subsequent uptake within the food web. These data will provide information about the effectiveness of the IRA and are intended to help inform future remedial decisions at the Site.

These PRAOs will be used to develop, evaluate, and compare remedial alternatives for the contemplated IRA.

3.5 Presence of Principal Threat Waste and Low Level Threat Waste for the Feasibility Study

The following section describes EPA policy for principal threat waste (PTW) and low level threat waste and the site-specific lines of evidence used to make a preliminary determination of these wastes categories for purposes of FS evaluations.

3.5.1 Policy Overview

This subsection describes EPA's policy and guidance in determining whether a CERCLA site has principal threat waste (PTW) and/or low level threat waste and the specific initial determinations made for the wastes addressed as part of this EIRA. The primary guidance document from EPA for making this determination is *A Guide to Principal Threat and Low Level Threat Wastes* (EPA 1991)

EPA established general expectations in the NCP to inform the public of the types of remedies that EPA has found to be appropriate for certain types of waste. These expectations guide the development of cleanup options and reflect EPA's belief that certain source materials are addressed best through treatment because of technical limitations to the long-term reliability of containment technologies, or the serious consequences of exposure should a release occur. Conversely, these expectations also reflect the fact that other source materials can be safely contained and that treatment for all waste will not be appropriate or necessary for protection of human health and the environment, nor cost effective.

The determination whether PTW or low level threat waste exists at a CERCLA site is contingent on the presence of source material. Source material includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for the migration of contamination to groundwater, surface water, or air, or that act as a source for direct exposure. Examples of source materials from *A Guide to Principal Threat and Low Level Threat Wastes* (EPA 1991) include drummed wastes, solid environmental media (e.g. contaminated soil, contaminated sediment), contaminated debris, contaminated sludges, and pools of non-aqueous phase liquids (NAPLs). Examples of non-source material include aqueous environmental media (e.g. groundwater, surface water) and residuals resulting from treatment of site materials.

Principal threat wastes (PTW) are source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the

environment should exposure occur. PTWs include liquids or other highly mobile materials (e.g., solvents) or materials with high concentrations of toxic compounds.

Low-level threat wastes are those source materials that generally can be reliably contained and would represent a low risk if released. They include source materials that exhibit low toxicity, low mobility in the environment, or are near health-based levels.

Determinations as to whether a source material is a principal or low level threat waste should be based on the inherent toxicity as well as a consideration of the physical state of the material (e.g..liquid), the potential mobility of the wastes in the particular environmental setting, and the lability and degradation products of the material. However, this concept of principal and low· level threat waste should not necessarily be equated with the risks posed by site contaminants via various exposure pathways. Although the characterization of some material as principal or low-level threats takes into account toxicity (and is thus related to degree of risk posed assuming exposure occurs), characterizing a waste as a principal threat does not mean that the waste poses the primary risk at the site.

Finally, the identification of principal and low-level threats is made on a site-specific basis. In some situations, site wastes will not be readily classifiable as either a principal or low-level threat waste, and thus no general expectations on how best to manage these source materials of moderate toxicity and mobility will necessarily apply. The principal threat/low level threat waste concept and the NCP expectations were established to help streamline and focus the remedy selection process, not as a mandatory waste classification requirement.

3.5.2 Site-Specific Considerations for Principal Threat Waste and Low Level Threat Waste Determinations During the Early Interim Remedial Action

Based on the findings of the RI, the following paragraphs describe the lines of evidence for site-specific considerations in making a determination of the presence of PTW and low level threat waste for this EIRA.

3.5.2.1 Considerations Regarding Presence of Source Materials

Sediments Are the Primary Ongoing Source of Mercury and Methylmercury

Elevated THg in sediments were identified. No pore water samples were analyzed for THg and MeHg; however, the presence of organic-rich tidal sediments elevated in THg and MeHg, with associated elevated mercury in fish tissue, demonstrates that sediments are the primary ongoing sources of THg and MeHg.

Historical Use of Mercury Salts, Not Elemental Mercury

Site history documents that mercuric chloride was used at the Dutchess Bleachery, and similar mercuric salts were likely used in related operations. There is no evidence of the import, handling, or conversion of elemental mercury, and the RI showed no observations of elemental droplets and no vapor detections during coring or air screening.

3.5.2.2 Considerations Regarding the Toxicity of Mercury in Source Materials

Total Mercury in Sediments Is Identified as the Primary Ongoing Source of Mercury and Methylmercury

Elevated THg concentrations in sediments were identified, with several intervals exceeding RALs by more than an order of magnitude, indicating a substantial sediment mercury inventory. Limited porewater data was collected as part of this investigation; however, consistent with established sediment-to-biota transfer frameworks, which recognize porewater as an important but not exclusive line of evidence, multiple lines of evidence support sediments as the primary ongoing source of THg and MeHg. These include the presence of organic-rich tidal sediments conducive to mercury methylation, measured MeHg in sediments, and observed elevated mercury concentrations in fish tissue. In combination, these lines of evidence indicate that contaminated sediments represent the primary ongoing source of mercury and methylmercury to the aquatic food web.

Limited Trophic Level 4 Fish Tissue Data Creates Uncertainty in Risk Magnitude

Methylmercury is recognized as a more toxic form of mercury than inorganic mercury because it bioaccumulates and biomagnifies. At this Site, methylmercury is generated from bioavailable inorganic mercury [Hg(II)] associated with total mercury present in organic-rich, tidally influenced sediments, and the resulting exposure concern is reflected in fish tissue and fish consumption risk and hazard results summarized in this FFS. The available fish tissue data provide evidence of bioaccumulation consistent with this pathway; however, limited trophic level 4 fish tissue data constrain evaluation of upper trophic level bioaccumulation and therefore affect the magnitude of risk estimates. This pathway nonetheless informs the overall site risk management strategy and the interim action focus on reducing total mercury source concentrations that support the pool of bioavailable Hg(II) available for methylation and subsequent uptake. However, consistent with PTW guidance, the presence of risk via a food web pathway does not by itself define the sediment source material as “highly toxic” PTW, and the “highly toxic” consideration should remain focused on the inherent toxicity of the source material in the context of the risk picture described above.

3.5.2.3 Considerations Regarding the Mobility and Containability of Mercury in Source Materials

This consideration evaluates whether the mercury-bearing source materials are “highly mobile” in the relevant environmental setting and therefore not reliably containable, consistent with PTW guidance.

As described in the CSM discussion, total mercury at the Site behaves predominantly as a particle-associated contaminant that binds strongly to fine-grained sediments and organic matter and is redistributed primarily through physical sediment processes such as resuspension and deposition, with negligible transport via groundwater. In sediments, inorganic Hg(II), including Hg(II) introduced historically as mercuric chloride, is commonly retained in the solid phase through strong sorption and binding to reduced sulfide and other sediment components, which limits the fraction present as freely dissolved, mobile mercury in porewater. Based on these characteristics, mercury in Site sediments is expected to remain largely associated with the sediment matrix and is therefore amenable to reliable containment using conventional sediment engineering measures (for example, dredging and capping).

Methylmercury can partition into porewater and overlying water once produced, and transport to the water column can occur by diffusion from sediments or during resuspension events. However, methylmercury production is described in this FFS as a shallow sediment process concentrated near the sediment-water interface (top 0 to 4 centimeters) in organic-rich sediments. Therefore, remedy components that remove or isolate the surficial, methylation-active sediment zone also address the portion of the sediment bed most directly linked to aqueous-phase methylmercury transfer and subsequent food web uptake, supporting a conclusion that the relevant mercury forms are reliably containable in the Site setting.

As noted above in the source material discussion, there is no indication of elemental mercury in Site source materials, so this mobility consideration is focused on the behavior of Hg(II) and sediment-associated mercury, and methylmercury produced in the surficial sediment zone.

3.5.3 Preliminary Conclusions Regarding the Presence of Principal Threat Waste and Low Level Threat Waste for the Feasibility Study

Sediments contaminated with mercury act as a potential reservoir of ongoing migration and for direct exposure to ecological receptors. However, the characteristics of mercury, including its occurrence as sediment-associated inorganic mercury with particulate-bound mercury salts and its role as a precursor to methymercury generated from bioavailable inorganic mercury, are consistent with forms that are not highly toxic in the context of PTW guidance, not highly mobile under side conditions, and are reliably containable.

The mercury that is present is in particle-associated salt forms rather than elemental forms, and there is no indication of highly mobile or uncontainable mercury in source materials.

Thus, sediments contaminated with mercury evaluated within this FFS are preliminarily determined to be low level threat wastes and this there is not a NCP expectation of treatment for these materials, although treatment may be applied for other purposes under CERCLA (for instance to facilitate meeting regulatory requirements for offsite disposal).

This determination is preliminary with a singular focus on the target COC (mercury) and does not consider a PTW or low level threat waste determination for any other COCs. However, additional investigation will be conducted to support remedy design. This preliminary determination of PTW and low level threat waste in this FFS is subject to modification if pre-design investigations conducted for the IRA provide additional data that change the lines of evidence presented herein and related considerations for site-specific determinations of PTW and low level threat waste.

3.6 Remedial Criteria and Remediation Zones

Remedial criteria are numerical thresholds used to determine if cleanups of source media are warranted to address exposures that pose unacceptable risks and when those cleanups result in acceptable risk reduction. The remedial criteria typically identified during the FS are PRGs. The development of PRGs is a requirement of the NCP (40 CFR 300.430(e)(2)(i)). Identification and selection of the PRGs are typically based on PRAOs, the current and anticipated future land uses, and the identified ARARs.

However, this is an IRA with the objectives of THg source control and migration reduction, so the remedial action will not necessarily achieve acceptable risk levels for human and ecological exposures. Thus, it requires setting an interim cleanup level for THg that is consistent with the objectives of the IRA. Additionally, ARAR-based PRGs are not available for sediment and streambank soils that are the target media for the PRAOs.

In lieu of PRGs, IRAs at the Site can be guided by RALs. A RAL defines the condition when remedial action is and is not warranted owing to THg contamination in sediment and streambank soils. For example, if sediment or streambank soil conditions are below the RAL, no action is warranted; if sediment or streambank soil conditions are at or above the RAL, then action is warranted.

Once the RAL has been specified, remediation zones can be identified that estimate the horizontal and vertical extent of contamination, which will be considered for this IRA. These estimated remediation zones can then be used to develop and evaluate remedial alternatives.

3.6.1 Development of Total Mercury Interim Performance Metric

The Wappinger Lake THg sediment data from the RI were used to derive a Wappinger Lake background-based IPM in consideration of human health risks at the Site. The IPM approach was initiated after it was determined that a risk-based PRG was not feasible owing to the lack of piscivorous fish data (e.g., smallmouth and largemouth bass). A background-based PRG associated with the Site (using Wappinger Lake as the surrogate background) was also determined to be infeasible because of Site data gaps such as:

1. Lack of shallow pore water (0 to 2 inches bss) THg and MeHg data to determine partitioning
2. Lack of THg and MeHg surface water data in shoal and embayments to determine exposure to the base of the food web
3. Lack of benthic macroinvertebrate data to evaluate the uptake of MeHg in one component of the food web base
4. Lack of information on presence/absence of methylation zones other than sediment (e.g., potential for periphyton methylation, as discussed in **Section 2.6.3** and CDM Smith [2025])

The use of a background IPM is more appropriate considering these data limitations, acknowledging that although Wappinger Lake is within the same watershed and just upstream of the Wappinger Creek Site, it potentially has different conditions related to mercury methylation and food web uptake dynamics.

The resulting sediment IPM was developed to lower human health risk associated with consumption of Trophic Level 4 (piscivorous/predator) and Trophic Level 3 (bottom feeder/benthic macroinvertebrate consumers) fish. IPMs can be derived with the goal to have similar baseline conditions between the Site and the Wappinger Lake background rather than a risk-based value. Seeking a background-based IPM that only considers sediment is conservative given the greater methylation potential in background sediments (Wappinger Lake). While streambank soil data are limited, the sediment-based IPMs are considered appropriate because the goal is to prevent any wasting or erosion from streambanks to submerged sediment from increasing the concentration of THg in the creek.

Currently, MeHg in Wappinger Creek sediment is twice as high as in Wappinger Lake because THg is an order of magnitude higher at the Site than in the background. The magnitude difference between Wappinger Creek and Wappinger Lake reflects the higher methylation potential in the lake. Therefore, if the Site sediments were decreased to similar THg concentrations as the background, resulting sediment, and subsequently predator fish concentrations, may end up being lower in the Site than the lake. This proposed IPM approach bypasses the need to understand trophic-level uptake and absolute human health risk (i.e., risk owing to consumption of predator fish) because non-cancer risks to human health from fish consumption in Wappinger Lake is present. Therefore, the purpose of the IPM would be to target risk reduction, not risk elimination. Furthermore, this proposed IPM approach would not require the collection of additional data at this time.

The IPM value for THg was determined to be 0.11 mg/kg. This value was derived using ProUCL (**Appendix B**) and data from Wappinger Lake (CDM Smith 2025). The use of the 95% Upper Confidence Limit is a reasonably conservative IPM since the methylation rate in the Wappinger Lake (background) is higher than in Wappinger Creek (Site), resulting in higher fish tissue concentrations and human health risk in the background than at the Site.

3.6.2 Development of a Remedial Action Level

RALs are commonly used at sediment sites to develop remedial alternatives and delineate areas exceeding a defined concentration threshold. The relative effect of remediating those areas can then be evaluated as part of the analysis of alternatives to determine whether RAOs can be met within a reasonable time frame. Residual contaminant concentrations remaining after remediating the RAL footprint can be used to compare the relative effectiveness of the alternatives in reducing contaminant concentrations, which is directly related to risk reduction.

For this IRA, a RAL was developed that is a THg-specific sediment concentration used to identify source areas for this IRA where active sediment remediation will be performed. Based on input from EPA's Contaminated Sediments Technical Advisory Group, EPA's experience with other sediment sites, the Site CSM, and risk management decisions, the following rationale was used to develop a RAL for this IRA:

- Source areas of significant THg concentrations will be considered 10 times the IPM for THg (1.1 mg/kg).
- NYSDEC (2014) technical guidance for screening sediment sites, which defines sediments above 1 part per million for mercury as being "highly contaminated and likely to pose a risk to aquatic life."

Surface and subsurface sediment and streambank concentrations of THg at various levels of contamination (i.e., 5x, 10x, 15x, 20x, and 50x IPM) across the site were reviewed from the RI data. Based on the level and distribution of the THg-impacted sediments, THg source material locations above 10x IPM (i.e., 15x, 20x, and 50x IPM) were less extensive in areas where shallow sediments are exposed during low tides and may provide conditions suitable for mercury methylation. If left untreated, these areas can lead to biotic exposure to mercury. In addition, contaminated streambank soils that may erode and serve as a contaminant source to the remediated sediment bed above 10x IPM would also potentially go untreated.

THg concentrations near 10x IPM are much more significant in areas that have lower-velocity flows and potentially can create depositional environments in the upper portion of the site above the HRL. THg-impacted sediments have been identified primarily in surface sediments (0 to 0.5 feet) and subsurface sediment (0.5 to 2.0 feet), with some impacted sediments below 2 feet in the upper shoal and embayment area, which are not prone to the most significant channel flows.

Selecting the 10x IPM (1.1 mg/kg THg) for the sediment RAL for this IRA supports the CSM in the upper portion of the Site, is supported by the NYSDEC (2014) guidance, and supports the goal of this interim action by reducing immediate risk and removing contaminant mass in a portion of the creek that could be a source for migration of contaminants in the upper portion of the site and further downstream. The sediment RAL is also being applied to streambank soils in support of this interim action, so that it does not serve as an ongoing source of contamination to sediment and further re-contaminate the sediment bed.

3.6.3 Identification of Remediation Zones

The purpose of identifying remediation zones is to estimate the horizontal and vertical extent of contamination, which will be considered for remediation for this IRA. These estimated remediation zones will be used to develop and evaluate remedial alternatives. As described in **Sections 1 and 3.6.2**, this IRA will focus on remediation of THg for the following conditions:

- Locations where THg concentrations in sediment and streambank soils exceed the RAL
- The area of the Site above the approximate extent of the HRL (as described in **Section 2.6.3.4**)

This area of the Site, which includes the Industrial Park section, the upper shoal section, and the embayment section, generally consists of the creek channel, low-lying shoal areas, and the shallow embayment area. Much of these areas are composed of deposits of finer-grained and potentially mobile sediments. In addition, while limited data were collected, streambank soils, including those within the extent of the 100-year floodplain and next to the embayment area, were found to be contaminated in a number of locations. Limited data were collected during the RI to delineate these areas; however, for this FFS, an approximate area will be estimated to target these streambank soils for remediation.

The HRL is used to represent an approximate zone of sediment exchange between the Hudson River and Wappinger Creek as discussed in **Section 2.6.3.4**. Additional bathymetric surveys and application of a comprehensive hydrodynamics model will help inform the RD process and ultimately further characterize the Hudson River's role in contributing to Site impacts and refine the understanding of sediment resuspension processes occurring at the Site. However, it is not expected that the approximate location of this zone, as identified in the FFS, and the remediation zone for the IRA will be substantially modified.

3.6.3.1 Focused Feasibility Study Remediation Zones Footprint (Horizontal Extent)

With the preceding uncertainties identified, the FFS remediation zone footprints meeting the conditions of the two preceding bullets were delineated using the following decision rules:

- The RAL footprint is a series of horizontal polygons that:
  - Encompass any THg sediment concentration that exceeds the RAL.

- Is upstream of (or approximately upstream of) the potential extent of solids deposition from the Hudson River (i.e., near the HRL).
- The embayment area is included in this FFS remedial footprint owing to:
  - Its proximity to the HRL.
  - The quiescent nature of this embayment as it is an "off-channel feature."
  - The relative THg concentrations present in its sediments.

- RI sediment THg data are used as the basis of the horizontal remedial footprint.
- Thiessen polygons are used to derive the RAL footprint for this FFS. More sophisticated mapping techniques (e.g., indicator kriging) may be used to refine the remedy footprint during design once additional pre-design investigation (PDI) data are collected.
- The RAL footprint applies regardless of an exceeding RI sample's depth within the sediment bed. This is because deeper sediments can contribute contamination from advecting and diffusing pore water to overlying sediments, the water column, and associated biological receptors.

Figure 3-1 presents the resultant FFS remediation footprint**.** This figure presents the RI sediment sampling transects, the locations of the individual sediment cores, and the maximum THg concentration and associated depth interval of that "highest THg concentration" sample in each sediment core. Additionally, any Thiessen polygon with a RAL exceedance is shaded yellow for easy identification.

These yellow-shaded polygons (i.e., remediation zones) generally align with areas that appear to be outside of the main channel flows and, thus, would be expected to be depositional or have a net sediment rate approaching zero under most flow conditions. These off-channel geomorphic features (i.e., shoals, mudflats, embayments) typically accumulate the finer sediment fractions, which are most often associated with higher concentrations of particulate-bound contaminants and exhibit the highest MeHg concentrations observed at the Site. The embayment area represents a low-energy, organic-rich depositional environment with persistent shallow inundation and vegetation that is most conducive to ongoing and future mercury methylation, based on RI observations. Consequently, the FFS remedial remediation zones align with areas that would be generally expected to have higher concentrations of sediment contaminants.

The extent of horizontal polygons is used to approximate the horizontal extent of areas for remediation and is sufficient for evaluation of remedial alternatives in this FFS.

3.6.3.2 Focused Feasibility Study Remediation Zones Footprint (Vertical Extent)

The vertical extent of THg exceeding the RAL, identified within the polygons, is primarily within the top 2 feet of sediment, with the most significant impacts between 0.5 and 1 feet bss in the embayment area (Transects T15 to T18) and the main stem (Transects T7 to T13), and between 1 to 2 feet bss in the upstream areas (Transects T5 to T7) and in the main stem (Transects T11 to T13 and T15 to T17). Exceedances of THg greater than 2 feet bss are much less noted at depth and are generally confined to the main stem (Transects T5 to T7, T11, T15, and T17).

These polygons and the extent of the remediation may need to be refined during a PDI depending on the remediation approach selected. While the figure shows remediation zones for estimated areas of RAL exceedance within the creek, additional area and volume will be included in each alternative to account for streambank soils and considerations related to implementing the remedial alternatives (e.g., sloping of excavations).

3.6.3.3 Focused Feasibility Study Remediation Zones Footprint (Streambank Soils)

The streambank samples collected as part of the RI were limited, but those that exceeded the RAL were generally 2-foot composite samples. However, since these were composite samples, and based on the CSM, the depth of contamination is expected to be mainly in the surficial streambank soils (less than 1 foot). Therefore, the remedial depth of streambank soils is assumed to be limited to a depth of 0.5 feet. The areal extent of the streambanks soils was estimated by looking at the RAL exceedances near the 100-year floodplain area within the site boundary (as described in **Section 3.1**). Since data was limited, this served as a guide to estimate the length of streambank impacted and how much inland area could be impacted. Based on this evaluation, it was estimated that up to approximately 25% of the streambank could be impacted and the impacts could extend up to the site boundary, inland from the banks. Because the data are limited along the banks and no samples were collected inland, professional judgement was used to estimate the extent of impacted streambank soils. For purposes of this FFS, the streambank soils footprint was estimated to encompass 10% of the streambank length and extend a width of 50 feet. The remedial extent of streambank soils will be refined with additional sampling as part of the PDI.

4.0 Identification and Screening of General Response Actions, Remedial Technologies, and Process Options

4.1 Overview

This section identifies GRAs, remedial technologies, and process options to address the PRAOs for the contaminated media that pose a potential threat to human health and the environment. This section presents the screening of the GRAs, remedial technologies, and process options performed in accordance with the NCP to retain representative technologies and process options. These can then be assembled into remedial alternatives, which are discussed in **Section 6**.

The identification and screening process consists of the following general steps:

1. Identify the COCs and affected media that pose risks to human health and the environment, and group these into a category or categories of contaminated environmental media for FFS evaluation.

2. Develop GRAs for the contaminated media to achieve the PRAOs identified in **Section 3**.

3. Compile remedial technologies and process options for each GRA that are potentially viable for remediation of each contaminated medium.

4. Screen the remedial technologies and process options with respect to technical implementability for the contaminated media at the site. Technologies and process options that are not technically implementable relative to the contaminated media are to be eliminated from further consideration.

5. Evaluate and screen the retained remedial technologies and process options with respect to effectiveness, ease of implementability, and relative cost. To address the contaminated media, technologies and process options that have low effectiveness, low implementability, and/or high cost are to be eliminated from further consideration.

The remainder of this section describes and evaluates the GRAs, technologies, and process options that are potentially viable for addressing the focused COC (THg) in contaminated media (sediment and streambank soils), thereby achieving the PRAOs. As described in **Section 2.6 and Section 3**, while there are non-mercury site-related contaminants due to co-location that may be incidentally addressed as part of this IRA, the PRAOs and the technology screening is focused on THg. However, as noted in **Section 4.4**, following the retention of technologies from the second step of the technology screening process, additional consideration is presented for whether retained technologies are applicable to non-mercury site-related contaminants.

4.2 General Response Actions

GRAs are initial broad response actions considered during technology screening used to achieve the PRAOs for the contaminated media identified at the site. GRAs include several remedial categories, such as containment, removal, disposal, and treatment of contamination within the media. Site-specific GRAs are first developed to achieve the PRAOs. These GRAs are then evaluated as part of the identification and screening of remedial technologies and process options for the contaminated media.

Given the limited scope and objectives of this interim action, which are focused on near-term risk reduction rather than full restoration, certain GRAs have been omitted in the technology screening for this FFS. For example, monitored natural recovery was not retained, as it does not align with the immediate objectives of the interim response. The GRAs considered for remediation of the contaminated media include the following:

- No Action
- Institutional Controls (ICs)
- Access Controls
- Containment
- Removal, Transport, Disposal
- Treatment

No Action leaves contaminated media under existing conditions with no control or cleanup planned. In accordance with the NCP, this GRA must be retained and considered as a stand-alone remedial alternative to provide a baseline against which other options can be compared.

ICs involve legal controls that are intended to control or prevent present and future exposure to contaminated media. Risk communication is an IC element and includes community awareness/education and notification measures to inform and warn of dangers associated with these contaminated media.

Access Controls involve physical restrictions that are intended to control or prevent present and future access to contaminated media.

Containment involves physical measures applied to contaminated media to control the further release of contaminants and/or prevent direct contact or exposure to the contaminants.

Removal, Transport, Disposal involves a complete or partial removal of contaminated media materials, followed by transportation and disposal at an on- or off-site location.

Treatment involves physical, chemical, biological, and/or thermal measures that can be applied to the contaminated media to reduce toxicity, mobility, and/or volume of contamination.

4.3 Identification and Screening of Remedial Technologies and Process Options

In this step of the FFS process, remedial technology types and process options that can remediate the mercury-contaminated sediment and streambank soils are identified and organized under each GRA

listed in **Section 4.2**. This section provides potentially viable remedial technologies and process options for the contaminated media material.

Several sources of information were used to identify remedial technologies and process options that can remediate mercury-contaminated sediment and streambank soils. The primary source of information used to identify remedial technologies and process options is the Federal Remediation Technologies Roundtable (FRTR) Remediation Technologies Screening Matrix and Reference Guide, Version 4.0 (EPA 2020). Other sources of information used for identification of remedial technologies and process options include relevant EPA guidance, published literature and vendor information, and engineering judgment based on other mercury and metals-related remediation projects. Relevant EPA guidance includes Contaminated Sediment Remediation Guidance for Hazardous Waste Sites (EPA 2005) and Treatment Technologies for Mercury in Soil, Waste, and Water (EPA 2007). Innovative remedial technologies and process options were also considered in the screening and elimination process.

The preliminary screening for remedial technologies and process options is very broad, considering the suitability of a technology for remediating the contaminated source media. A given technology or process option was retained for further consideration based on technical implementability. If site conditions or characterization data indicate the technology or process option is incompatible with the contaminated media or cannot be implemented effectively because of physical limitations or constraints, that technology or process option was eliminated from further consideration.

Some of the eliminated process options may be technically implementable on a small-scale basis for a specific location or may be considered for conditions other than that for which they are being evaluated. However, the technical implementability screening and elimination were performed by evaluating the process options that would be effective for the contaminated media in areas identified as critical and when contaminant loading is most significant. Specifically, overall contaminant loading is expected to be most significant in the wet season. However, it should be noted that transformation of inorganic Hg to MeHg is typically most significant during the dry season.

Table 4-1 provides a comprehensive overview of the technical implementability screening and elimination process for remedial technologies and process options identified for the contaminated media (contaminated sediment and streambank soils). The process options eliminated from further consideration in this FFS (with the rationale for elimination) are indicated by blue shading. Retained technologies and process options were then carried forward to the second step of the evaluation process, which are discussed in **Section 4.4**. The screening for technical implementability resulted in the following general conclusions:

- Remedial technologies and process options exist that should be eliminated and have no further consideration because they are unable to remediate the contaminated medium owing to site conditions or the lack of compatibility with the material composition of the contaminated medium.
- Remedial technologies and process options that have substantial potential and applicability as a stand-alone remedy for the contaminated medium are retained for further evaluation.

- Remedial technologies and process options that could provide remedial benefits in combination with other remedial technologies—but would likely only have cost-effective application for specific site elements and particular conditions—are retained for further evaluation.

4.4 Evaluation of Remedial Technologies and Process Options for Effectiveness, Implementability, and Relative Cost

Each of the technically implementable remedial technologies and process options retained from the preliminary screening process in **Section 4.3** were further evaluated in the second step of the screening process. The intent of the second screening step was to determine which remedial technologies and process options are to be eliminated from further consideration and which are to be retained for assembly into remedial alternatives.

4.4.1 Evaluation Criteria

Retained remedial technology or process options for contaminated sediment and streambank soils were qualitatively evaluated for effectiveness, implementability, and relative cost. The sections that follow describe the three criteria used in the evaluation and screening of remedial technologies and process options.

4.4.1.1 Effectiveness

Effectiveness as an evaluation criterion consists of the following considerations:

- Potential effectiveness in handling the estimated quantities and volumes of contaminated media and meeting the goals identified in the PRAOs
- Potential impacts to human health and the environment during construction and implementation
- The proven effectiveness of the remedial technology or process option with respect to the contaminants and conditions at the site

4.4.1.2 Implementability

Technically implementable technologies and process options retained from the screening step described in **Section 4.3** are evaluated with respect to both the technical and administrative feasibility of implementing a remedial technology or process option. Technical implementability was used as an initial screening step to eliminate remedial technologies and process options that were clearly ineffective or unworkable at the site. This subsequent screening criterion places greater emphasis on the institutional (i.e., administrative and logistical) aspects of implementability. This criterion focuses on:

- Ability to obtain permits for off-site actions
- Availability and capacity of treatment, storage, and disposal services
- Availability of necessary equipment and skilled workers

4.4.1.3 Relative Cost

Cost plays a limited role in the screening of remedial technologies and process options at this stage of the evaluation process. The cost analysis relies on engineering judgment, and a particular process option is ranked relative to other process options in the same technology type. Because remedial alternatives and associated quantities are not defined during the technology screening process, relative capital and operations and maintenance (O&M) costs are presented in a qualitative manner rather than as detailed estimates.

4.4.2 Screening Evaluation

Each of the remedial technologies and process options retained from the first screening step for contaminated sediment and streambank soils were evaluated against the three criteria identified in above to determine whether they should be eliminated from further consideration in the FFS or retained for assembly into remedial alternatives. **Table 4-2** presents the results of this second screening step.

The relative maturity of the remedial technology or process option was considered in this evaluation and screening process. Three phases of technology maturity were defined: developing, limited application, and full scale. Developing indicates that the technology has been demonstrated at the laboratory or pilot scale in at least one study. Limited application indicates that the technology has been demonstrated at full scale in at least one study or at the pilot scale in several studies. Full scale indicates that the technology has been demonstrated repeatedly at the full scale and is considered a common application for that specific contaminant in that specific media.

This evaluation and screening process is inherently qualitative. The evaluation criteria are specified by EPA RI/FS guidance (EPA 1988); however, the degree to which the criteria are weighed against each other is not specified. Determination of how the individual evaluation criterion should influence the overall rankings is subjective and based on site-specific considerations and professional judgment.

The factors considered for each of the three criteria that justify retention or elimination are rated using the qualitative rating system. For the effectiveness and implementability criteria, a “low” rating was the least preferable, and a “high” rating was the most preferable. For relative cost criteria, a “low” rating indicated a relatively low cost (most preferable), while a “high” rating indicated a relatively high cost (least preferable).

Regarding the mercury-contaminated sediment and streambank soils, remedial technologies or process options deemed to have low effectiveness, low implementability, and/or high relative cost were eliminated from further consideration in the FFS and are indicated by blue shading in **Table 4-2**. The factors considered for each of the three criteria that provide justification for retention or elimination are also summarized.

Table 4-2 also presents information about whether each technology evaluated in this step of the technology screening process is also effective and applicable for non-mercury site-related contaminants due to co-location as discussed in **Section 4.1**. For this evaluation, the non-mercury site-related contaminants are separated into two classes: organics and inorganics. Potential organic site-related contaminants include VOCs, semi-VOCs, pesticides, PCBs, and dioxin/furans. Potential non-mercury

inorganic site-related contaminants include metals and cyanide. While additional factors such as bioaccumulation rates, toxicity effects, contaminant mobility, and speciation can result in differing effectiveness for individual contaminants within each class of contaminants, this evaluation is meant to focus on general applicability to the classes of contaminants as a whole.

4.5 Retained General Response Actions, Remedial Technologies, and Process Options

Based on the results of the two-step screening process described in **Section 4.4.2**, a reduced number of remedial technologies and process options for the contaminated media were retained for further evaluation and the development of remedial action alternatives. **Table 4-3** presents these retained remedial technologies and process options for contaminated sediment and streambank soils.

Remedial technologies and process options identified to address the contaminated media were retained because:

- They have substantial potential and/or applicability as a stand-alone remedy.
- They have remedial benefits in combination with other remedial technologies, but they would only have a cost-effective application for specific site elements and particular conditions.

It is unlikely that using or applying a single remedial technology or process option to the contaminated media would achieve the PRAOs or comply with all ARARs. Thus, using various remedial technologies and process options in combination is likely to be necessary.

5.0 Definition of Criteria Used in the Detailed Analysis of Retained Alternatives

The remedial alternatives identified in **Section 6** are evaluated using the nine NCP-identified detailed evaluation criteria. These criteria were developed to address statutory requirements and considerations for remedial actions in accordance with the NCP and additional technical and policy considerations that have proven to be important for selecting among remedial alternatives (EPA 1988). The subsections that follow describe the nine evaluation criteria used in the detailed analysis of remedial alternatives and the priority in which the criteria are considered. The evaluation tables within **Appendix C** present an analysis of each alternative against the threshold and balancing criteria, with a summary provided in **Section 7**.

The remedial alternatives identified in this FFS are not meant to be a final remedial action for all contaminated media posing potential unacceptable risks to human health and the environment. While the criteria used for evaluating remedial alternatives remain consistent with those required by the NCP, the analysis of remedial alternatives is focused on pertinent criteria for the limited scope of these alternatives. This approach aims to meet the identified PRAOs for the contemplated IRA, which seeks to reduce human and ecological risks and reduce the contaminated mass of THg in sediment in the upper portion of the Site. As appropriate, additional clarification has been provided in the subsections that follow to identify those criteria that are either pertinent or have limited pertinence for evaluation of the contemplated IRA represented by the remedial alternatives.

5.1 Overall Protection of Human Health and the Environment

Each alternative is assessed to determine whether it can provide adequate protection of human health and the environment (short and long term) from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the Site. Evaluation of this criterion focuses on how risks are eliminated, reduced, or controlled through treatment, engineered controls, or ICs, and whether an alternative poses any unacceptable cross-media impacts.

The scope of the remedial alternatives is focused on reducing human and ecological risks and reducing contaminated mass of THg in sediment in the upper portion of the Site. While non-mercury site-related contaminants are potentially colocated with high concentrations of THg and will likely be incidentally addressed as part of this IRA, this IRA is focused on THg in sediment. In addition, this IRA excludes other potential pathways (e.g., groundwater and upland sources). The analysis of this criterion is focused on providing adequate protection of human health and the environment on an interim basis to achieve the IRA PRAOs until a final remedy is selected for the Site.

5.2 Compliance with ARARs

For this criterion, each alternative is evaluated to determine how ARARs identified in **Appendix A** of this document will be met. If the assessment indicates an ARAR will not be met, then the basis for justifying one of the six ARAR waivers allowed under CERCLA is discussed. **Exhibit 5-1** details these ARARs waivers.

Exhibit 5-1. ARAR Waivers

Waiver	Description
Interim measures	The remedial action selected is only part of a total remedial action that will attain such level or standard of control when completed. (CERCLA Section 121(d)(4)(A))
Greater risk to health and the environment	Compliance with such requirement at the facility will result in greater risk to human health and the environment than alternative options. (CERCLA Section 121(d)(4)(B))
Technical impracticability	Compliance with such requirement is technically impracticable from an engineering perspective. (CERCLA Section 121(d)(4)(C))
Equivalent standard of performance	The remedial action selected will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, criteria, or limitation through use of another method or approach. (CERCLA Section 121(d)(4)(D))
Inconsistent application of state requirements	With respect to a state standard, requirement, criteria, or limitation, the state has not consistently applied (or demonstrated the intention to consistently apply) the standard, requirement, criteria, or limitation in similar circumstances at other remedial actions. (CERCLA Section 121(d)(4)(E))
Fund balancing	In the case of a remedial action to be undertaken solely under Section 104 using the fund, selection of a remedial action that attains such level or standard of control will not provide a balance between the need for protection of public health and welfare and the environment at the facility under consideration and the availability of amounts from the fund to respond to other sites that present or may present a threat to public health, welfare, or the environment, taking into consideration the relative immediacy of such threats. (CERCLA Section 121(d)(4)(F))

Under CERCLA, remedial actions must comply with all federal and state environmental requirements, standards, criteria, and limitations, unless such ARARs are waived under certain specific conditions. Compliance with an ARAR may not be possible for components of the remedial alternatives because they are interim in scope and do not address all contaminated media posing unacceptable human health and ecological risks. Thus, the CERCLA interim measures waiver is the most pertinent to the IRA and the only CERCLA ARAR waiver evaluated in this FFS.

5.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence addresses the results of a remedial action based on the remaining risk at the Site after response objectives have been met. The primary focus of this evaluation is the extent and effectiveness of the controls that may be required to manage the risk posed by treatment residuals and/or untreated wastes. Factors to be considered, as appropriate, include the following:

- Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities. The characteristics of the residuals are considered to the degree that they remain hazardous, considering their toxicity, mobility, or volume, and propensity to bioaccumulate.

- Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the Site. This factor includes an assessment of containment systems and ICs to determine if they are sufficient to ensure that any exposure to human and ecological receptors is within protective levels. This factor also addresses the long-term reliability of management controls for providing continued protection from residuals, the assessment of the potential need to replace technical components of the alternative, and the potential exposure pathways and risks posed if the remedial action needs replacement.

Because the scope of the remedial alternatives is limited to reducing risks and reducing contaminated mass of THg from the upper portion of the Site, analysis of this criterion is focused on relevant residual risks and adequacy/reliability of the controls imparted by the IRA until a final remedy is selected for the Site. Pertinent long-term effectiveness considerations for this IRA include the potential development of site conditions that may transform residuals into more toxic and bioavailable forms that may exacerbate recovery or reverse initial recovery gains, the long-term effectiveness of reactive caps, and remaining residuals and untreated waste related to non-mercury site-related contaminants. **Appendix D** contains the analyses conducted to support the development and evaluation of the preliminary design for engineered reactive caps at the Site.

5.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

This criterion assesses the degree to which each remedial alternative employs a treatment technology to permanently and significantly reduce toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by contaminated media at the Site. Factors to be considered, as appropriate, include the following:

- The treatment processes the alternatives use and materials they will treat
- The amount of hazardous substances, pollutants, or contaminants that will be destroyed or treated, including how the principal threat(s) will be addressed
- The degree of expected reduction in toxicity, mobility, or volume of the waste because of treatment
- The degree to which the treatment is irreversible
- The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate such hazardous substances and their constituents
- Whether the alternative would satisfy the statutory preference for treatment as a principal element of the remedial action

5.5 Short-Term Effectiveness

This criterion reviews the effects of each alternative during the construction and implementation phase of the remedial action until remedial response objectives are met. The short-term impacts of each alternative are assessed, considering the following factors, as appropriate:

- Protection of the community during remedial action: This factor addresses risks that might be posed to the community during implementation of an alternative.
- Protection of workers during remedial action: This factor addresses potential impacts on workers during remedial action and the effectiveness and reliability of protective measures.
- Environmental impacts during remedial action: This factor addresses potential adverse environmental impacts resulting from construction and implementation of an alternative. It also evaluates the reliability of the available mitigation measures during implementation to prevent or reduce the potential impacts.
- Time until remedial objectives (i.e., RAOs) are achieved: This factor includes an estimate of time required to achieve protection for the entire site or individual elements associated with specific site areas or threats.

Because the scope of the remedial alternatives is limited to reducing risks and removing contaminated mass of THg from the upper portion of the Site, analysis of this criterion is focused on relevant short-term impacts from the IRA until the PRAOs are achieved.

5.6 Implementability

The technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation are evaluated under this criterion. The ease or difficulty of implementing each alternative will be assessed by considering the following factors detailed in **Exhibit 5-2.**

Exhibit 5-2. Implementability Factors to be Considered During Alternative Evaluation

Waiver	Description
Technical feasibility	• Technical difficulties and unknowns associated with the construction and operation of a technology • Reliability of the technology, focusing on technical problems that will lead to schedule delays • Ease of undertaking additional remedial actions, including what, if any, future remedial actions would be needed and the difficulty to implement additional remedial actions • Ability to monitor the effectiveness of the remedy, including an evaluation of risks of exposure if monitoring is insufficient to detect a system failure
Administrative feasibility	• Activities needed to coordinate with other offices and agencies, and the ability and time required to obtain any necessary approvals and permits from other agencies (for off-site actions)
Availability of services and materials	• Availability of adequate off-site treatment, storage capacity, and disposal capacity and services • Availability of necessary equipment and specialists, and provisions to ensure any necessary additional resources • Availability of services and materials, plus the potential for obtaining competitive bids, which is particularly important for innovative technologies • Availability of prospective technologies

5.7 Cost

Types of costs that are assessed during detailed analysis of each retained alternative include the following:

- Capital costs
- Annual O&M costs
- Periodic costs
- Present value of capital and annual O&M costs

Cost estimates are developed according to EPA's guidance on developing and documenting FS cost estimates (EPA 2000). Flexibility is incorporated into each alternative for the location of remedial facilities, the selection of cleanup levels, and the period in which remedial action will be completed. Assumptions of the project scope and duration are defined for each alternative to provide cost estimates for the various remedial alternatives. Important assumptions specific to each alternative are summarized in the description of the alternative. The detailed cost estimates in **Appendix E** provide additional assumptions.

The levels of detail employed in making these estimates are conceptual, but they are considered appropriate for making choices between alternatives; however, they are not meant to be design-level estimates used for budgeting purposes or Superfund settlements. The information provided in the cost estimate is based on the best available information regarding the anticipated scope of the remedial alternatives. The costs are typically evaluated with respect to the following three cost categories:

- Capital costs are expenditures required to construct a remedial action. They are exclusive of costs required to operate or maintain the action throughout its lifetime. Capital costs consist primarily of expenditures initially incurred to build or install the remedial action. Capital costs include all labor, equipment, and material costs (including contractor markups such as overhead and profit) associated with activities such as mobilization/demobilization, site work, installation of reactive caps, and transportation and disposal of wastes. Capital costs also include expenditures for professional/technical services necessary to support design and construction of the remedial action.
- Alternative-specific capital costs include all anticipated activities for implementation of the remedial alternative, exclusive of monitoring and maintenance.
- Annual O&M costs are necessary to ensure or verify the continued effectiveness of a remedial action. These costs are estimated mostly on an annual basis. Annual O&M costs include all labor, equipment, and material costs (including contractor markups such as overhead and profit) associated with activities such as monitoring of reactive caps. Annual O&M costs also include expenditures for professional/technical services necessary to support O&M activities.
- Annual O&M costs include all anticipated annual activities for alternative-specific post-construction monitoring, such as reactive cap and performance monitoring to evaluate the effectiveness of the remedial alternative, and inspection of remedial areas and covers. Sitewide annual activities that are performed irrespective of the alternative are excluded from cost analysis.

- Periodic costs are costs that occur only once every few years (e.g., 5-year site reviews and equipment replacement) or expenditures that occur only once during the entire O&M period or remedial time frame (e.g., site closeout and remedy failure/replacement). These costs may be either capital or O&M costs, but because of their periodic nature, it is more practical to consider them separately from other capital or O&M costs in the estimating process.
- Periodic O&M costs include all anticipated periodic activities for alternative-specific, post-construction maintenance, such as maintenance of ICs. Periodic activities that are performed irrespective of the alternative (such as 5-year reviews) are excluded from cost analysis.

The present value of each alternative provides the basis for the cost comparison. The present value cost represents the amount of money that, if invested in the initial year of the remedial action at a given rate, would provide the funds required to make future payments to cover all costs associated with the remedial action over its planned life. Future O&M and periodic costs are included and discounted (reduced) by the appropriate present value discount rate over the period of analysis selected for each alternative. Per guidance, inflation and depreciation are not considered in preparing the present value costs.

As discussed in *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (EPA 2000), the real discount (interest) rate of 7% should be used to calculate present value costs for all nonfederal facility sites, including this Site. A 7% real discount rate was used to develop present value costs for each retained remedial alternative.

The period of analysis is the period of time over which present value is calculated. In general, the period of analysis should be equivalent to the project duration, resulting in a complete life cycle cost estimate for implementing the remedial alternative. The project duration generally begins with the planning, design, and construction of the remedial alternative, continues through short- and long-term post-construction, and ends with project completion and closeout.

For this FFS, the period of analysis is meant to cover the construction costs of alternative implementation and the post-construction costs necessary to maintain protectiveness of the IRA until a comprehensive remedial decision is made for the Site. The assumed period of analysis covering these activities for this FFS, and used to develop estimates of present value costs for each alternative, is 20 years. The guidance indicates that site-specific justification should be provided when the project duration exceeds the selected period of present value analysis. **Section 6** provides those justifications.

A ”no-discounting” scenario is also included for the present value analysis of each alternative, as recommended by the guidance for long-term projects (e.g., project duration exceeding 30 years). A non-discounted constant dollar cash flow over time demonstrates the impact of a discount rate on the total present value cost and the relative amounts of future annual expenditures. Non-discounted constant dollar costs are presented for comparison purposes only and should not be used in place of present value costs in the Superfund remedy selection process.

5.8 State (Support Agency) Acceptance

State (support agency) acceptance is a modifying criterion under the NCP. This criterion evaluates the technical and administrative issues and concerns of the State of New York, represented by NYSDEC, may

have regarding each of the alternatives. State acceptance is typically considered following the review of this document and the proposed plan, and it is formally documented as part of the ROD. As a result, no assessment or estimate of the State of New York's acceptance will be made in this FFS.

5.9 Community Acceptance

Community acceptance is also a modifying criterion under the NCP. Assessment of community acceptance will include responses to questions any interested person in the community may have regarding any component of the remedial alternatives presented in the proposed plan. Assessment of concerns from the public will be completed after comments on the FFS and proposed plan are received by EPA and addressed in the ROD. Thus, community acceptance is not evaluated in the detailed analysis of alternatives presented in this FFS.

5.10 Criteria Priorities

The nine NCP alternative evaluation criteria are separated into three groups to establish priority among these criteria during detailed evaluation of the remedial alternatives, as detailed in **Exhibit 5-3**.

Exhibit 5-3. Criteria Priorities

Group	Criteria	Definition
Threshold criteria	Overall protection of human health and the environment Compliance with ARARs	Criteria that must be satisfied for remedial alternative to be selected as the preferred remedy.
Balancing criteria	Long-term effectiveness and permanence Reduction of toxicity, mobility, or volume through treatment Short-term effectiveness Implementability Cost	Technical criteria that are evaluated among those alternatives that satisfy the threshold criteria.
Modifying criteria	State (support agency) acceptance Community acceptance	Not evaluated in this FFS. This is evaluated after comments are received on the FFS and proposed plan.

6.0 Detailed Analysis of Retained Alternatives

This section presents the development and detailed analysis of the remedial alternatives. Remedial alternatives are assembled by combining the remedial technologies and process options presented in **Section 4**. Remedial alternatives are developed from either stand-alone process options or combinations of the retained process options. Remedial alternatives were developed in accordance with CERCLA, the NCP (40 CFR Section 300.430), and EPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA 1988).

EPA's RI/FS guidance indicates that remedial alternatives are typically developed using remedial technologies and process options retained from a two-step screening process and are identified to span a range of GRA approaches to provide protection of human health and the environment. The assembled remedial alternatives are then screened using the effectiveness, implementability, and cost criteria after development. Only those remedial alternatives not eliminated during the alternative screening process are retained for further detailed analysis.

For this FFS, EPA determined the alternative screening step suggested for a comprehensive FS is not needed. EPA indicated this FFS should perform the two-step remedial technology/process option screening and then evaluate a limited number of remedial alternatives to address contaminated sediments and streambank soils in Wappinger Creek.

During detailed analysis, each remedial alternative is evaluated using the nine NCP alternative evaluation criteria, which include the two threshold criteria, five primary balancing criteria, and two modifying criteria. **Section 5** presents the criteria and their definitions. The evaluation tables in **Appendix C** and **Appendix E** provide individual detailed analysis for each remedial alternative. The results of the individual detailed analysis for each remedial alternative are then arranged to perform a comparative analysis of the alternatives and identify the key trade-offs between them, as presented in **Section 7**. The two modifying criteria, which are also NCP alternative evaluation criteria, are not analyzed in this FFS because of the rationale presented in **Appendix C**.

6.1 Identification of Remedial Alternatives for Detailed Analysis

Remedial alternatives were assembled by combining remedial technologies and representative process options for them retained from the technology/process option screening process. **Table 6-1** provides a matrix that specifies how the retained remedial technologies and representative process options identified in **Section 4** were combined to create the remedial alternatives for this FFS. Alternatives were developed with at least one representative process option in each remedial technology that was retained after the technology screening. During alternative development for the detailed analysis, representative process options were identified for each alternative. However, identification of a representative process option in development of the remedial alternatives for FFS evaluations does not preclude use of alternate retained process option(s) within a GRA to be considered if a remedial alternative is selected as the remedy for the IRA. Process option(s) ultimately incorporated into a selected remedy may be altered during remedial design or after additional data collection is conducted during a PDI.

The remedial alternatives span a range of categories defined by the NCP, including:

- No Action alternative
- Alternatives that involve little or no treatment but provide protection through prevention or control of exposure through actions, such as removal, containment, and engineering controls (e.g., access controls) and, as necessary, ICs
- Alternatives that remove or destroy contaminants to the maximum extent feasible, eliminating or minimizing long-term management
- Alternatives that include innovative treatment technologies/materials

The remedial alternatives developed for this FFS include:

- Alternative 1 – No Action
- Alternative 2 – Dredge to Depth of 1 Foot; Capping of Underlying Contamination
- Alternative 3 – Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination
- Alternative 4 – Dredge to Remove Any RAL Exceedance; Backfill to Grade in the Dredge Footprint

6.2 Alternative Scope Assumptions, Limitations, and Uncertainties

6.2.1 Contaminants of Concern

As presented in **Section 2**, owing to the complex behavior, distribution, and toxicity of THg, it has been identified as the key COC at the Site. THg was used during the screening of remedial technologies and process options, and it was used to define the extent of the remediation zone for this IRA as described in **Section 3.6**.

6.2.2 Regulatory Floodway

All remedial alternatives are expected to disturb contaminated sediments in the Regulatory Floodway defined by the Federal Emergency Management Agency (FEMA). However, based on expected changes in grades relative to remediation of contaminated sediments in the FEMA-defined Regulatory Floodway, the remedial alternatives proposed in this FFS are not expected to change the overall capacity of the floodplain. For this FFS, it is assumed that whenever materials are placed or backfilled in the Regulatory Floodway, the final surface will not be above the original pre-remediation surface. For alternatives that involve placement of residual layers or reactive caps, it is assumed that the depth of those components would be equal to or less than the dredge depth that preceded the placement of those components. Therefore, it is anticipated that none of the alternatives will negatively impact the overall capacity of the floodplain.

6.2.3 Streambank Soils

There are uncertainties and data associated with THg contamination of streambank soils that have the potential to have elevated risks and contribute to recontamination of the creek. As discussed in

Section 3.6.3.3, based on the RI data, assumptions were made to estimate the remedial extent of the streambank soils. For this FFS, it is assumed that a 0.5 foot depth and 10% of the length of the creek within the remedial extents would have streambank soils that would be addressed by the alternatives, and the streambank soils will be addressed collectively with contaminated sediment. It is anticipated that the PDI would collect additional data to refine the extent of streambank soils to be addressed.

6.2.4 Wetlands

All remedial alternatives would most likely disturb contaminated sediments in wetlands. In 2022, NY passed the legislative amendment to New York's Freshwater Wetland Act (Article 24 of the Environmental Conservation Law) (New York 2022). NYSDEC's regulatory protections of freshwater wetlands are no longer limited to wetlands depicted on the NYS Freshwater Wetlands Map. In addition to the wetlands shown on the National Wetlands Inventory maps from USFWS (**Figure 2-2**), a field delineation of the wetlands will need to be performed to determine the extent of actual wetland areas and types. Disturbance during remediation is considered temporary, and no permanent wetland loss is anticipated. For example, excavation activities within delineated wetlands are considered temporary disturbance, as these areas would be reclaimed and mitigated as wetlands following excavation. The subaqueous and intertidal capping areas should experience the same water inundations and would be expected to repopulate with submerged aquatic vegetation and emergent vegetation. Each of the alternatives would cause varying levels of wetland disturbance. However, as part of site reclamation, it is assumed that each of the alternatives will include wetland mitigation in an area equivalent to the area of wetland disturbed by the remedial action, ensuring there would be no net change in overall acreage of wetlands. If reduction of wetlands is unavoidable, a third-party compensatory mitigation option would be considered to the extent necessary to meet ARARs.

6.2.5 Access Constraint Assumptions

Access constraints between Hudson River and Wappinger Creek require that all equipment mobilization and waste transportation and disposal be via land-based transportation methods. For this FFS, it is assumed that wastes will be transported off-site by truck. Barging is likely not a viable off-site transportation option at the Site owing to the fixed railroad bridge at the confluence of Wappinger Creek to the Hudson River. The railroad bridge carries the Metro-North Railroad's Hudson Line. Metro-North Railroad is a subsidiary of the Metropolitan Transportation Authority. Additionally, there are three other bridges across Wappinger Creek that present access constraints, including the New Hamburg Road bridge and two bridges in the Industrial Park. The bridges in the industrial area reduce access of the creek upstream of the industrial area.

There are real and potential upland landownership and access constraints along the creek, particularly on the northern side of the creek, where the uplands are fairly steep, lack current road access to the creek, and have various types of land ownership, including nonprofit and private ownership. There are additional access considerations for the embayment area. The shallow water in this area makes it difficult for barge access. The land north of the embayment area, which is owned by the Audubon Society, likely inhibits land access through the uplands on that side of the creek. Additionally, tidal swings will further constrain water vessel access to shallow areas during low tide. Because of these access constraints, all equipment for dredging or in-water transport likely needs to be transported to the Site via truck. This restriction likely limits the types of dredging that can be implemented. It also may

require the use of smaller equipment (e.g., smaller hopper barges) or equipment that can be mobilized in sections (e.g., portable interlocking modular barges).

For this FFS, it is assumed that all sediment management will occur on-site and will be exempt from permits under CERCLA, as described in **Section 3.3.4**. While no Federal, State, or local permits are required, any substantive requirements of these permits will be met. Implementation of the alternatives that follow requires (1) an access point to the creek for mobilizing and demobilizing in-water equipment, (2) an area for off-loading sediments, and (3) an area for processing sediment prior to off-site transport and disposal. Based on the topography and existing infrastructure (including residential, industrial, and governmental buildings and roads), there are limitations to available areas to conduct these activities. It is assumed that there are several areas directly next to the creek that could be considered for access and off-loading areas. In addition, open areas that are a short distance from the creek could be considered as a secondary processing area for sediment management and staging equipment and/or materials. The Wappinger Creek boat launch on Market Street (County Road 91) in Wappingers Falls is available as a potential option for mobilization of materials and equipment into and out of the creek. However, it may need to be renovated to accommodate the size of the barges, vessels, and equipment that will need to be mobilized for the alternatives described in this FFS. The village of Wappingers Falls owns the boat launch and public works area. The exact location of the staging area will be determined during the RD; however, the FFS describes these potential on-site options for costing purposes.

6.2.6 Period of Analysis for All Remedial Alternatives

All remedial alternatives result in some level of contamination being left in place; therefore, they are expected to require an indefinite duration of O&M at a minimum until a final site remedy is selected. This is because contamination left in place could have contaminant concentrations that would not allow for unlimited use/unrestricted exposure (UU/UE) under the current and potential future land uses. Remedial components, such as caps, likely would require an indefinite duration of O&M. However, for this FFS, the period of analysis for all alternatives is assumed to be 20 years post-construction. The FFS assumption is that after this period, results of 5-year reviews for the IRA components would inform final remedy decisions that integrate these components.

6.2.7 Contaminated Sediment Characterization and Disposal Assumptions

Without Toxicity Characteristic Leaching Procedure (TCLP) data for contaminated sediment characterization, the “Rule of 20” can be used to estimate the volume of dredged sediment anticipated to fail TCLP (EPA 1999b). A preliminary hazardous waste evaluation was conducted as part of this FFS to determine whether sediment concentrations at the site could potentially fail the Resource Conservation and Recovery Act (RCRA) TCLP criteria and therefore potentially be characterized as hazardous waste. This preliminary evaluation is based solely on available sediment chemical data using the “Rule of 20.” The evaluation indicated that chromium, lead, and mercury (RCRA Characteristic Waste Codes D007, D008, and D009, respectively) are anticipated to be the only chemicals to potentially trigger hazardous waste characterization. This evaluation also indicated that approximately 45% of contaminated sediment generated as part of this remedial action could pass the TCLP criteria and be classified as nonhazardous solid waste; the other 55% of contaminated sediment generated as part of this remedial action could fail the RCRA TCLP criteria and be characterized as RCRA characteristic hazardous waste.

A preliminary Toxic Substances Control Act (TSCA) waste evaluation was also conducted as part of this FFS to determine whether sediment PCB Aroclor concentrations at the site could potentially exceed the TSCA limit (50 mg/kg) and therefore potentially be characterized as TSCA waste. This preliminary evaluation is based solely on available sediment PCB Aroclor data from the RI in the upper portion of the creek. PCB Aroclor concentrations were primarily detected in the shallow (0 to 0.5 ft below the mudline [bml]) sediments and ranged from 0.0043 mg/kg to 0.36 mg/kg. This preliminary evaluation suggests that it is unlikely that the contaminated sediment generated as part of this remedial action will be classified as TSCA waste. Additional data collected as part of the PDI will confirm these assumptions.

6.2.8 Remedial Activities Sequencing and Support Assumptions

The remedial activities will take place in a sequential manner. Dredging and debris removal activities would take place prior to capping/backfilling operations to minimize the potential for recontamination.

Each alternative would require construction of support facilities and connections to utilities during implementation of the remedy.

6.3 Detailed Component Descriptions of Remedial Alternatives

6.3.1 Common Elements of Alternatives

The sections that follow summarize major elements that will be included in every remedial alternative except Alternative 1. Additional common elements may be identified and refined in the draft FFS.

6.3.1.1 Dredging

Each of the active remedial alternatives includes various amounts of dredging that will reduce the volume of contaminated sediment in Wappinger Creek. Dredging depths are specific to each alternative and are described in **Section 6.3.2**. Dredging of sediments could be implemented through various methods, including mechanical dredging methods (e.g., barge-mounted excavators, amphibious excavators, excavators staged along the riverbank) or hydraulic dredging methods. The methodology for dredging and in-water transport of contaminated sediment would be further evaluated and determined during RD. For this FFS, it is assumed that dredging will be performed by barge-mounted long-reach excavators.

Because of the shallow water in some areas, such as the embayment area and shoals during low tide, access is likely to be more difficult. For this FFS, it is assumed that access channels will need to be dredged into the embayment area and other shallow areas, as necessary, to allow access for the barge-mounted long-reach excavators and small hopper barges to operate during both high and low tide. Dredged sediments will be loaded onto hopper barges and transported to a shoreline off-loading area for management. Dredge spoils from dredging access channels are assumed to be contaminated and will be managed as waste.

Turbidity would be mitigated in the creek around the active excavation area to control the transport of sediment into the water body away from the active dredging area. Best management practices (BMPs), such as silt curtains could be used. Silt curtains would need to be compatible with and managed both for current velocities and for shallow deployment areas that are exposed at low tide, ensuring that silt releases associated with the water moving in and out of these shallow locations during sediment

removal can be mitigated. Alternative turbidity control measures (e.g., sheet pile walls) could be considered during design.

6.3.1.2 Excavation of Streambanks Soils

Each of the active remedial alternatives includes various amounts of excavation of streambank soils that will reduce the volume of contaminated streambank soils in Wappinger Creek. Excavation depths are specified to a maximum depth of 0.5 feet, with an estimate of 10% of the streambank length and a width of 50 feet. for each alternative. Excavation of streambank soils could be implemented through various mechanical dredging methods (e.g., barge-mounted excavators, amphibious excavators, excavators staged along the riverbank). The methodology for excavating and transporting contaminated streambank soils would be further evaluated and determined during RD. For this FFS, it is assumed that barge-mounted long-reach excavators will perform the excavation.

6.3.1.3 Capping

Alternatives 2 and 3 include placement of reactive caps to control the long-term flux of THg and the resulting potential biotransformation to MeHg. Alternative 4 includes the placement of backfill materials without additional reactive amendment added as Alternative 4 sediments are dredged to the RAL. A sand backfill layer will be placed in lieu of a reactive cap to control residuals and potentially ensure better slope stability of any dredge cuts.

A reactive cap consists of adding specialized or manufactured amendments intermixed with or layered within typical cap aggregate materials at specified amounts. The objectives and the function of the cap in each area are as follows:

- Provide physical separation, physical stabilization, and physical sequestration of contaminants.
- Reduce advective and/or diffusive flux of contaminants from sediment pore water to the surface sediments and/or overlying surface water (i.e., using adsorptive/reactive amendments).

The proposed reactive capping material for the draft FFS would be an agglomerate comprised of a treatment agent like AC, a weighting agent, and an inert binder to be determined during RD (assumed to be a sand material for this FFS). The weighting agent should improve placement of the AC through the water column (e.g., no significant particle density differences between pure AC and sand) and avoid or lessen differences in particle settling rates. This should produce a more homogenous mixture of amendment and sand and result in increased cap performance.

Once bound to the AC, contaminants are effectively sequestered, reducing their bioavailability (e.g., inorganic mercury bioavailability for methylation and MeHg bioavailability to enter the food web) and associated risks. It is assumed that sand and amendment will be mixed at the on-land staging area before loading the material onto hopper barges and transporting the material to the areas in the creek where it will be placed. It is assumed that the capping material will be uniformly mixed and placed using equipment similar to that used for the removal process, and that the cap components using an agglomerate mix would be similar regardless of the cap thickness, with only the amounts of the mix varying. The depth of a reactive cap is specific to each alternative and is described in the sections that follow.

The use of sand in the cap will likely increase pore water conductivity in capped areas as compared to pre-remedy conditions, which may result in deeper penetration of oxygen into the sediment in the inter-tidal areas during low tide. This will potentially allow for capped areas to drain more effectively during low tide periods, bringing oxygen penetration deeper into the sediment bed than what would have likely been observed in the pre-remedy sediments. Considering mercury methylation is associated with the zone just under the aerobic/anerobic boundary, this may in turn induce MeHg production areas deeper into capped sediment relative to native sediment conditions.

For streambank soils, it is assumed that once excavated, capping will only include backfill since there is less potential for underlying contamination to migrate upward to the soil surface via dissolved phase transport. The need for reactive caps or soil cover for the streambank soils will be evaluated during PDI and RD.

The sediment caps were evaluated assuming a 100-year design life. **Appendix D** documents the analyses conducted to develop and evaluate a conceptual estimate for the AC dosage of engineered reactive caps at the Site. It is likely that treatability studies and additional PDI data will be required during RD to determine the most effective cap amendment and dosage, depending on the alternative selected.

A habitat layer is also assumed as a component of the cap design. For Alternatives 2 and 3, the habitat layer will be placed above the reactive cap. While Alternative 4 does not have a reactive cap, a habitat layer will be formed as part of the backfill material placed above the sediments, consistent with Alternatives 2 and 3.

An erosion protection layer to maintain the stability of the reactive cap surface may be required, depending on site conditions in this upper section of the creek. The depositional, erosional, or dynamic equilibrium (i.e., near equally erosional and depositional) extents of the sediment bed are not fully known. An empirical assessment of net sedimentation rates and general erosion/deposition patterns (e.g., using differential bathymetry, geochronology cores) conducted during the PDI and/or site-specific modeling may provide additional data to update the CSM and better understand the erosional, depositional, and/or dynamic equilibrium nature of these areas prior to design.

6.3.1.4 Sediment and Streambank Soil Management, Treatment, and Disposal

Each active alternative includes the management, treatment, and disposal of removed materials. For this FFS, it is assumed that dredged sediment and excavated streambank soils will be off-loaded and managed in an area near the creek. After removal, dewatering will be required to reduce the amount of water in dredged sediment and excavated streambank soils to prepare the contaminated materials for transport and treatment or disposal. Sediment and streambank soils would be transported to the sediment processing area, where it would be drained and conditioned for off-site disposal. The sediment and streambank soils may be mechanically screened to remove coarse material (coarse sand and gravel) and reduce the volume of sediment to be dewatered. Three common categories of dewatering that could be implemented include gravity dewatering, mechanical dewatering, and reagent dewatering.

For this FFS, the primary dewatering mechanism is assumed to be a combination of passive gravity dewatering and reagent dewatering, including the use of dewatering and solidification reagents. Bench-scale testing during the RD phase would be necessary to determine the type of reagent and optimum

reagent mixture prior to remedial construction. It is assumed that wastewater generated during the dewatering process would require treatment to meet discharge standards prior to discharge to Wappinger Creek. The water from the dewatering process is assumed to be treated through an on-site temporary water treatment system prior to discharge. Details regarding the dewatering process and wastewater treatment requirements would be further developed as part of RD.

Following the dewatering process, sediment and streambank soils would then be transported off-site and disposed of in a facility approved for receiving such contaminated materials. The approved facilities must be in compliance with the Off-Site Rule as established in the NCP. The type and location of the disposal facility depend on the nature and concentrations of the waste materials. For this FFS, the disposal options being considered include Subtitle C landfill and Subtitle D landfill. In New York State, they could be hazardous landfill or municipal solid waste landfill, construction and demolition debris landfill or industrial non-hazardous waste landfill depending on the results of waste characterization during remedial action.

Dredge material that meets applicable criteria may be suitable for potential off-site beneficial reuse. These opportunities will be considered during the RD phase.

6.3.1.5 Restoration of Remediated Areas

Each of the active alternatives may require restoration of streambank soils after the remedial action is completed. The excavated areas would be backfilled with clean material and restored to their original grade. Additional data may be collected to support vegetative restoration of remediated areas.

As presented in **Section 6.2.4**, all remedial alternatives would most likely disturb contaminated sediments and streambank soil in wetlands. A field delineation of the wetlands will need to be performed to determine the extent of actual wetland areas and types. Additional data collection may also be necessary to support habitat restoration of remediated areas. Disturbance during remediation is considered temporary, and no permanent wetland loss is anticipated. It is assumed that each of the alternatives will include wetland mitigation in an area equivalent to the area of wetland disturbed by the remedial action, ensuring there would be no net change in overall acreage of wetlands. If reduction of wetlands is unavoidable, a third-party compensatory mitigation option would be considered to the extent necessary to meet ARARs.

6.3.1.6 Evaluation Monitoring

A robust evaluation monitoring program will be developed that includes baseline monitoring, construction-phase monitoring, and performance evaluation monitoring.

Baseline monitoring: Baseline monitoring will be undertaken prior to implementation of the IRA to establish the baseline environmental conditions against which progress toward achieving RAOs will be measured. A monitoring plan that will determine the specifics of the baseline monitoring program will be developed as part of the RD. A component of this monitoring program will include fish tissue sampling, which will be collected prior to IRA construction as part of baseline characterization and following construction as part of post-construction and performance monitoring.

Construction-phase monitoring: Construction-phase monitoring will be conducted to evaluate environmental conditions during remedy construction. This monitoring may include water quality and turbidity monitoring, monitoring impacts to local biota, and other BMPs. The monitoring would also include data to verify that the remedy implementation is being done in accordance with the RD and specifications.

Performance evaluation monitoring: Performance monitoring will likely include both physical and chemical monitoring and will assess both the performance of the remedy and the impact on the remedy's protectiveness from ongoing sources post-implementation. Goals of the monitoring will be to confirm the achievement of RAOs and to evaluate the permanence of the caps to confirm if they are adequate and reliable long term. The details of the monitoring will be developed as part of the performance monitoring plan, including the monitoring media and methods, frequency, locations, spatial density, and triggers/metrics for taking any additional action. The monitoring is anticipated to include bathymetric surveys, cap inspection (where applicable), and verification sampling. Sampling will likely include both biotic and abiotic media, and pore water and sediments. Maintenance of the caps will also be included to account for any potential impacts (i.e., physical damage, movement), and the caps will be monitored in three dimensions. Data from these monitoring efforts will also be used to update the CSM.

6.3.1.7 Pre-Design Investigation and Additional Data Collection

Prior to implementing the RD, a robust PDI will be conducted to fill the data gaps for the RD of the alternative. In addition, data collection for several uncertainties, identified in **Section 2.9,** will also be collected at this time. Data needs will vary by alternative but could include:

- Chemical data at increased spatial density and more frequent discrete sample depth intervals to define vertical and horizontal extents of contaminant distributions to revise the sediment and streambank soil removal boundary
- Pore water, groundwater, and sediment seepage velocity data to refine cap designs and site-specific partition coefficients
- Geotechnical data to support dredge design, cap design, and shoreline stability evaluation
- Debris survey and characterization to support sediment management (i.e., sediment handling and dewatering)
- Additional waste characterization data to support decisions on disposal options
- Flow data, flood rise impacts, and climate data to support cap design, erosion control/armor stone, habitat layer necessity, and bank protection
- Bathymetric survey to evaluate erosion/sedimentation
- Hydrodynamics modeling to inform the RD process and ultimately further characterize the Hudson River's role in contributing to Site impacts and refine the understanding of sediment resuspension processes occurring at the Site
- Surface water data to evaluate suspended solids in surface water samples

- Storm drain discharges to the creek to evaluate potential contaminant contribution from these sources
- Treatability studies to determine the most effective reactive capping amendment and dosage
- Refine cap modeling approaches to:
  - Evaluate multiple caps of varying thickness, amendment(s), and amendment(s) dosage(s) based on subarea Site characteristics
  - Evaluate PDI data to determine whether localized areas of significantly elevated contaminant concentrations exist and can be addressed separately from other portions of the Site
  - Evaluate cap constructability (i.e., fully homogenized sand/AC mixture versus a cap with distinct layers of sand and AC resulting from particle density-induced settling differences during cap material placement)
  - Evaluate efficacy of a sand backfill layer/soil cover in lieu of a reactive cap
- Trace-level pore water and surface water sampling to evaluate partitioning between the solid phase and liquid phase for THg and MeHg
- Periphyton sampling to evaluate periphyton growth (a potentially significant mercury sink and methylator) on the hanging roots in the water chestnut area
- Fish tissue sampling, including top trophic-level species (e.g., largemouth and smallmouth bass), which are critical for evaluating biomagnification of MeHg end points in the food web
- Freshwater mussel surveys, submerged aquatic vegetation surveys, and other vegetative surveys needed to restore the remediated streambank and wetland adjacent area.
- Pre-construction surveys, including bathymetric surveys, cultural resources surveys, habitat surveys, noxious weed surveys, wetland delineations, and other surveys as identified in **Appendix A** for compliance with potential ARARs, would be conducted, as necessary, prior to implementing a remedial alternative. To the extent possible, existing surveys from previous investigations would be used.

6.3.1.8 Institutional Controls

Since contaminated sediment exceeding the RALs may remain in the creek, ICs would be developed to protect the receptors to Wappinger Creek. ICs would involve administrative and legal measures (i.e., legal controls) and/or informational measures (e.g., risk communication programs) intended to inform activities within the creek that could pose unacceptable risks to human health and the environment. Current IC measures at the Site include an existing fish advisory, maintained by New York State Department of Health, which is a common element for all alternatives. Additional ICs may include educational programs or notification programs, such as additional environmental and health advisories. For areas where caps are implemented, waterway use, signage, or regulated navigation and land use restrictions would likely be implemented pursuant to ICs to prevent damage to the cap (e.g., no anchoring). The specific categories and types of IC instruments to be used would be determined during RD.

6.3.1.9 Five-Year Reviews

The CERCLA process generally requires 5-year reviews when hazardous substances remain on-site above levels that permit UU/UE. While this statutory requirement is independent of, and thus not an element of, any remedial alterative considered, this review would occur at this Site under all the alternatives. Because the scope of this IRA is focused on the upper portion of the Site, where THg concentrations in sediments and streambank soils exceed an interim action level, it is anticipated that none of the alternatives will result in UU/UE. Therefore, it is assumed that 5-year reviews are a common element of all alternatives.

6.3.2 Description of Remedial Alternatives

The subsections that follow provide a description specific to each remedial alternative.

6.3.2.1 Alternative 1 – No Action

Under this alternative, no action will be taken. Alternative 1 is required by the NCP to provide an environmental baseline against which impacts of the other remedial alternatives can be compared. This alternative would leave all contaminated sediment and streambank soils in its current state. No action would be taken to prevent human or ecological receptors from being directly exposed to contaminated media that presents unacceptable risks and would not include implementation of any new ICs. Because this alternative would result in contaminants remaining above levels that allow for UU/UE, CERCLA requires that the Site be reviewed at least once every 5 years.

6.3.2.2 Alternative 2 – Dredge to Depth of 1 Foot; Capping of Underlying Contamination

Alternative 2 focuses on targeted removal and in-place containment of contaminated sediments and streambank soils in conjunction with ICs, access controls, and monitoring. Treatment in the form of a reactive cap and ex situ stabilization of contaminated material is not the primary focus of this alternative, but it is a supporting component.

Alternative 2 would consist of removing high levels of THg greater than the RAL in surface sediments within the remedy footprint to a depth of 1 foot (plus an over-excavation thickness of approximately 6 inches for cap construction). A 1-foot removal depth was chosen over a shallower removal depth because of construction implementability and the precision of mechanical dredging operations. As THg-contaminated sediments would remain in much of the underlying undredged sediments, an amended cap (e.g., sand and AC) would be needed to provide a physical barrier to solids-bound THg contamination and reduce dissolved-phase contaminant migration via advection/dispersion/diffusion from these deeper sediments to the post- remedy surface sediment. THg migrating to the post-remedy surface sediment would have the potential to methylate, further supporting the use of an amended cap under current site understanding.

An over-dredging of 6 inches is estimated based on site conditions and cap constructability assumptions and will be refined during RD. The intent of over-dredging is from a constructability consideration because of the precision of mechanical dredging operations, not specifically targeted for mass removal of contaminants. There may be instances where the over-dredge depth will be more or less than 6 inches.

Alternative 2 would:

- Remove a significant amount of THg mass in the sediments.
- Allow for the placement of an amended cap to reduce/eliminate exposure of benthic organisms to THg contamination while not exacerbating flooding along Wappinger Creek.

The subsections that follow present the components of this alternative. **Table 6-2** summarizes the major remedial components for Alternative 2 and the estimated quantities for these components for FFS evaluation purposes. The common elements included in every alternative (**Section 6.3.1**) include details that are specific to each alternative.

Dredging

Under this alternative, it is assumed the entire footprint with RAL exceedance, regardless of exceedance depth, will be dredged to 1 foot bml (**Figure 6-1**), with an approximate 6 inches of over-dredging. **Figure 6-1b** illustrates the number of other site-related contaminants identified from the RI data exceeding the RISCs (see **Section 2.6.2.1**) within the 1-foot bml interval that would be removed during dredging. Dredging will be performed using barge-mounted long-reach excavators.

Streambank Soils Excavation

Under this alternative, excavation of streambank soils will reduce the volume of contaminated streambank soils in Wappinger Creek. Streambank soils will be excavated to a maximum depth of 0.5 feet through similar sediment mechanical dredging methods. For streambank soils, it is assumed that capping will only include backfill because for these soils there is less potential for underlying contamination to migrate upward to the soil surface. The need for reactive caps or soil cover for the streambank soils will be evaluated during PDI and RD.

Capping/Containment

Following dredging, the dredged surface will be capped with a reactive cap. It is assumed that the total thickness of the cap will match the depth of dredge to ensure that the post-remediation surface does not exceed the pre-existing bathymetric surface, and will include the habitat layer and chemical isolation layer (CIL) as presented in Appendix D. If a dredged polygon has no remaining concentrations that exceed the RAL, a residuals control layer will be placed in lieu of a reactive cap in that polygon. Based on the available data for this alternative, it is assumed that all dredge polygons will have a reactive cap. The specific locations and viability (e.g., dredge prism slope stability) of any residuals control layer that is not a component of a backfill or cap to the pre-remediation surface will be determined during the PDI and RD.

Sediment and Streambank Soil Management, Treatment, and Disposal

Disposal processes of dredged sediments and excavated streambank soils apply to this alternative. Dredged contaminated sediment and excavated streambank soils will be loaded onto hopper barges and transported to a central processing area for dewatering/treatment before being transported for off-site disposal. Ex situ treatment of dredged sediments and excavated streambank soils apply to this alternative. Treatment, including stabilization/solidification with amendment, to reduce the moisture content of the material will be performed to meet transport and disposal requirements.

Monitoring and Maintenance

Performance monitoring would be implemented to evaluate remedy performance. Periodic maintenance for this alternative would include physical inspections of the caps, periodic updates of ICs, and maintenance of access controls. This alternative would result in contaminants remaining above levels that allow for UU/UE; therefore, 5-year reviews would be implemented as part of this alternative.

Institutional Controls and Access Controls

ICs will be required since THg concentrations in sediment that do not allow for UU/UE will remain onsite under this alternative and to protect the constructed components. Access controls would consist of physical measures, such as informational signage or waterway access controls.

6.3.2.3 Alternative 3 – Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination

Alternative 3 focuses on removal and in-place containment of contaminated sediments and streambanks in conjunction with ICs, access controls, and monitoring. Treatment in the form of a reactive cap and ex situ stabilization of contaminated material is not the primary focus of this alternative, but it is a supporting component.

Alternative 3 would consist of removing high levels of THg greater than the RAL to a depth of 2 feet within select portions of the proposed remedy footprint and to a removal depth of 1 foot in the remainder of the proposed remedy footprint. As THg-contaminated sediments would remain in the underlying undredged sediments regardless of the additional 1 foot of dredging, an amended cap (e.g., sand and AC) would be needed to provide a physical barrier to solids-bound THg contamination and reduce dissolved-phase contaminant migration via advection/dispersion/diffusion from these deeper sediments to the post- remedy surface sediment. THg migrating to the post-remedy surface sediment would have the potential to methylate, further supporting the use of an amended cap under current site understanding.

In areas where dredging is limited to 1 foot, an over-dredge thickness of 6 inches is estimated based on site conditions and cap constructability assumptions and may be refined during RD. The intent of over-dredging is from a constructability consideration because of the precision of mechanical dredging operations, not specifically targeted for mass removal of contaminants. There may be instances where the over-dredge depth is more or less than 6 inches.

Alternative 3 would:

- Remove more THg mass in the sediments than Alternative 2, take advantage of the open-dredge prism, and remove the newly exposed high-concentration THg sediments (i.e., those high THg concentration sediments that were formerly 1 to 2 feet bml but are now 0 to 1 feet bml after removal of the top foot of sediment).
- Allow for the placement of an amended cap to reduce/eliminate exposure of benthic organisms to THg contamination while not exacerbating flooding along Wappinger Creek.

The subsections that follow present the components of this alternative. **Table 6-2** summarizes the major remedial components for Alternative 3 and the estimated quantities for these components for FFS

evaluation purposes. The common elements included in every alternative (**Section 6.3.1**) include details that are specific to each alternative.

Dredging

Under this alternative, the entire footprint will be dredged to at least 1-foot bml, with an additional 6 inches of over-dredging to facilitate capping. Additionally, dredge polygons with THg concentrations that exceed the RAL in the 1- to 2-foot depth interval bml will also be dredged (**Figure 6-2**). In the case of polygons T6-A, T12-A, T15-C, T16-C, the 0- to 1-foot interval was not dredged as part of Alternative 2 because THg did not exceed the RAL but it will be dredged in order to reach the 1- to 2-foot bml interval. **Figure 6-2b** illustrates the number of other site-related contaminants identified from the RI data exceeding the RISCs (see **Section 2.6.2.1**) within the 1- to 2-foot bml interval that would be removed during dredging. No over-dredging will be completed in the polygons to be dredged from 1 to 2 feet bml. Dredging will be performed using barge-mounted long-reach excavators.

Streambank Soils Excavation

Under this alternative, excavation of streambank soils will reduce the volume of contaminated streambank soils in Wappinger Creek. Streambank soils will be excavated to a maximum depth of 0.5 feet through similar sediment mechanical dredging methods. For streambank soils, it is assumed that capping will only include backfill because for these soils there is less potential for underlying contamination to migrate upward to the soil surface. The need for reactive caps or soil cover for the streambank soils will be evaluated during PDI and RD.

Capping/Containment

Following dredging, the dredged surface will be capped with a reactive cap. It is assumed that the total thickness of the cap will match the depth of dredge to ensure that the post-remediation surface does not exceed the pre-existing bathymetric surface, and will include the habitat layer and CIL layer as presented in Appendix D. While the CIL layer thickness is consistent for Alternatives 2 and 3, additional sand material will be included to match the pre-existing bathymetric surface and will be refined as part of RD.

If a dredged polygon has no remaining concentrations that exceed the RAL, a residuals control layer will be placed in lieu of a reactive cap in that polygon. The specific locations and viability (e.g., dredge prism slope stability) of any residuals control layer that is not a component of a backfill or cap to the pre-remediation surface will be determined during the PDI and RD. For this alternative, based on the available data, it is assumed that all dredge polygons will have a reactive cap.

Sediment and Streambank Soil Management, Treatment, and Disposal

Disposal processes of dredged sediments and excavated streambank soils apply to this alternative. Dredged contaminated sediment and excavated streambank soils will be loaded onto hopper barges and transported to a central processing area for dewatering/treatment before being transported for off-site disposal. Ex situ treatment of dredged sediments and excavated streambank soils apply to this alternative. Treatment, including stabilization/solidification with amendment, to reduce the moisture content of the material will be performed to meet transport and disposal requirements.

Monitoring and Maintenance

Performance monitoring would be implemented to evaluate remedy performance. Periodic maintenance for this alternative would include physical inspections of the caps, periodic updates of ICs, and maintenance of access controls. This alternative would result in contaminants remaining above levels that allow for UU/UE; therefore, 5-year reviews would be implemented as part of this alternative.

Institutional Controls and Access Controls

ICs will be required since THg concentrations in sediment that do not allow for UU/UE will remain onsite under this alternative and to protect the constructed components of this alternative. Access controls would consist of physical measures, such as informational signage or waterway access controls.

6.3.2.4 Alternative 4 – Dredge to Remove Any RAL Exceedance; Backfill to Grade in the Dredge Footprint

Alternative 4 consists of dredging sediments in the horizontal footprint that exceed the RAL and removal of contaminated sediments down to the vertical extent that exceed the RAL within the horizontal footprint, followed by the associated backfill in conjunction with ICs, access controls, and monitoring. Alternative 4 focuses primarily on removal of contaminated sediments. Containment and treatment are not the primary focus of this alternative and this alternative will not require a cap.

The subsections that follow present the key components of this alternative. **Table 6-2** summarizes the major remedial components for Alternative 4 and the estimated quantities for these components for FFS evaluation purposes. The common elements included in every alternative (**Section 6.3.1**) include details that are specific to each alternative.

Dredging

Under this alternative, the vertical extent of sediment with THg concentrations exceeding the RAL in a given polygon will be dredged using barge-mounted long-reach excavators (**Figure 6-3**). In the case of polygons T13-A and T-13B, the 0- to 1-foot and 1- to 2-foot interval were not dredged as part of Alternatives 2 and 3 because THg did not exceed the RAL, but they will be dredged as part of the greater than 2-foot bml interval. **Figure 6-3b** illustrates the number of other site-related contaminants exceeding the RISCs (see **Section 2.6.2.1**) within the 2- to 4-foot bml interval that would be removed during dredging. **Figure 6-3c** illustrates the number of other site-related contaminants exceeding the RISCs greater than 4-foot bml that would be removed during dredging. Because of the deeper dredge depths (up to 5.5 feet bml), variability of dredging depths for polygons, an over-dredging factor of 25% was assumed for this alternative to account for slope stability concerns between adjacent dredge prisms. Over-dredge and slope stability between adjacent polygons having different dredge depths will be further evaluated in the RD.

Streambank Soils Excavation

Under this alternative, excavation of streambank soils will reduce the volume of contaminated streambank soils in Wappinger Creek. Streambank soils will be excavated to a maximum depth of 0.5 feet through similar sediment mechanical dredging methods. For streambank soils, it is assumed that capping will only include backfill because for these soils there is less potential for underlying contamination to migrate upward to the soil surface. The need for reactive caps or soil cover for the streambank soils will be evaluated during PDI and RD.

Backfilling

Capping/containment is not the primary focus of this alternative. A clean backfill will be used to control residuals and/or to better ensure slope stability**.** For this FFS, the thickness of the backfill layer will match the depth of dredge to ensure that the post-remediation surface does not exceed the pre-existing bathymetric surface. The actual depth and stability of the backfill layer will be determined during the PDI and RD.

Sediment and Streambank Soil Management, Treatment, and Disposal

Disposal processes of dredged sediments and excavated streambank soils apply to this alternative. Dredged contaminated sediment and excavated streambank soils will be loaded onto hopper barges and transported to a central processing area for dewatering/treatment before being transported for off-site disposal. Ex situ treatment of dredged sediments and excavated streambank soils apply to this alternative. Treatment, including stabilization/solidification with amendment, to reduce the moisture content of the material will be performed to meet transport and disposal requirements.

Monitoring and Maintenance

Performance monitoring would be implemented to evaluate remedy performance. Periodic maintenance for this alternative would include physical inspections of the residual layer, periodic updates of ICs, and maintenance of access controls. Since this is an IRA, it is assumed that this alternative would result in contaminants remaining above levels that allow for UU/UE; therefore, 5-year reviews would be implemented as part of this alternative.

Institutional Controls and Access Controls

ICs will be needed since THg concentrations in sediment that do not allow for UU/UE will remain onsite under this alternative and to protect the constructed components of this alternative. Access controls would consist of physical measures, such as informational signage or waterway access controls, similar to Alternatives 2 and 3.

6.4 Qualitative Rating System for Detailed Analysis

An alternative analysis is inherently qualitative in nature (except for cost). The threshold and balancing evaluation criteria described in **Section 5** are specified in NCP and CERCLA guidance; however, the degree to which the criteria are weighted against each other is not specified. A determination of how the individual evaluation criteria influence the overall rankings is based on site-specific considerations and requires engineering judgment.

For this FFS, the remedial alternatives are evaluated with threshold criteria and balancing criteria, using the qualitative rating system in **Exhibit 6-1**.

Exhibit 6-1. Legend for Qualitative Rating System

Qualitative Rating System		
Threshold Criteria (Overall Protection of Human Health and the Environment) • Not adequate	**Threshold Criteria (Compliance with ARARs)** • None • Will comply	**Balancing Criteria (Excluding Cost)** • None • Low • Low to moderate

Qualitative Rating System		
• Adequate	• Will comply, but may require a CERCLA ARAR waiver(s)	• Moderate • Moderate to high • High

6.5 Individual Analysis of Alternatives

The remedial alternatives were individually assessed using the two threshold criteria and five balancing criteria, as presented in **Section 5**. The two additional modifying criteria, state (support agency) acceptance and community acceptance, which are also NCP evaluation criteria, were not analyzed for remedial alternatives because of the rationale provided.

The evaluation tables within **Appendix C** present threshold, balancing, and modifying criteria evaluations for each remedial alternative. **Appendix E** presents detailed cost spreadsheets (cost summaries, present value analyses, and cost worksheets) for each alternative**. Table 6-3** summarizes the qualitative ratings for each criterion for each remedial alternative.

7.0 Comparative Analysis of Retained Alternatives

This FFS evaluated four remedial alternatives, including the No Action alternative. These remedial alternatives were presented and individually analyzed against the two threshold criteria and five balancing criteria. The two modifying criteria, which are also NCP alternative evaluation criteria, are not analyzed in this FFS because of the rationale presented in **Section 5**.

Table 6-3 presents the ratings for the detailed analysis of threshold and balancing criteria for each remedial alternative**.** Presentation of this information helps develop a comparative analysis of the alternatives and identify the key trade-offs between them.

The sections that follow discuss the comparative analysis for the remedial alternatives using the threshold and balancing criteria. Only significant comparative differences between alternatives are presented. **Appendix C** and **Appendix E** present the full rationale for the qualitative ratings and costs (determined as part of individual detailed analysis for the remedial alternatives), respectively.

7.1 Overall Protection of Human Health and the Environment

Each alternative is assessed to determine whether it can provide adequate protection of human health and the environment (short and long term) from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the Site.

Of the four remedial alternatives developed and evaluated in this FFS, the No Action alternative (Alternative 1) is the only alternative that would fail to provide adequate protection of human health and the environment in the interim, until a final remedy is selected. It would also not address the PRAOs for the contaminated sediments and streambank soils. Alternative 1 would leave THg-contaminated sediments exceeding the RAL in their current state, resulting in continued contributions to unacceptable exposures to human and ecological receptors. Furthermore, under Alternative 1, contaminated sediments would have the potential to further contribute to contaminant migration in the upper portion of the site and to downstream media (sediments, streambank soils, and surface water). Thus, Alternative 1 was given a rating of not adequate.

Alternatives 2, 3, and 4 were given a rating of adequate because they would provide protection of human health and the environment in the interim until a final remedy is selected by achieving PRAOs 1 through 4. However, the method and certainty for protection of human and ecological receptors varies for each alternative. Alternatives 2 and 3 would both use a similar combination of targeted removal, followed by in-place containment using a reactive cap, ICs, monitoring, and access controls to address PRAOs. However, Alternative 3 would include greater removal (to a depth of 2 feet) compared to Alternative 2 (to a depth of 1 foot).

The actions for Alternatives 2 and 3 would reduce contributions to human exposure (through ingestion of contaminated fish from recreational fishing) and ecological exposure (through dietary exposure and direct contact) to contaminated sediments by reducing concentrations of THg. In addition, Alternative 2 and 3 would reduce migration of mercury from sediments in the upper portion of the site and to

downstream media (sediments, streambank soils, and surface water) through reactive capping of areas above the RAL following targeted removal.

Alternatives 2 and 3 are both adequately protective of human health and the environment for the interim. Alternative 3 would offer slightly greater certainty than Alternative 2 for a number of factors, including additional source removal with deeper excavation of contaminated sediment reducing the volume of untreated material requiring long-term containment, reduction in the long-term flux of THg, and provision of a thicker physical barrier to receptors and erosive forces.

Alternative 4 offers greater certainty that Alternatives 2 and 3 regarding protection of human health and the environment by permanently removing all THg-contaminated sediments in exceedance of the RAL for disposal off-site, providing the greatest reduction of THg mass in the system and addressing both exposure- and migration-related risks. **Appendix C, Table C-1** provides additional details regarding the overall protection of human health and the environment for remedial alternatives.

7.2 Compliance with ARARs

For this criterion, each alternative is evaluated to determine how ARARs identified in **Appendix A** of this document will be met.

Under Alternative 1 (No Action), contaminants would continue to be left in sediment. Because no remedial activities would be conducted, ARARs would not be triggered or pertinent. Thus, this alternative was given a rating of none.

Alternatives 2, 3, and 4 are expected to comply with location- and action-specific ARARs without the need for CERCLA ARAR waivers. An interim measures waiver may be needed for chemical-specific ARARs because this IRA focuses on reducing THg in sediment. While other contaminants may be incidentally addressed, they are not the primary focus and will not be closely monitored. Thus, interim CERCLA ARAR waivers may be invoked for federal or New York State water quality standards for surface water or New York's Remedial Program Soil Cleanup Objectives. These alternatives were given a rating of will comply but may require a CERCLA ARAR waiver(s).

7.2.1 Chemical-Specific ARARs

Federal chemical-specific ARARs for Alternatives 2, 3, and 4 include federal water quality criteria from the Clean Water Act. State chemical-specific ARARs include narrative and numerical standards from New York's Narrative Water Quality Standards and Water Quality Standards for Toxic Substances, and New York's Remedial Program Soil Cleanup Objectives. THg has been identified as the primary risk driver at the Site and is the key contaminant. Other contaminants in sediment include both inorganic compounds (THg, lead, chromium, cyanide, and arsenic) and organic compounds (PAHs, PCBs, BAPs, and pesticides and dioxins/furans TEQ). Lead was the only key inorganic contaminant detected above its screening criteria in surface water samples. In groundwater and pore water, lead, THg, chromium, and VOCs have been detected exceeding screening levels.

Compliance with federal water quality criteria, state water quality standards, and soil cleanup objectives are expected to be similarly achieved with each of the remedial alternatives for the interim remedial action at the Site.

7.2.2 Location-Specific ARARs

Federal location-specific ARARs for Alternatives 2, 3, and 4 include the Floodplain Management Regulations, Protection of Wetlands Regulations, Endangered Species Act, Migratory Bird Treaty Act, National Historic Preservation Act, Archeological and Historic Preservation Act, the Bald and Golden Eagle Protection Act, Fish and Wildlife Coordination Act, Magnuson–Stevens Fishery Conservation and Management Act, Coastal Zone Management along with their implementing regulations.

State ARARs include New York State Environmental Conservation Law (ECL) and New York State Statutes regarding the following location-specific conditions:

- Tidal wetlands
- Freshwater wetlands
- Threatened and endangered species
- Flood control and floodplain management
- Historical and cultural artifacts
- Lands and forests
- Fish and wildlife management
- Coastal erosion hazard areas

These alternatives may affect endangered species, endangered native plants, migratory birds, eagles, and archaeological resources. Consultation with federal agencies, NYSDEC, and other state agencies, such as the State Historic Preservation Office (SHPO), will be conducted to identify the substantive requirements of these ARARs to protect these resources, and steps would be taken to implement measures that ensure compliance with the pertinent ARARs.

These alternatives may also impact water bodies, essential fish habitats, wetlands, floodplains, and floodways. Much of the Site is within the FEMA-designated Special Flood Hazard Area. Wappinger Creek is a floodway per FEMA. Wappinger Creek is listed as a riverine habitat in the National Wetlands Inventory. There are also several freshwater ponds nearby and one location of freshwater forested/shrub wetland. Implementation of BMPs when working in and around wetlands and floodplains and coordination with federal and state agencies will ensure compliance and mitigation of potential impacts on these sensitive areas. Direct take of protected fish, shellfish and wildlife would be avoided; however, if incidental collection, handling, or disturbance of protected wildlife occurs during remedial activities, such actions would be conducted in accordance with variance provisions of ECL § 11-0515 pertaining to propagation and scientific purposes. While the current conceptual locations of remedial action components are not within these sensitive areas, the design may differ from the current conceptual model. Given the presence of these sensitive areas throughout the Site, it is important to consider how these ARARs will be complied with if components of the remedial action result in impacts to these sensitive areas.

7.2.3 Action-Specific ARARs

Federal action-specific ARARs for these alternatives include the Clean Air Act; Clean Water Act (CWA); RCRA; Safe Drinking Water Act; River and Harbors Act; Marine Protection, Research and Sanctuaries Act; and Toxic Substances Control Act (TSCA), along with their implementing regulations. State action-specific ARARs include the New York State ECL, Navigation Law, and their implementing regulations.

Alternatives 2, 3, and 4 include dredging and capping activities that could disturb sediments and lead to erosion during stormwater flow. Erosion and sediment controls would be implemented to protect water quality, maintain a stable creek system, thus complying with New York State ECL and CWA discharge limitations.

Stormwater discharges to surface water bodies identified by the National Wetlands Inventory will be addressed through engineering controls, BMPs, and compliance with the substantive requirements of the NYSDEC permitting program for both point and non-point source discharges, in accordance with the New York State ECL and CWA. In addition, dredging activities will occur in navigable waters used by boats and the public; therefore, compliance with the substantive requirements of the New York State Navigation Law would be addressed during design to ensure the remedial action does not introduce obstructions that impede public access to the navigable waters.

PM and lead generated during dredging and sediment processing will be managed in accordance with New York Air Pollution Control regulations under the New York State ECL and federal Clean Air Act. This will be achieved through the implementation of dust suppression BMPs, engineering controls, erosion control measures, and air monitoring.

Dredged, contaminated sediments will be treated through the dewatering process, then transported off-site and disposed of in a facility approved for receiving contaminated material. Compliance with the New York Solid Waste and Hazardous Waste Management regulations, and federal RCRA and TSCA will be maintained through characterization of sampling and proper management of dredged materials. Point source discharges from dewatering to surface water and coastal zones will be in compliance with pertinent CWA and New York's State Pollutant Discharge Elimination System requirements.

Appendix C, Table C-2 provides additional details regarding compliance with chemical-, location-, and action-specific ARARs for the remedial alternatives.

7.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence evaluations include addressing the results of a remedial action based on the remaining risk at the Site after response objectives have been met.

The No Action alternative (Alternative 1) would not provide long-term effectiveness and permanence, as no remedial activities would be conducted. In addition, no controls would be put in place to limit exposure of human or ecological receptors to unacceptable risks, and contaminants could continue to migrate within the upper portion of the site and to downstream media.

Alternatives 2 and 3 would reduce residual risk from untreated waste and provide long-term effectiveness and permanence through a similar combination of targeted removal and off-site disposal,

containment, ICs, monitoring, and access controls. However, the excavation of contaminated sediments exceeding the RAL for THg would differ between these two alternatives (1-foot bml for Alternative 2 and 2 feet bml for Alternative 3).

Alternatives 2 and 3 rely on in-place containment, through reactive capping, to manage underlying contamination exceeding the THg RAL and reduce the potential for underlying contamination to migrate upward to surface sediment within the upper portion of the site and to downstream media. Under Alternatives 2 and 3, the primary components (targeted removal and reactive capping with an assumed 100-year cap design life) are reliable and effective controls for contaminated sediment and streambank soils. These measures would provide adequate protection by reducing the mass of mercury in the system available to receptors and containing residual contamination, thereby reducing human health and ecological exposures and the migration of mercury through the system.

For Alternatives 2 and 3, a substantial portion of contaminated sediment would remain on-site under the cap; therefore, long-term effectiveness and permanence would be highly dependent on the integrity and design of the cap, periodic inspection, post-construction monitoring and maintenance, and enforcement of ICs to ensure adequate protection in the interim until a final remedy for the Site is selected. If the engineered caps were compromised, contaminated sediment left in place could pose a risk of exposure or migration.

Alternative 3 is expected to offer greater long-term effectiveness and permanence than Alternative 2 because of several factors, including additional source removal through deeper excavation of contaminated sediment reducing the volume of material requiring long-term containment, reduction in the long-term flux of THg, and provision of a thicker physical barrier to erosive forces potentially exposing underlying contaminated sediments. As a result, Alternative 3 is subject to fewer long-term concerns related to potential breach of containment than Alternative 2.

Alternative 4 would provide the highest long-term effectiveness and permanence among the alternatives evaluated, as it would involve removal of contaminated sediment and streambank soils in exceedance of the THg RAL and off-site disposal at a permitted facility. By eliminating the need for long-term containment and minimizing residual risk, Alternative 4 offers the most reliable long-term protection.

Resiliency measures could be implemented as part of these alternatives to minimize damage from extreme weather-related hazards and to enhance long-term reliability of remedial components. At the Site, the primary resiliency concern is the increasing intensity and frequency of storm events, which may lead to higher flooding and flow velocities that could affect remedy components within containment areas. As part of RD, evaluations of system vulnerability, consideration of resilience enhancing measures, and design features that support long-term adaptive capacity could be implemented to the extent practicable. A maintenance and monitoring program would be implemented to confirm the containment system remains effective over time. The maintenance and monitoring program efforts would be more extensive for Alternatives 2 and 3 as they are more reliant on containment for protectiveness.

Based on these considerations, Alternative 1 is rated as none for long-term effectiveness and permanence. Alternative 2 is rated moderate, Alternative 3 is rated moderate to high, and Alternative 4 is rated high for long-term effectiveness and permanence. **Appendix C, Table C-3** provides additional details regarding the long-term effectiveness and permanence for remedial alternatives.

7.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

This criterion assesses the degree to which each remedial alternative employs a treatment technology to permanently and significantly reduce toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by contaminated media at the Site.

The toxicity, mobility, or volume of contaminants would not be reduced through treatment for Alternative 1 because it does not include any remedial activities. Based on these considerations, Alternative 1 is rated as none for reduction of toxicity, mobility, or volume through treatment.

Alternatives 2 through 4 partially meet the statutory preference for treatment as a principal element of the remedial alternative. These alternatives involve ex-situ treatment of dredged sediments (approximately 41,200 loose cubic yards (LCY) for Alternative 2; 51,200 LCY for Alternative 3; and 69,200 LCY for Alternative 4) using stabilization amendments to facilitate transportation for off-site disposal. Dewatering liquids would be treated on-site, with contaminants captured in media such as granular AC, which would be regenerated (a form of treatment) or disposed of (with incidental treatment as needed to meet disposal facility requirements).

In addition to the ex-situ treatment of dredged sediments, sediment exceeding the RAL that remains in place for Alternatives 2 and 3 following the targeted removal would be capped with a reactive cap. While the reactive cap would not directly treat underlying contaminated sediments, it would employ passive treatment to any dissolved-phase contamination moving through the cap layers. The amount of contaminants treated by the cap over time would be difficult to quantify.

Alternatives 3 and 4 would provide a moderate to high reduction in toxicity, mobility, or volume through treatment. The combination of dredging to remove all RAL exceedances, a large volume of treated sediment, and treatment of dewatering liquids under Alternative 4 is expected to result in significant reductions in toxicity and mobility. In contrast, Alternative 3 involves a smaller quantity of dredged sediments and streambank soils that would be treated to facilitate off-site disposal than Alternative 4. However, it does include the addition of a reactive cap to passively treat potential dissolved contaminants in pore water, enhancing long-term contaminant mobility reduction through treatment.

Alternative 2, by comparison, would provide a moderate reduction in toxicity, mobility, or volume through treatment. This alternative includes treatment of sediment via ex situ dewatering and stabilization prior to off-site disposal, and on-site treatment of dewatering liquids. It also includes a reactive cap similar to Alternative 3 for the passive treatment of pore water migration. However, the shallow depth of dredging (1 foot bml) and smaller volume of treated sediment reduces the overall treatment volume and long-term contaminant reduction potential relative to Alternatives 3 and 4. **Appendix C, Table C-4** provides additional details regarding the reduction of toxicity, mobility, or volume through treatment for remedial alternatives.

7.5 Short-Term Effectiveness

This criterion reviews the effects of each alternative during the construction and implementation phase of the remedial action until remedial response objectives are met.

The No Action alternative (Alternative 1) would not provide short-term effectiveness, as no remedial activities would be conducted. Because no construction activities would occur, there would be no short-term risks to workers, the community, or the environment associated with this alternative. As such, Alternative 1 is rated as none for short-term effectiveness.

All other remedial alternatives (Alternatives 2 through 4) would involve construction activities and dredging of contaminated sediment and streambank soils, resulting in temporary impacts to the community, workers, and the surrounding environment. Community impacts for all action alternatives include increased truck traffic, potential nuisance odors and noise, dust generation, and temporary restricted use of Wappinger Creek. These impacts would be most significant under Alternative 4 because of the higher volume of sediment and streambank soils excavation and material transport. Truck traffic, including transport for off-site disposal of wastes and import of material for backfill and capping, under Alternative 2 would involve approximately 4,000 truckloads, compared to approximately 5,300 truckloads under Alternative 3, and 8,200 truckloads under Alternative 4. Careful selection of haul routes, time-of-day restrictions, signage, and flaggers would help mitigate traffic-related safety hazards. Additional mitigation measures would include dust suppression, perimeter air monitoring, and restricting work hours to reduce community disruption.

Risks to workers would be present under Alternatives 2 through 4 owing to the need to excavate, handle, and manage contaminated sediment and streambank soils, some of which may be classified as hazardous waste. Handling mercury-contaminated sediment presents a potential for inhalation and dermal exposure. In terms of volume of contaminated sediments, Alternative 2 would have the lowest risk to workers because it has the smallest excavation depth (1 foot bml). Alternative 3 would increase risk slightly with deeper excavation (up to 2 feet bml), while Alternative 4 would pose the greatest risk owing to deeper excavation of contaminated sediment (up to 5.5 feet bml). Furthermore, exposure to chemical amendments, dewatering reagents, or treatment media from the dewatering process under Alternatives 2 through 4 could present a short-term risk of adverse effects to workers. Proper health and safety protocols—including the use of personal protective equipment, decontamination procedures, and monitoring—would be implemented to minimize worker risk during construction.

Short-term environmental impacts are expected for Alternatives 2 through 4 as a result of in-water dredging and disturbance of contaminated sediment and streambank soils. These impacts include increased turbidity, resuspension of contaminated material, temporary habitat loss, and impacts on aquatic species. Alternative 4, which involves deeper and more extensive sediment removal, would result in greater environmental disturbance compared to Alternatives 2 and 3. Engineering controls such as silt curtains, sheet pile walls, sequencing of dredging/capping activities, and adherence to any in-water work windows would be used to reduce the magnitude of these impacts. Use of heavy equipment and increased truck traffic would also result in short-term air emissions; however, this can be minimized with fuel-efficient and low-emission equipment. Dust generation from disturbed sediments and construction activities would be controlled with dust suppression measures and air monitoring. These

impacts would be most significant under Alternative 4, which involves the most extensive construction effort. Use of resources (i.e., borrow) would result in short-term environmental impacts (i.e., generating borrow material would result in a short-term increase of air emissions from transport and construction equipment as well as dust during transport and placement of borrow material). These impacts would be most significant under Alternative 4, which involves the most extensive dredging and backfill. Impacts could be reduced through segregation of unimpacted coarser fraction for beneficial reuse.

Alternatives 2 through 4 would require the implementation of ICs to limit Site access and protect both the community and ecological receptors during construction. These activities would also temporarily restrict public use of Wappinger Creek for recreation, which could be managed through access barriers and signage. Construction durations vary by alternative: Alternative 2 is estimated to take approximately 2 years to complete, Alternative 3 would require about 2 years, and Alternative 4 is expected to take approximately 3 years because of the larger volume of sediment and streambank soils to be removed and backfilled.

Based on these considerations, Alternatives 2 and 3 are rated moderate for short-term effectiveness owing to lower extent of excavation and disruption, and shorter implementation time. Alternative 4 is rated low to moderate owing to the highest level of construction activity and associated risks to the community, workers, and environment. **Appendix C, Table C-5** provides additional details regarding the short-term effectiveness for remedial alternatives.

7.6 Implementability

The technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation are evaluated under this criterion.

Implementability is not a pertinent criterion for evaluation of the No Action alternative (Alternative 1) because no remedial activities would be undertaken. As such, Alternative 1 is rated as none for implementability. The subsections that follow discuss the implementability for the other remedial alternatives, which are divided into technical feasibility, administrative feasibility, and availability of services and materials.

7.6.1 Technical Feasibility

Alternatives 2, 3, and 4 involve dredging and in-place containment of contaminated sediments and streambank soils in Wappinger Creek using well-established technologies. Construction of reactive caps (Alternatives 2 and 3) and backfilling (Alternative 4) are relatively straightforward.

However, each of these alternatives face similar site-specific technical challenges. These include restricted access for dredging equipment owing to shallow water depths, tidal conditions, fixed bridges with limited clearance, and overhead utilities. Equipment mobilization is complicated by the absence of waterway access from the Hudson River, requiring all machinery to be trucked in and launched via limited shoreline entry points.

Under Alternatives 2 through 4, dredged sediments and streambank soils would need to be dewatered and stabilized prior to off-site disposal. While technologies for dewatering and water treatment are

available and reliable, all alternatives are constrained by limited on-site space for staging, processing, and temporary treatment systems. Establishing access routes for construction equipment and material deliveries would also be difficult owing to spatial limitations.

Storm events and seasonal high flows present a risk of sediment dispersion, erosion of streambank soils, and construction delays. BMPs such as silt fencing and working during dry seasons are necessary for Alternatives 2 through 4. Tidal fluctuations could further complicate scheduling and sediment control.

Alternatives 2 and 3 include the additional step of a reactive cap, while Alternative 4 includes the additional step of backfilling. Both types of activities are technically straightforward. For Alternatives 2 and 3, if it is determined additional dredging is required to remove contaminated sediments in capped areas, then the capping materials would need to be removed prior to additional dredging in those areas. For Alternative 4, if it is determined additional dredging is required to remove contaminated sediments, then a new residuals control layer would need to be applied in those dredged areas. For each of these alternatives, implementation of remedial activities in other areas of the creek not part of this IRA (e.g., areas downstream of the HRL) could be easily implemented; however, care may be needed to avoid disturbing areas from this IRA.

7.6.2 Administrative Feasibility

Each alternative (excluding Alternative 1) would require coordination with multiple regulatory agencies. Coordination with NYSDEC would be needed for dredging within FEMA-designated floodways and for disturbance to wetlands. Coordination with SHPO for any cultural resource surveys and USFWS or state agency for threatened and endangered species would be required. Approvals and permitting for off-site transportation of dredged material must be secured through the New York State Department of Transportation, with possible involvement from other state agencies.

ICs would need to be developed and coordinated with relevant regulatory entities. Additionally, Alternatives 2 through 4 include off-site disposal, which would require approval from permitted facilities meeting EPA's Off-Site rule for the acceptance of contaminated sediment, including hazardous waste where applicable.

7.6.3 Availability of Services and Materials

Containment and dredging technologies (Alternatives 2, 3, and 4) are widely used and supported by an available pool of experienced subcontractors, vendors, and equipment suppliers. Construction specialists experienced in working under constrained access and shallow creek conditions are available and would be needed across all action alternatives. Dewatering and water treatment technologies are readily available in the environmental remediation marketplace.

Certain capping amendments may be proprietary, but functionally equivalent generic alternatives are commercially available. Off-site treatment and disposal facilities for both hazardous and nonhazardous waste—potentially including out-of-state facilities—have sufficient capacity and are expected to accept the full volume of contaminated material generated by these alternatives.

7.6.4 Overall Ratings

Based on these considerations, Alternatives 2 and 3 have a rating of moderate and Alternative 4 has a rating of moderate to high for implementability owing to increased complexity from the more extensive dredging. **Appendix C, Table C-6** provides additional details regarding the implementability for remedial alternatives.

7.7 Cost

Appendix E provides detailed cost spreadsheets (cost summaries, present value analysis, and cost worksheets) for each alternative.

Alternative 1 has no costs associated with it, as no remedial activities would be performed.

Alternatives 2, 3, and 4 were all evaluated over a 20-year period after the base year (Years 0 through 20), using a 7% discount factor. Alternative 2 is expected to be the least expensive remedial alternative, with a present value cost of $77,298,000 over a 20-year period of analysis. Alternative 3 has an estimated present value cost of $98,472,000. Alternative 4 has an estimated present value cost of $88,098,000.

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Tables

Table 4-1
Identification and Technical Implementability Screening of Potentially Viable Remedial Technologies/Process Options
Contaminated Sediment and Streambank Soils
Wappinger Creek Superfund Site, Wappingers Falls, New York

General Response Action	Remedial Technology	Process Option	Description of Option	Screening Comments	Retained
No Action	None	None	No action would be taken. Contaminated media (i.e., sediment and streambank soils) would remain in its existing condition.	Required by the NCP as a baseline for comparison.	Yes
Institutional Controls	Legal Controls	Governmental Controls, Proprietary Controls, and Informational Devices	Disturbance of contaminated media would be controlled through legal instruments. Examples of governmental (state or local) controls include local zoning, permits, codes, or regulations/ordinances. An example of proprietary controls includes the use of environmental easements and deed restrictions. An example of informational devices includes environmental and health advisories such as the existing fish advisory maintained by New York State Department of Health.	This is a potentially implementable process option.	Yes
	Risk Communication Programs	Information and Education Programs	Community information and education programs would be undertaken to enhance awareness of potential hazards and remedies for the site.	This is a potentially implementable process option.	Yes
		Notification Programs	Notification programs would be undertaken to inform the community of potential hazards from contamination at specific locations. Examples of notification programs include environmental and health advisories such as the existing fish advisory maintained by New York State Department of Health.	This is a potentially implementable process option.	Yes
Access Controls	Access Restrictions	Fencing and Posted Warnings	Streambank areas of contaminated media would be separated by fences to control access by human receptors and some (i.e., terrestrial) ecological receptors. Warning signs would be posted to control access by human receptors.	This is a potentially implementable process option.	Yes
Containment	Physical Barriers (Subaqueous Source Controls)	Sand/Earthen Cap	Contaminated media in Wappinger Creek would be covered with a layer of sand/sand and armoring, with sufficient thickness to eliminate surface exposure and provide erosion resistance. Alternatively, a layer of a low-permeability material, such as clay or commercially available materials, could be used to decrease the material's permeability. Consideration must be given to applying heavy material to soft sediment to not release contaminated sediments during application.	This is a potentially implementable process option.	Yes
		Reactive Cap	Contaminated sediment in Wappinger Creek would be covered with a reactive cap composed of specialized or manufactured reactive materials, either mixed with or layered within typical cap aggregate materials at specified amounts. This approach would be combined with in situ treatment technologies, such as solidification/stabilization, chemical oxidation/reduction, or sequestration.	This is a potentially implementable process option.	Yes
Removal, Transport, Disposal	Removal	Mechanical Excavation/Dredging	Contaminated media would be removed using mechanical excavation/dredging methods. Contaminated media would be removed either by mechanically dredging submerged media or by excavating dewatered media.	This is a potentially implementable process option.	Yes
		Hydraulic Dredging	Contaminated sediment would be dredged and removed in slurry form using a pipeline or another hydraulic conveyance system. Requires dewatering using geobags, filter presses, or other similar devices.	This is a potentially implementable process option.	Yes
	Transport	Mechanical Transport (Hauling/Conveying)	Contaminated media would be transported by truck, barge, or another mechanical conveyance method to the transload or disposal location.	This is a potentially implementable process option.	Yes
Removal, Transport, Disposal (Continued)	Transport (Continued)	Hydraulic Transport (Slurry Pumping)	Contaminated sediment would be transported in slurry form using a pipeline or another hydraulic conveyance system to the transload or disposal location. Requires dewatering using geobags, filter presses, or other similar devices.	This is a potentially implementable process option.	Yes
	Upland Disposal	On-Site Disposal at Constructed Upland Repository	Removed contaminated media would be disposed of within the Site at a constructed repository specifically for site-related wastes. The repository would be on-site in an upland area outside the floodplain.	This is a potentially implementable process option.	Yes
		Off-Site Disposal at Existing Commercial Facility	Removed contaminated media would be disposed of at an off-site facility authorized for disposal of contaminated sediment such as a landfill.	This is a potentially implementable process	Yes

Table 4-1
Identification and Technical Implementability Screening of Potentially Viable Remedial Technologies/Process Options
Contaminated Sediment and Streambank Soils
Wappinger Creek Superfund Site, Wappingers Falls, New York

General Response Action	Remedial Technology	Process Option	Description of Option	Screening Comments	Retained
				option.	
	Subaqueous Disposal	Confined Disposal Facility (CDF)	Dredged contaminated media would be placed in a CDF. A CDF may be constructed as an in-water site (i.e., a containment island.) An in-water CDF can be constructed with dikes or other containment structures to contain the contaminated dredged material, isolating it from the surrounding environment. The in-water CDF ultimately converts open water to dry land. A CDF may also be constructed as a nearshore site (i.e., in water with one or more sides next to land). The nearshore CDF converts open water to dry land. In some cases, a nearshore CDF can be integrated with site reuse plans to both reduce environmental risk and simultaneously foster redevelopment.	This is a potentially implementable process option.	Yes
		Confined Aquatic Disposal (CAD)	Dredged contaminated media would be placed in a CAD site. Dredged sediment would be deposited in depressions or excavated pits or placed behind subaqueous lateral berms (at a nearshore location), followed by subaqueous covering or capping. If an engineered cap is used in conjunction with CAD at the disposal site, the potential need for armor in erosive areas must be evaluated, and cap maintenance would be required to ensure long-term chemical isolation of the disposed material. The final grade of a capped CAD cell would be similar to the adjacent subaqueous surface elevation.	This is a potentially implementable process option.	Yes
Treatment	Physical/Chemical Treatment – In Situ	Solidification/Stabilization	Contaminated media would be injected and mixed in situ with a binding agent that produces a solid mass that would reduce or prevent contaminant mobility. This could require drained or dry conditions prior to injection and/or mixing depending on the technology applied. Conventional amendments include cement or pozzolan. Innovative amendments can be added to capture and stabilize multiple species of mercury, including elemental, ionic, and methylmercury.	This is a potentially implementable process option.	Yes
		Electrokinetic Separation	Low-intensity electrical current would be passed between electrodes inserted into contaminated sediment to desorb and mobilize charged chemical species. Positively charged metal ions would migrate toward anodes, where they could be removed from solution using electroplating, ion exchange, precipitation, or pumping water near the electrode. Alternatively, this process can be used to concentrate contaminants prior to excavation.	This is a potentially implementable process option in conjunction with other technologies.	Yes
		Sequestration	Sequestration is an innovative in situ technology that involves the use of remedial agents like activated carbon (e.g., powdered activated carbon and granular activated carbon), organoclays, apatite, and zeolites to reduce the toxicity, bioavailability, and mobility of sediment contaminants. These agents are typically mixed into the sediment surface layer by mechanical means. Materials such as activated carbon are a low-impact system for delivery of remedial agents to the sediment surface. A weighting agent enables the granular material to sink to the surface and release the activated carbon, which is then mixed by bioturbation.	This is a potentially implementable process option.	Yes

Table 4-1
Identification and Technical Implementability Screening of Potentially Viable Remedial Technologies/Process Options
Contaminated Sediment and Streambank Soils
Wappinger Creek Superfund Site, Wappingers Falls, New York

General Response Action	Remedial Technology	Process Option	Description of Option	Screening Comments	Retained
Treatment (Continued)	Physical/Chemical Treatment – In Situ (Continued)	Chemical Reduction/Oxidation (Redox)	An application of chemical oxidants is used to remediate contaminated media. Chemical oxidation typically involves redox reactions that chemically convert hazardous contaminants into nonhazardous or less toxic compounds that are more stable, less mobile, or inert. Reagents can be added to contaminated media to control mercury through oxidation and subsequent adsorption onto the solid phase.	This is a potentially implementable process option.	Yes
	Physical/Chemical Treatment – Ex Situ	Acid Extraction	Acid is applied ex situ to dredged contaminated media to extract contaminants into the liquid phase. The liquid phase is then separated from the sediment and treated.	This is a potentially implementable process option.	Yes
		Sediment (Soil) Washing	Dredged contaminated media would be screened and introduced into a washing process that uses a chemical solution and mechanical agitation to remove surficial contaminants.	This is a potentially implementable process option.	Yes
		Solidification/Stabilization	Contaminated media would be dredged and mixed ex situ with a binding agent to produce a solid mass that would reduce or prevent contaminant mobility. This process would be undertaken if the material is dredged and transported to a repository, and if it is determined that the material is likely to leach contaminants. This could require dewatering of excavated soil. Amendments can be added to capture and stabilize multiple species of mercury, including elemental, ionic, and methylmercury.	This is a potentially implementable process option.	Yes
		Chemical Reduction/Oxidation (Redox)	Reducing/oxidizing agents are used to chemically convert toxic contaminants in excavated waste materials to less toxic compounds that are more stable, less mobile, and/or inert. Commonly used reducing/oxidizing agents are ozone, hydrogen peroxide, hypochlorites, chlorine, and chlorine dioxide. Target contaminant group for chemical redox is generally inorganics. Reagents can be added to contaminated media to control metals through oxidation and subsequent adsorption onto the solid phase.	This is a potentially implementable process option.	Yes
	Biological Treatment – In Situ	Phytoremediation	Contaminants would be removed from contaminated media in situ in the creek using select plant species. For example, transgenic plant species genetically engineered with mercury-detoxifying enzymatic clusters, which cleave the methyl group off methylmercury and reduce inorganic mercury to elemental mercury, respectively, enabling mercury to leave the system as a vapor.	This is a potentially implementable process option.	Yes
		Phytoremediation	Phytoremediation can address the wide range of contaminants present within Wappinger Creek. Contaminants can also be addressed through phytoextraction or rhizofiltration; contaminants inside plant tissues are transformed by plant enzymes (phytotransformation) and/or volatilize into the atmosphere (phytovolatilization); and contaminants in sediment are degraded by microbes in the root zone (rhizoremediation) or incorporated to sediment material (phytostabilization).	This is a potentially implementable process option.	Yes

Table 4-1
Identification and Technical Implementability Screening of Potentially Viable Remedial Technologies/Process Options
Contaminated Sediment and Streambank Soils
Wappinger Creek Superfund Site, Wappingers Falls, New York

General Response Action	Remedial Technology	Process Option	Description of Option	Screening Comments	Retained
Treatment (Continued)	Biological Treatment – In Situ (Continued)	Biologically Mediated Stabilization	Contaminated media would be treated in situ in the creek to grow the native bacteria population that produce calcium carbonate to bind contaminants and inhibit leaching. Nutrients in the form of sugar, protein, and nitrogen are applied to the contaminated media to grow the native bacteria population. The bacteria ingest the nutrients and hydrolyze the urea component in the presence of water to form ammonium and carbonate ions. Nutrients are again applied to the contaminated media, with the addition of calcium chloride. In the presence of calcium ions and nucleation sites (soil particles), the carbonate ions react spontaneously with the calcium ions to form calcium carbonate, the cementing agent used to bind sediment particles together. Microbial-induced calcium carbonate precipitation is a form of biologically mediated stabilization.	This is a potentially implementable process option.	Yes
	Biological Treatment – Ex Situ	Constructed Wetland	Contaminants would be removed from contaminated media ex situ in a constructed wetland using phytoremediation.	This is a potentially implementable process option.	Yes
		Biologically Mediated Stabilization	Contaminated media would be treated ex situ in a constructed wetland to grow the native bacteria population that produce calcium carbonate to bind contaminants and inhibit leaching. Nutrients in the form of sugar, protein, and nitrogen are applied to the contaminated media to grow the native bacteria population. The bacteria ingest the nutrients and hydrolyze the urea component in the presence of water to form ammonium and carbonate ions. Nutrients are again applied to the contaminated media, with the addition of calcium chloride. In the presence of calcium ions and nucleation sites (soil particles), the carbonate ions react spontaneously with the calcium ions to form calcium carbonate, the cementing agent used to bind sediment particles together. Microbial-induced calcium carbonate precipitation is a form of biologically mediated stabilization.	This is a potentially implementable process option.	Yes
	Thermal Treatment – Ex Situ	Vitrification	High-intensity electrical current would be passed between electrodes inserted into contaminated media to cause melting. The melted matrix is then allowed to cool in place into a solid vitrified glass mass that is chemically inert and resistant to leaching.	This is a potentially implementable process option.	Yes
		Thermal Desorption	Excavated contaminated media would be heated ex situ to promote volatilization of contaminants and compost contaminants. The contaminant vapors and ash would then be condensed and treated prior to disposal. This requires dewatering of excavated sediment.	This is a potentially implementable process option.	Yes
		Incineration	Excavated contaminated media would be incinerated. The contaminant vapors would then be condensed and treated prior to disposal. The resulting ash would then be treated prior to disposal. This requires dewatering of excavated sediment.	This is a potentially implementable process option.	Yes

Notes:
1. The screening process for technical implementability involves a qualitative assessment of the degree to which process options address evaluation criteria presented in Section 4.4.
2. Shading indicates remedial technologies/process options have been eliminated from further consideration based on a lack of technical implementability. Remaining (unshaded) remedial technologies/process options have been retained for additional screening in Table 4-2.

Table 4-2
Effectiveness, Implementability, and Relative Cost Screening of Potentially Applicable Remedial Technologies/Process Options
Contaminated Sediment and Streambank Soils
Wappinger Creek Superfund Site, Wappingers Falls, New York

General Response Action	Remedial Technology	Process Option	Description of Option	Effectiveness		Implementability		Relative Cost		Reason(s) for Eliminating the Process Option from Consideration	Applicability to Non-Mercury Contaminants	
								Capital Cost	O&M Cost		Inorganics	Organics
No Action	None	None	No action would be taken. Contaminated media (i.e., sediment and streambank soils) would remain in its existing condition.	None	There is no protection of human or ecological health, and no compliance with ARARs.	None	This approach is easily implemented technically but has low administrative feasibility because it may not be acceptable to regulatory agencies.	None	None	Retained (NCP requirement)	✓	✓
Institutional Controls	Legal Controls	Governmental Controls, Proprietary Controls, and Informational Devices	Disturbance of contaminated media would be controlled through legal instruments. Examples of governmental (state or local) controls include local zoning, permits, codes, or regulations/ordinances. An example of proprietary controls includes the use of environmental easements and deed restrictions. An example of informational devices includes environmental and health advisories such as the existing fish advisory maintained by New York State Department of Health.	Low to Moderate	This approach enhances awareness of potential site hazards and remedies, and restricts future uses of the site that are not protective of human health and the environment, but it does not physically address contamination. Noncompliance with the legal instruments affects protectiveness. Additionally, it is not effective for ecological receptors and does not physically address contamination.	Moderate	This approach is implemented using legal instruments and labor resources. There is potential public resistance to certain types of legal instruments.	Low to Moderate	Low	Retained	✓	✓
Institutional Controls (Continued)	Risk Communication Programs	Information and Education Programs	Community information and education programs would be undertaken to enhance awareness of potential hazards and remedies for the site.	Low to Moderate	This approach protects human receptors by enhancing awareness of potential site hazards and remedies. It is not effective for ecological receptors and does not physically address contamination.	High	This approach is easily implemented using available technical and community involvement labor resources.	Low	Low	Retained	✓	✓
	Risk Communication Programs	Notification Programs	Notification programs would be undertaken to inform the community of potential hazards from contamination at specific locations. Examples of notification programs include environmental and health advisories such as the existing fish advisory maintained by New York State Department of Health.	Low to Moderate	Fish consumption advisories have limited effectiveness. Effectiveness can be enhanced through community outreach and education programs that raise awareness of potential site hazards.	High	This approach is easily implemented using available technical and community involvement labor resources.	Low	Low	Retained	✓	✓
Access Controls	Access Restrictions	Fencing and Posted Warnings	Streambank areas of contaminated media would be separated by fences to control access by human receptors and some (i.e., terrestrial) ecological receptors. Warning signs would be posted to control access by human receptors.	Moderate	This approach protects human receptors by providing warnings and/or restricting access. However, human receptors may choose to ignore access restrictions, particularly where there is access to Wappinger Creek upstream or downstream of fencing. It is not effective for ecological receptors and does not physically address contamination. Fencing may not stay intact within the floodplain of Wappinger Creek during flood events. There are also private properties with access along the creek.	Moderate	Resources are readily available, but they are potentially difficult to install and maintain along some areas of the creek. There is potential public resistance owing to private property. Maintenance is required for long-term protectiveness.	Low	Low	Retained	✓	✓

Table 4-2
Effectiveness, Implementability, and Relative Cost Screening of Potentially Applicable Remedial Technologies/Process Options
Contaminated Sediment and Streambank Soils
Wappinger Creek Superfund Site, Wappingers Falls, New York

General Response Action	Remedial Technology	Process Option	Description of Option	Effectiveness		Implementability		Relative Cost		Reason(s) for Eliminating the Process Option from Consideration	Applicability to Non-Mercury Contaminants	
								Capital Cost	O&M Cost		Inorganics	Organics
Containment	Physical Barriers (Subaqueous Source Controls)	Sand/Earthen Cap	Contaminated media in Wappinger Creek would be covered with a simple layer of sand/sand and armoring (such as riprap), with sufficient thickness to eliminate surface exposure and provide erosion resistance. Alternatively, a simple layer of a low-permeability material, such as clay or commercially available materials, could be used to decrease the material's permeability. Consideration must be given to applying heavy material to soft sediment to not release contaminated sediments during application.	Moderate	Sand, sand and armored, and low-permeability layers protect receptors by eliminating surface exposure of contaminants, but their effectiveness varies based on site conditions. Sand layers are effective for low-solubility contaminants in low-energy environments. Sand combined with armor provides greater durability in high-flow areas and reduces exposure to biota. Sand or sand and armored layers do not affect the chemical transport. Low-permeability caps limit contaminant migration and offer erosion protection, but they may degrade over time owing to development of desiccation cracking or penetration of aquatic organisms and vegetation. Long-term monitoring and maintenance would be required to ensure cap integrity and prevent contaminant resuspension.	Moderate	This approach is implementable using available technical and construction resources. Although, placement can be challenging in locations of permanent pools of surface water. Sand caps are vulnerable to scouring in high-energy flow conditions and require ongoing monitoring and maintenance compared to armored caps that require minimal monitoring and maintenance. Low-permeability caps present challenges in sourcing, mixing, and placing clay/aggregate materials, particularly under saturated conditions.	Moderate	Low	Retained as a viable option for streambank soils	✓	✓
		Reactive Cap	Contaminated sediment in Wappinger Creek would be covered with a reactive cap composed of specialized or manufactured reactive materials, either mixed with or layered within typical cap aggregate materials at specified amounts. This approach would be combined with in situ treatment technologies such as solidification/stabilization, chemical oxidation/reduction, or sequestration.	Moderate to High	Reactive caps protect receptors by isolating contaminated sediments and actively treating contaminants through either chemical or biological processes. These caps include reactive materials, which are designed to adsorb, degrade, or immobilize contaminants. This allows reactive caps to address both particulate-bound and dissolved-phase transport, including desorption and diffusion into the water column. The overall performance depends on appropriate material selection, site-specific geochemical conditions, and proper placement. Long-term monitoring and maintenance will be required to ensure cap integrity and prevent contaminant resuspension.	Moderate	This approach is implementable using available technical and construction resources. Although, placement may be challenging in areas with permanent pools of surface water. While reactive materials are generally accessible and do not require specialized sourcing, transporting and placing them may require additional planning and equipment. Reactive caps require ongoing monitoring maintenance.	Moderate to High	Low to Moderate	Retained	✓	✓

Table 4-2
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General Response Action	Remedial Technology	Process Option	Description of Option	Effectiveness		Implementability		Relative Cost		Reason(s) for Eliminating the Process Option from Consideration	Applicability to Non-Mercury Contaminants	
								Capital Cost	O&M Cost		Inorganics	Organics
Removal, Transport, Disposal	Removal	Mechanical Excavation/Dredging	Contaminated media would be removed using mechanical excavation/dredging methods. Contaminated media would be removed either by mechanically dredging submerged media or by excavating dewatered media.	Moderate to High	This approach protects receptors by eliminating future exposure to contaminated media and migration of contaminants after implementation. It must be combined with containment, transport, disposal, and/or treatment technologies to be protective.	Moderate	This approach is implemented using available construction resources. Variability of the creek bottom and the presence of exposed bedrock may make it difficult to get full coverage of the sediment bottom. Resuspended particles and associated contaminants may be deposited downstream.	Moderate to High	None	Retained	✓	✓
		Hydraulic Dredging	Contaminated sediment would be dredged and removed in slurry form using a pipeline or another hydraulic conveyance system. Requires dewatering using geobags, filter presses, or other similar devices.	Moderate	This approach protects receptors by eliminating future exposure to contaminated sediment and migration of contaminants after implementation. It must be combined with containment, transport, dewatering, disposal, and/or treatment technologies to be protective.	Low to Moderate	This approach is implementable for smaller sizes of sediment. It is not feasible for large cobbles or boulders. The remoteness would make it difficult to get hydraulic dredging equipment onto the reservoir. A large volume of water would be needed to create the slurry. Dewatering of sediments and construction of infrastructure is required for implementation and safeguards to prevent spilling of materials.	Moderate to High	None	Retained	✓	✓
	Transport	Mechanical Transport (Hauling/Conveying)	Contaminated media would be transported by truck, barge, or another mechanical conveyance method to the transload or disposal location.	Moderate	This approach protects receptors by eliminating exposure to contaminated media. It must be combined with removal, containment, disposal, and/or treatment technologies to be effective.	Moderate to High	This approach is implemented using available construction resources and is efficient for all sizes of materials. It has suitable road access or a travel corridor to transport contaminated media off-site to disposal or treatment facilities. Dewatering and water treatment is required prior to transport.	Moderate to High	None	Retained	✓	✓

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								Capital Cost	O&M Cost		Inorganics	Organics
Removal, Transport, Disposal (Continued)	Transport (Continued)	Hydraulic Transport (Slurry Pumping)	Contaminated sediment would be transported in slurry form using a pipeline or another hydraulic conveyance system to the transload or disposal location. Requires dewatering using geobags, filter presses, or other similar devices.	Moderate to High	This approach protects receptors by eliminating exposure to contaminated sediment. It must be combined with removal, containment, disposal, dewatering, and/or treatment technologies to be effective. Treatment of water used for transport would be required.	Low to Moderate	This approach is effective for sediment, gravel, and small particles. It is only useful for disposal and/or treatment actions near dredge sites and energy requirements for pumping affected by elevation changes. A large volume of water would be required to create the slurry. Dewatering and water treatment is required following transport. Construction of infrastructure is required for implementation and safeguards to prevent spilling of materials. It may be suitable for short-term conveyance to barge or another mechanical transport mechanism, but it is not suitable for long distance conveyance.	Moderate to High	None	Retained	✓	✓
	Upland Disposal	On-Site Disposal at Constructed Upland Repository	Removed contaminated media would be disposed of within the Site at a constructed repository specifically for site-related wastes. The repository would be on-site in an upland area outside the floodplain.	Moderate to High	This approach protects receptors by eliminating exposure to contaminated media at the original location and provides containment of contaminated media. It must be combined with removal and transport technologies to be protective.	Low	This approach is implemented using property that has adequate storage space for contaminated media. Acquisition of property or concurrence from landowner on land use would be required. Institutional controls and access controls would also be required. Requires post-construction monitoring and maintenance for long-term protectiveness. There is limited space available near Wappinger Creek for construction of a repository. There is potential for public resistance owing to the proximity to private properties and recreational areas.	Moderate to High	Low	Implementability and cost	✓	✓
		Off-Site Disposal at Existing Commercial Facility	Removed contaminated media would be disposed of at an off-site facility authorized for disposal of contaminated media such as a landfill.	Moderate to High	This approach protects receptors by eliminating exposure to contaminated media at the original location and provides containment of contaminated media within an engineered disposal facility. It must be combined with removal and transport technologies to be protective.	Moderate to High	This approach is implemented using available construction resources. Approval of a landfill disposal facility and treatment at the facility to meet regulations may be required.	High	None	Retained	✓	✓

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Removal, Transport, Disposal (Continued)	Subaqueous Disposal	CDF	Dredged contaminated media would be placed in a CDF. A CDF may be constructed as an in-water site (i.e., a containment island.) An in-water CDF can be constructed with dikes or other containment structures to contain the contaminated dredged material, isolating it from the surrounding environment. The in-water CDF ultimately converts open water to dry land. A CDF may also be constructed as a nearshore site (i.e., in water with one or more sides next to land). The nearshore CDF converts open water to dry land. In some cases, a nearshore CDF can be integrated with site reuse plans to both reduce environmental risk and simultaneously foster redevelopment.	Moderate	This approach protects receptors by eliminating exposure to contaminated media at the original location and provides containment of contaminated media. It must be combined with removal and transport technologies to be protective. It is effective if constructed and maintained properly.	Low	This approach is requires long-term monitoring and maintenance. Flood rise analysis and mitigation is also required. Resource Conservation and Recovery Act (RCRA) regulations exclude dredged material that is subject to the requirements of Section 404 of the Clean Water Act, which would govern disposal of sediment in a disposal area within the navigable Waters of the United States, from the definition of hazardous waste. Waterway impacts, such as disruption of circulation patterns, impact on flooding, need for low-permeability subgrade formation, and avoidance of buried utilities, need to be minimized. In addition, because of the permanent loss of aquatic habitat, extensive mitigation would be required. There are currently no identified areas within the site where this process option could be implemented. Limitations such as the absence of suitable in-water or nearshore containment locations constrain the feasibility of this option.	Moderate	Low to Moderate	Implementability and cost	✓	✓
		CAD	Dredged contaminated media would be placed in a CAD site. Dredged sediment would be deposited in depressions or excavated pits or placed behind subaqueous lateral berms (at a nearshore location), followed by subaqueous covering or capping. If an engineered cap is used in conjunction with CAD at the disposal site, the potential need for armor in erosive areas must be evaluated, and cap maintenance would be required to ensure long-term chemical isolation of the disposed material. The final grade of a capped CAD cell would be similar to the adjacent subaqueous surface elevation.	Low to Moderate	This approach demonstrated effectiveness in aquatic environment, providing effective containment of metals, organics, and PCBs. It can be designed to include habitat enhancement for fish and other aquatic species. CADs must be engineered to withstand bioturbation, advective flux, release of buried COPCs, and propeller and/or high-flow scour. Long-term monitoring, institutional controls, and financial commitment is required.	Low	This approach has high potential for increased releases during disposal. CAD cells may be implemented with solid-phase controls, such as silt curtains or berms, to address concerns with potential sediment transport outside the CAD area during filling events. The need for seasonal capping reduces available capacity. There is potential for additional actions if CAD fails. This approach requires concurrence with the landowner. There are currently no identified areas within the site where this process option could be implemented. Limitations such as the absence of suitable in-water or nearshore containment locations constrain the feasibility of this option.	Moderate	Low to Moderate	Implementability and cost	✓	✓

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Treatment	Physical/Chemical Treatment – In Situ	Solidification/Stabilization	Contaminated media would be injected and mixed in situ with a binding agent that produces a solid mass that would reduce or prevent contaminant mobility. This could require drained or dry conditions prior to injection depending on the technology applied. Conventional amendments include cement or pozzolan. Innovative amendments can be added to capture and stabilize multiple species of mercury, including elemental, ionic, and methylmercury.	Moderate	This approach is effective in reducing the mobility of contaminants by isolating impacted sediments from the water column and reducing the exposure to fish and other biota. It will not affect the toxicity and may increase the volume of contaminants. It has proven effectiveness at reducing contaminant mobility in previous bench-, pilot-, and full-scale studies.	Moderate	This approach is implemented using available construction resources. It may be difficult to obtain and transport large quantities of binding agent and homogenize the binding agent with sediment. Some maintenance for long-term protectiveness is required. Saturated sediment may prevent treatment. Media may require dewatering prior to treatment. Treatability studies may be required to determine the most effective binding agent and mixing conditions for the site.	Moderate	Low to Moderate	Retained	✓	✓
		Electrokinetic Separation	Low-intensity electrical current would be passed between electrodes inserted into contaminated sediment to desorb and mobilize charged chemical species. Positively charged metal ions would migrate toward anodes, where they could be removed from solution using electroplating, ion exchange, precipitation, or pumping water near the electrode. Alternatively, this process can be used to concentrate contaminants prior to dredging.	Low to Moderate	This approach protects surface water by reducing metal concentrations in sediment, thus preventing contaminated sediment from functioning as a potential continuing source. There are limited applications of this technology at the field scale. Most applications are applicable in low-permeability sediments, such as saturated and partially saturated clays and silt-clay mixtures. Although the sediments in the riverbed would remain saturated, the sediment at the site is comprised of unconsolidated sand and gravel sediment that may not be conducive to this technology. A laboratory-scale treatability study and a pilot study is required to determine effectiveness.	Low to Moderate	This approach is considered an innovative technology. It would require purchasing or leasing specialized equipment, which may be limited. In the areas of sediment contamination that would require targeting, in situ electrodes are spread out, which may make implementation more challenging. Additionally, it requires a significant external energy source to apply direct current.	High	Moderate	Implementability and cost	✓	

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Treatment (Continued)	Physical/Chemical Treatment – In Situ (Continued)	Sequestration	Sequestration is an innovative in situ technology that involves the use of remedial agents like activated carbon (e.g., powdered activated carbon and granular activated carbon), organoclays, apatite, and zeolites to reduce the toxicity, bioavailability, and mobility of sediment contaminants. These agents are typically mixed into the sediment surface layer by mechanical means. Materials are a low-impact system for delivery of remedial agents to the sediment surface. It is an agglomerate comprised of a treatment agent like activated carbon, weighting agent, and an inert binder. The weighting agent enables granular material to sink to the surface and release the activated carbon, which is then mixed by bioturbation.	Moderate to High	This approach is limited to organic compounds and some metals. Site-specific studies are required to determine extent of use and effectiveness.	Moderate	This approach has been demonstrated to work best with lower levels of contaminants. It is easily applied in situ and may require armoring in scour areas.	Low to Moderate	Low to Moderate	Retained	✓	✓
		Chemical Reduction/Oxidation (Redox)	An application of chemical oxidants is used to remediate contaminated media. Chemical oxidation typically involves redox reactions that chemically convert hazardous contaminants to nonhazardous or less toxic compounds that are more stable, less mobile, or inert. Reagents can be added to contaminated media to control mercury through oxidation and subsequent adsorption onto the solid phase.	Low to Moderate	The target contaminant group for chemical redox is exclusive to mercury constituents.	Low to Moderate	This approach is easily applied in situ and may require armoring in scour areas. High contaminant concentrations may require large amounts of an oxidizing agent.	Low to Moderate	Low to Moderate	Retained	✓	✓

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Treatment (Continued)	Physical/Chemical Treatment – Ex Situ	Acid Extraction	Acid is applied ex situ to dredged contaminated media to extract contaminants into the liquid phase. The liquid phase is then separated from the sediment and treated.	Moderate to High	This approach protects receptors by removing contaminants from sediment. The contaminants and extraction chemicals would need to be flushed from sediment and treated as a separate waste stream.	Low to Moderate	This approach is implemented using available equipment and construction resources. However, this technology would require additional treatment processes for dredging and transporting sediment, and for treating the aqueous waste stream, which resulted from the extraction of contaminants from sediment. The extent of the areas contaminated along the creek would result in an excessive volume to process.	High	None	Implementability and cost	✓	
		Sediment (Soil) Washing	Dredged contaminated media would be screened and introduced into a washing process that uses a chemical solution and mechanical agitation to remove surficial contaminants.	Moderate to High	This approach protects receptors by removing contaminants associated with sediment. The contaminants and washing solution would need to be treated as a separate waste stream.	Low to Moderate	This approach is implemented using available equipment and construction resources. However, this technology would require additional treatment processes for dredging and transporting sediment, and for treating the aqueous waste stream, which resulted from sediment washing. The extent of the areas contaminated along the creek would result in an excessive volume to process.	High	None	Implementability and cost	✓	✓
		Solidification/Stabilization	Contaminated media would be dredged and mixed ex situ with a binding agent that produces a solid mass that would reduce or prevent contaminant mobility. This would be done if material is dredged and transported to a repository, and if it is determined that the material is likely to leach contaminants. This could require dewatering of dredged sediment. Amendments can be added to capture and stabilize multiple species of mercury, including elemental, ionic, and methylmercury.	Moderate to High	This approach is effective in reducing the mobility and leachability of contaminants. It will not affect the toxicity and may increase the volume of contaminants. It has proven effectiveness at reducing contaminant mobility in previous bench-, pilot-, and full-scale studies.	Moderate	This approach is implemented using available construction resources. It may be difficult to obtain and transport large quantities of binding agent and homogenize the binding agent with sediment. Some maintenance for long-term protectiveness is required. Saturated sediment may require dewatering prior to treatment. Treatability studies may be required to determine the most effective binding agent and mixing conditions for the site. The extent of the areas contaminated along the creek would result in an excessive volume to process.	Moderate to High	Low	Retained	✓	✓

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								Capital Cost	O&M Cost		Inorganics	Organics
		Chemical Reduction/Oxidation (Redox)	Reducing/oxidizing agents are used to chemically convert toxic contaminants in excavated waste materials to less toxic compounds that are more stable, less mobile, and/or inert. Commonly used reducing/oxidizing agents are ozone, hydrogen peroxide, hypochlorites, chlorine, and chlorine dioxide. The target contaminant group for chemical redox is inorganics. Reagents such as MerckLok can be added to contaminated media to control mercury through oxidation and subsequent adsorption onto the solid phase.	Low to Moderate	The target contaminant group for chemical redox is inorganics.	Low to Moderate	This approach is easily implemented ex situ; however, this technology would require additional treatment processes for dredging and transporting sediment. High contaminant concentrations may require large amounts of an oxidizing agent.	Moderate	Low	Effectiveness, Implementability	✓	✓

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								Capital Cost	O&M Cost		Inorganics	Organics
Treatment (Continued)	Biological Treatment – In Situ	Phytoremediation	Contaminants would be removed from contaminated media in situ in the creek using select plant species. For example, transgenic plant species genetically engineered with mercury-detoxifying enzymatic clusters, which cleave the methyl group off of methylmercury and reduce inorganic mercury to elemental mercury, respectively, enabling mercury to leave the system as a vapor.	Low to Moderate	This approach is effective at removing contaminants from sediment and into plant biomass. Effectiveness is dependent on the contaminant concentration and plant species. Phytoremediation has been used to treat non-leachable contaminants; however, there has been limited full-scale application of this technology for the contaminants at the site. There are already plant species indigenous to the creek that can chemically alter the contaminants present at the site. The environment is likely to be conducive to aquatic cultivation.	Moderate	This approach is implementable using available plant and construction resources. The treatment process would likely be lengthy (years) and dependent on the ability to cultivate and/or engineer plants capable of contaminant uptake.	Moderate	Low	Effectiveness	✓	
		Phytoremediation	Phytoremediation can address the wide range of contaminants present within Wappinger Creek. Contaminants can also be addressed through phytoextraction or rhizofiltration; contaminants inside plant tissues are transformed by plant enzymes (phytotransformation) and/or volatilize into the atmosphere (phytovolatilization); and contaminants in sediment are degraded by microbes in the root zone (rhizoremediation) or incorporated to sediment material (phytostabilization).	Low to Moderate	This approach is effective at removing contaminants from sediment and into plant biomass. Effectiveness is dependent on the contaminant concentration and plant species. Phytoremediation has been used to treat leachable contaminants; however, there have been limited full-scale applications of this technology for the leachable contaminants present at the site. There are already plant species indigenous to the creek that can chemically alter the contaminants present at the site. The environment is likely to be conducive to aquatic cultivation.	Moderate	This approach is implementable using available plant and construction resources. The treatment process would likely be lengthy (years) and dependent on the ability to cultivate and/or engineer plants capable of contaminant uptake.	Moderate	Low	Effectiveness	✓	✓

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Treatment (Continued)	Biological Treatment – In Situ (Continued)	Biologically Mediated Stabilization	Contaminated media would be treated in situ in the creek to grow the native bacteria population that produce calcium carbonate to bind contaminants and inhibit leaching. Nutrients in the form of sugar, protein, and nitrogen are applied to the contaminated media to grow the native bacteria population. The bacteria ingest the nutrients and hydrolyze the urea component in the presence of water to form ammonium and carbonate ions. Nutrients are again applied to the contaminated media, with the addition of calcium chloride. In the presence of calcium ions and nucleation sites (sediment particles), the carbonate ions react spontaneously with the calcium ions to form calcium carbonate, the cementing agent used to bind sediment particles together. Microbial-induced calcium carbonate precipitation is a form of biologically mediated stabilization.	Low to Moderate	This process option would protect receptors by eliminating exposure of contaminants. It would provide reduction of contaminated aqueous media generation and migration. It would be effective in reducing the mobility of contaminants by isolating impacted sediment from the water column and reducing the exposure to fish and other biota, but it would not affect the volume of contaminants. This process option is also still in the conceptual stage and has limited real-world application or documentation available to support its effectiveness.	Low to Moderate	This process option would be implemented using available construction resources. It would be difficult to design and homogenize bacteria with contaminated media and may require implementation of a treatability study. Implementation during wet or moist conditions would help in homogenizing bacteria for the treatment within the contaminated media. This process option is commercially available, but it currently has a sole vendor whose process is proprietary and subject to patents. It requires minor maintenance for long-term protectiveness.	Moderate	Low	Effectiveness and implementability	✓	
	Biological Treatment – Ex Situ	Constructed Wetland	Contaminants would be removed from contaminated media ex situ in a constructed wetland using phytoremediation.	Low to Moderate	This approach is effective at removing contaminants from sediment and into plant biomass. Effectiveness is dependent on the contaminant concentration and plant species. There are already plant species indigenous to the creek that can chemically alter the contaminants present at the site that could be used as a starting point for cultivating a constructed wetland. The environment is likely to be conducive to aquatic cultivation.	Low to Moderate	This approach is implementable using available plant and construction resources; however, property acquisition may be necessary to construct the wetland along the banks of the creek. The treatment process would likely be lengthy (years) and dependent on the ability to cultivate and/or engineer plants capable of contaminant uptake. It would need to be combined with phytoremediation and/or biologically mediated stabilization.	Moderate	Low	Effectiveness and implementability	✓	✓

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								Capital Cost	O&M Cost		Inorganics	Organics
Treatment (Continued)	Biological Treatment – Ex Situ (Continued)	Biologically Mediated Stabilization	Contaminated media would be treated ex situ in a constructed wetland to grow the native bacteria population that produce calcium carbonate to bind contaminants and inhibit leaching. Nutrients in the form of sugar, protein, and nitrogen are applied to the contaminated media to grow the native bacteria population. The bacteria ingest the nutrients and hydrolyze the urea component in the presence of water to form ammonium and carbonate ions. Nutrients are again applied to the contaminated media, with the addition of calcium chloride. In the presence of calcium ions and nucleation sites (sediment particles), the carbonate ions react spontaneously with the calcium ions to form calcium carbonate, the cementing agent used to bind sediment particles together. Microbial-induced calcium carbonate precipitation is a form of biologically mediated stabilization.	Low to Moderate	This process option would protect receptors by eliminating exposure of contaminants. It would provide reduction of contaminated aqueous media generation and migration. It would be effective in reducing the mobility of contaminants by isolating impacted sediment from the water column and reducing the exposure to fish and other biota, but it would not affect the volume of contaminants. This process option is also still in the conceptual stage and has limited real-world application or documentation available to support its effectiveness.	Low to Moderate	This process option would be implemented using available construction resources. It would be difficult to design and homogenize bacteria with contaminated media and may require implementation of a treatability study. Implementation during wet or moist conditions would help in homogenizing bacteria for the treatment within the contaminated media. This process option is commercially available, but it currently has a sole vendor whose process is proprietary and subject to patents. It requires minor maintenance for long-term protectiveness.	Moderate	Low	Effectiveness and implementability	✓	
	Thermal Treatment	Vitrification (Ex Situ)	High-intensity electrical current would be passed between electrodes inserted into contaminated media to cause melting. The melted matrix is then allowed to cool in place into a solid vitrified glass mass that is chemically inert and resistant to leaching.	Moderate	This approach protects receptors by irreversibly converting contaminated media to an inert form. Effectiveness is highly dependent on the nature of the subsurface. Heterogeneity of the sediment and variable depth to bedrock would impact effectiveness.	Low to Moderate	This approach is implemented using a patented, demonstrated, and commercialized technology. The technology requires a significant, reliable source of electrical power. It is difficult to implement since technology is mainly dependent on the electrical conductivity of the subsurface and contaminated media is heterogeneous. The reservoir would need to be drained and the stream diverted prior to implementation. The system requires an off-gas treatment system to address air emissions.	High	None	Implementability and cost	✓	✓
		Thermal Desorption	Excavated media would be heated ex situ to promote volatilization and compost contaminants. The contaminant vapors (e.g., mercury) and ash would then be condensed and treated prior to disposal. This requires dewatering of excavated media.	Moderate	This approach protects receptors by removing volatile contaminants from sediment. The effectiveness is limited to volatile compounds (e.g., elemental mercury) and will not address the other contaminants. The contaminated vapors would need to be condensed and treated as a separate waste stream.	Low to Moderate	This approach is implemented using available equipment and construction resources. This technology requires a reliable source of electrical power. Dredging of sediment and condensing and treatment of the vapor would be required for this technology. Dewatering of excavated sediment is required.	High	None	Implementability and cost	✓	✓

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Treatment (Continued)	Thermal Treatment (Continued)	Incineration	Excavated contaminated media would be incinerated. The contaminated vapors (e.g., mercury) would then be condensed and treated prior to disposal. The resulting ash would then be treated prior to disposal. This requires dewatering of excavated sediment.	Moderate to High	This approach protects receptors by removing volatile contaminants from sediment and the other contaminants into ash. The contaminated vapors would need to be condensed and treated as a separate waste stream.	Low to Moderate	This approach is implemented using available equipment and construction resources. This technology requires a reliable source of electrical power. Dredging of sediment and condensing and treatment of the vapor would be required for this technology. Availability of incineration units with the required throughput is limited. Dewatering of excavated sediment is required.	High	None	Implementability and cost	✓	✓

Notes:
1. The screening process for effectiveness, implementability, and relative cost involves a qualitative assessment of the degree to which process options address evaluation criteria presented in Section 4.4.
2. Shading indicates remedial technologies/process options have been eliminated from further consideration based on a lack of effectiveness, implementability, and/or cost. Remaining (unshaded) remedial technologies/process options have been retained for consideration in remedial action alternatives and are presented in Table 4-3.
3. ✓ indicates that the process option is applicable to non-mercury contaminants.

Table 4-3
Retained Remedial Technologies/Process Options
Contaminated Sediment and Streambank Soils
Wappinger Creek Superfund Site, Wappingers Falls, New York

General Response Action	Remedial Technology	Process Option	Description of Option
No Action	None	None	No action would be taken. Contaminated media (i.e., sediment and stream bank soils) would remain in its existing condition.
Institutional Controls	Legal Controls	Governmental Controls, Proprietary Controls, and Informational Devices	Disturbance of contaminated soil would be controlled through legal instruments. Examples of governmental (state or local) controls include local zoning, permits, codes, or regulations/ordinances. An example of proprietary controls includes the use of environmental easements and deed restrictions. An example of informational devices includes environmental and health advisories such as the existing fish advisory maintained by New York State Department of Health.
	Risk Communication Programs	Information and Education Programs	Community information and education programs would be undertaken to enhance awareness of potential hazards and remedies for the site.
		Notification Programs	Notification programs would be undertaken to inform the community of potential hazards from contamination at specific locations. Examples of notification programs include environmental and health advisories such as the existing fish advisory maintained by New York State Department of Health.
Access Controls	Access Restrictions	Fencing and Posted Warnings	Streambank areas of contaminated media would be separated by fences to control access by human receptors and some (i.e., terrestrial) ecological receptors. Warning signs would be posted to control access by human receptors.
Containment	Physical Barriers (Subaqueous Source Controls)	Sand/Earthen Cap	Contaminated media in Wappinger Creek would be covered with a layer of sand/sand and armoring, with sufficient thickness to eliminate surface exposure and provide erosion resistance. Alternatively, a layer of a low-permeability material, such as clay or commercially available materials, could be used to decrease the material's permeability. Consideration must be given to applying heavy material to soft sediment to not release contaminated sediments during application.
		Reactive Cap	Contaminated sediment in Wappinger Creek would be covered with a reactive cap composed of specialized or manufactured reactive materials, either mixed with or layered within typical cap aggregate materials at specified amounts. This approach would be combined with in situ treatment technologies, such as solidification/stabilization, chemical oxidation/reduction, or sequestration.
Removal, Transport, Disposal	Removal	Mechanical Excavation/Dredging	Contaminated media would be removed using mechanical excavation methods. Contaminated media would be removed either by mechanically dredging submerged media or by excavating dewatered media.
		Hydraulic Dredging	Contaminated sediment would be dredged and removed in slurry form using a pipeline or another hydraulic conveyance system. This approach requires dewatering using geobags, filter presses, or other similar devices.
	Transport	Mechanical Transport (Hauling/Conveying)	Contaminated media would be transported by truck, barge, or another mechanical conveyance method to the transload or disposal location.
Removal, Transport, Disposal (Continued)	Transport (Continued)	Hydraulic Transport (Slurry Pumping)	Contaminated sediment would be transported in slurry form using a pipeline or other hydraulic conveyance system to the transload or disposal location. This approach requires dewatering using geobags, filter presses, or other similar devices.
	Upland Disposal	Off-Site Disposal at Existing Commercial Facility	Removed contaminated media would be disposed of at an off-site facility authorized for disposal of contaminated sediment, such as a landfill.
Treatment	Physical/Chemical Treatment – In Situ	Solidification/Stabilization	Contaminated media would be injected and mixed in situ with a binding agent that produces a solid mass that would reduce or prevent contaminant mobility. This could require drained or dry conditions prior to injection and/or mixing, depending on the technology applied. Conventional amendments include cement or pozzolan. Innovative amendments can be added to capture and stabilize multiple species of mercury, including elemental, ionic, and methylmercury.
		Sequestration	Sequestration is an innovative in situ technology that involves the use of remedial agents like activated carbon (e.g., powdered activated carbon and granular activated carbon), organoclays, apatite, and zeolites to reduce the toxicity, bioavailability, and mobility of sediment contaminants. These agents are typically mixed into the sediment surface layer by mechanical means. Materials such as activated carbon are a low-impact system for delivery of remedial agents to the sediment surface. It is an agglomerate comprised of a treatment agent like activated carbon, a weighting agent, and an inert binder. The weighting agent enables the granular material to sink to the surface and release the activated carbon, which is then mixed by bioturbation.
		Chemical Reduction/Oxidation (Redox)	An application of chemical oxidants is used to remediate contaminated media. Chemical oxidation typically involves redox reactions that chemically convert hazardous contaminants to nonhazardous or less toxic compounds that are more stable, less mobile, or inert. Reagents can be added to contaminated media to control mercury through oxidation and subsequent adsorption onto the solid phase. Other redox altering options are available.

Table 4-3
Retained Remedial Technologies/Process Options
Contaminated Sediment and Streambank Soils
Wappinger Creek Superfund Site, Wappingers Falls, New York

General Response Action	Remedial Technology	Process Option	Description of Option
Treatment	Physical/Chemical Treatment – Ex Situ	Solidification/Stabilization	Contaminated media would be dredged and mixed ex situ with a binding agent that produces a solid mass that would reduce or prevent contaminant mobility. This process would be undertaken if material is dredged and transported to a repository, and if it is determined that the material is likely to leach contaminants. This could require dewatering of excavated soil. Amendments can be added to capture and stabilize multiple species of mercury, including elemental, ionic, and methylmercury.

Notes:
1. The screening process for technical implementability involves a qualitative assessment of the degree to which process options address evaluation criteria presented in Section 4.4.

Table 6-1
Matrix of Remedial Technologies with Process Options Retained for Remedial Alternative Development
Wappinger Creek Superfund Site, Dutchess County, New York

GRAs	Remedial Technology	Process Option	Alternative 1	Alternative 2	Alternative 3	Alternative 4
			No Action	Dredge to Depth of 1 Foot; Capping of Underlying Contamination	Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	Dredge to Remove Any RAL Exceedance; Backfill to Grade in the Dredge Footprint
No Action	None	None	✓			
Institutional Controls	Legal Controls	Governmental Controls, Proprietary Controls, and Informational Devices		✓	✓	✓
	Risk Communication Programs	Information and Education Programs		✓	✓	✓
		Notification Programs		✓	✓	✓
Access Controls	Access Restrictions	Fencing and Posted Warnings		✓	✓	✓
Containment	Physical Barriers (Subaqueous Source Controls)	Sand/Earthen Cap		✓	✓	✓
		Reactive Cap		✓	✓	
Removal, Transport, Disposal	Removal	Mechanical Excavation/Dredging		✓	✓	✓
		Hydraulic Dredging		✓	✓	✓
	Transport	Mechanical Transport (Hauling/Conveying)		✓	✓	✓
		Hydraulic Transport (Slurry Pumping)				
	Upland Disposal	Off-Site Disposal at Existing Commercial Facility		✓	✓	✓
Treatment	Physical/Chemical Treatment – In Situ	Solidification/Stabilization		✓	✓	
		Sequestration		✓	✓	
		Chemical Reduction/Oxidation (Redox)		✓	✓	
	Physical/Chemical Treatment – Ex Situ	Solidification/Stabilization		✓	✓	✓

Notes:
1. Table 4-1 summarizes all technology process options evaluated. Check marks in the table above indicate process options that will be implemented as necessary for each alternative.
2. For purposes of FS evaluation, representative process options are selected for evaluation within the remedial technology category to simplify the analysis and comparison of alternatives, as described in Section 6.

Table 6-2
Estimated Quantities for Each Remedial Alternative
Wappinger Creek Superfund Site, Dutchess County, New York

Remedial Alternatives	Estimated Volume of Sediment Dredged	Volume of Streambank Soil Excavated	Estimated Volume of Non-Hazardous Waste for Off-Site Disposal	Estimated Volume of Hazardous Waste for Off-Site Disposal	Estimated Volume of Placed Materials for Capping, Backfill, or Residuals Control Layer	Estimated Reactive Media for Reactive Capping	Estimated Area of Reactive Capping	Estimated Area of Streambank Soil Backfill	Estimated Area of Residuals Control Layer
	BCY	BCY	LCY	LCY	LCY	TON	AC	AC	AC
Alternative 1 – No Action	—	—	—	—	—	—	—	—	—
Alternative 2 – Dredge to Depth of 1 Foot; Capping of Underlying Contamination	35,800	1,900	20,500	25,000	27,000	2,000	13.2	2.3	—
Alternative 3 – Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	44,600	1,900	25,200	30,800	39,300	2,975	15.4	2.3	—
Alternative 4 – Dredge to Remove Any RAL Exceedance; Backfill in the Dredge Footprint	60,200	1,900	33,700	41,200	71,200	—	—	2.3	16.3

Key: AC – Acres, BCY – bank cubic yards, LCY – loose cubic yards, TON – Tons
Notes: Quantities summarized in this table are provided in Appendix E. Although detailed quantities have been provided, they should be considered approximate for FFS evaluation purposes only.

Table 6-3
Summary of Detailed Analysis of Remedial Alternatives
Wappinger Creek Superfund Site, Dutchess County, New York

Remedial Alternatives	Threshold Criteria [1]		Balancing Criteria [1]				
	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness	Implementability	Present Value Cost (Dollars) [2]
Alternative 1 – No Action [3]	–	–	None	None	None	None	$0
Alternative 2 – Dredge to Depth of 1 Foot; Capping of Underlying Contamination	+	+*	Moderate	Moderate	Moderate	Moderate to High	$77,298,000
Alternative 3 – Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	+	+*	Moderate to High	Moderate to High	Moderate	Moderate to High	$98,472,000
Alternative 4 – Dredge to Remove Any RAL Exceedance; Backfill to Grade in the Dredge Footprint	+	+*	High	Moderate to High	Low to Moderate	Moderate	$88,098,000

Notes:
1. Analysis of the remedial alternatives for threshold and balancing criteria are presented in Appendix C. See below for legend for qualitative ratings system. Descriptions of the evaluation criteria are provided in Section 5.
2. Detailed cost spreadsheets (cost summaries, present value analyses, and cost reports) for each alternative are presented in Appendix E.
3. Alternative 1 represents the no action alternative required by the NCP.

Legend for Qualitative Rating System

Overall Protection of Human Health and the Environment

–	Not adequate
+	Adequate

Compliance with ARARs

–	None
+	Will comply
+*	Will comply but may require CERCLA ARAR waiver(s)

Balancing Criteria (Excluding Cost)

None
Low
Low to moderate
Moderate
Moderate to high
High

Figures

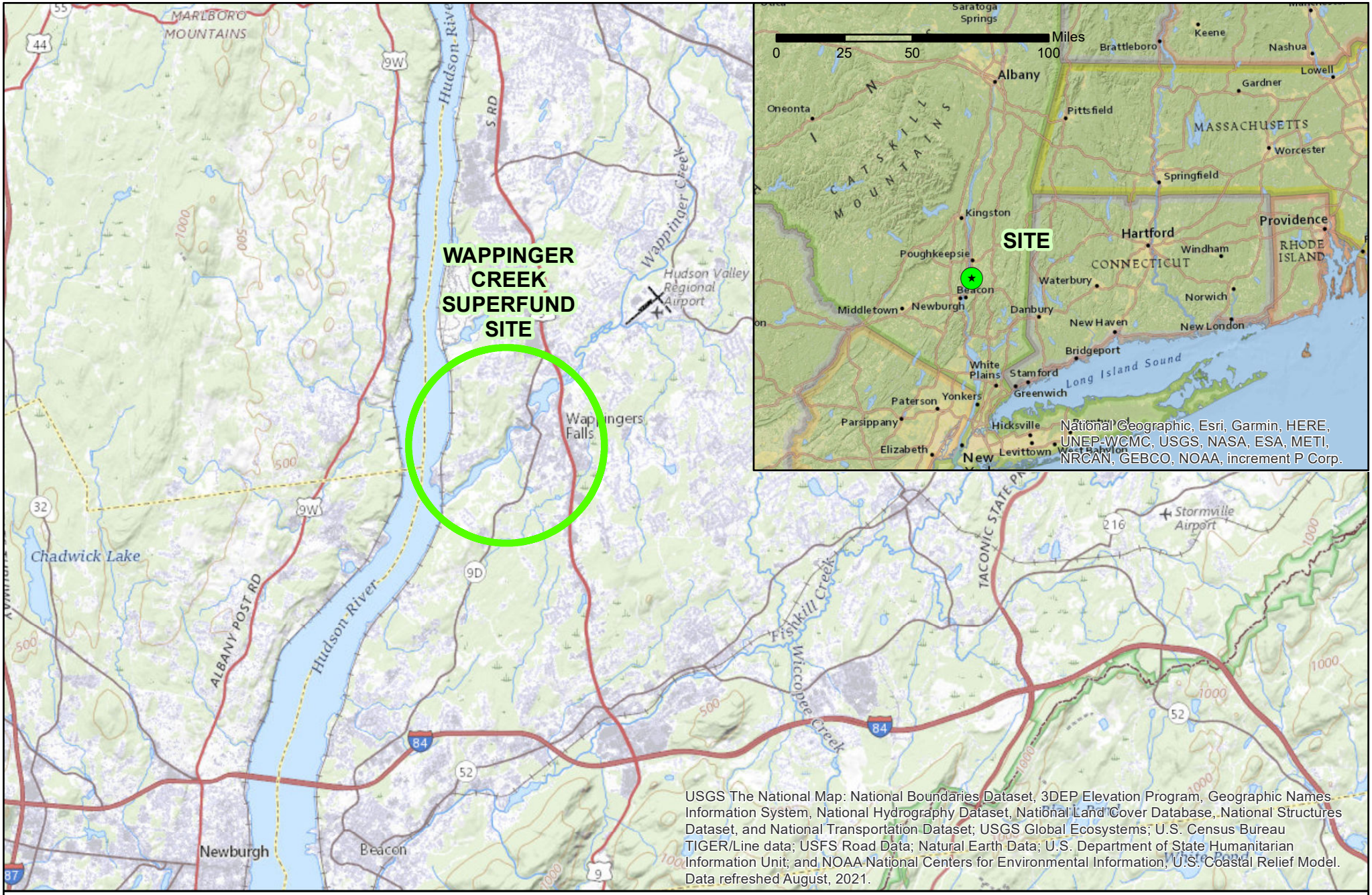


Figure 1-1
Site Location
Wappinger Creek Superfund Site
Wappingers Falls, New York

CDM Smith

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Market Street Industrial Park (see Figure 1-3)

Reese Audubon Sanctuary (Wappinger Greenway Trail)

Unnamed Tributary

Wappinger Lake

Wappinger Lake Dam

Hunter Creek

Reese Park

Wappinger Creek

Hudson River

New Hamburg Metro North Station

CR-28 Bridge

Rail Bridge

Wappingers Falls

Hughsonville

New Hamburg

Cedar Cliff

Diamond Reef

ORANGE COUNTY
DUTCHESS COUNTY

Creek Sections
(Tidal Portion of Creek)

- Industrial Park
- Upper Shoal
- Embayment
- Lower Shoal (Downstream)
- Confluence
- Tributaries
- Estimated Hudson River Line

N
W E
S

0 500 1,000 2,000 Feet

Figure 1-2
Site Overview
Wappinger Creek Superfund Site
Wappingers Falls, New York

CDM Smith

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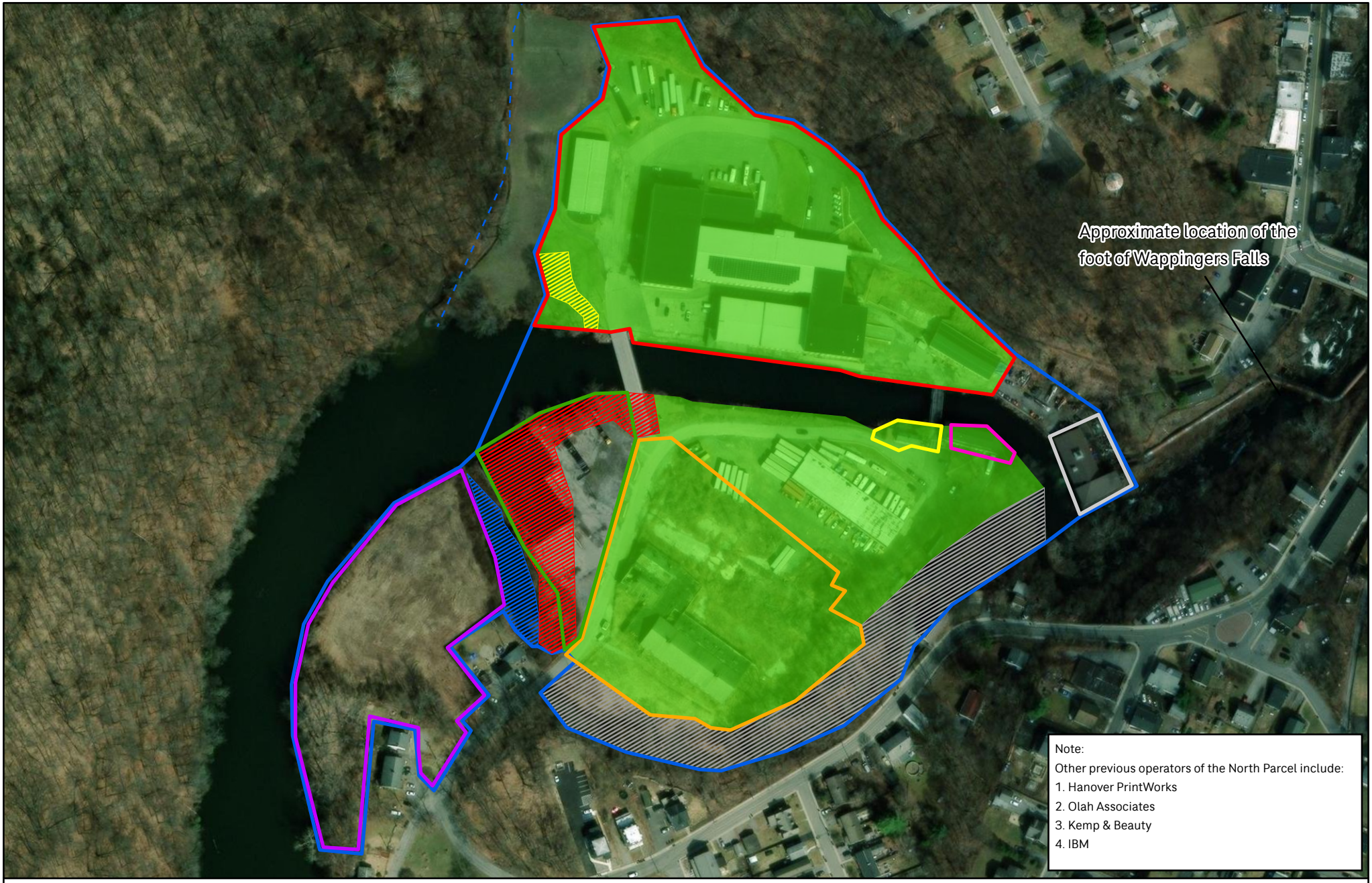
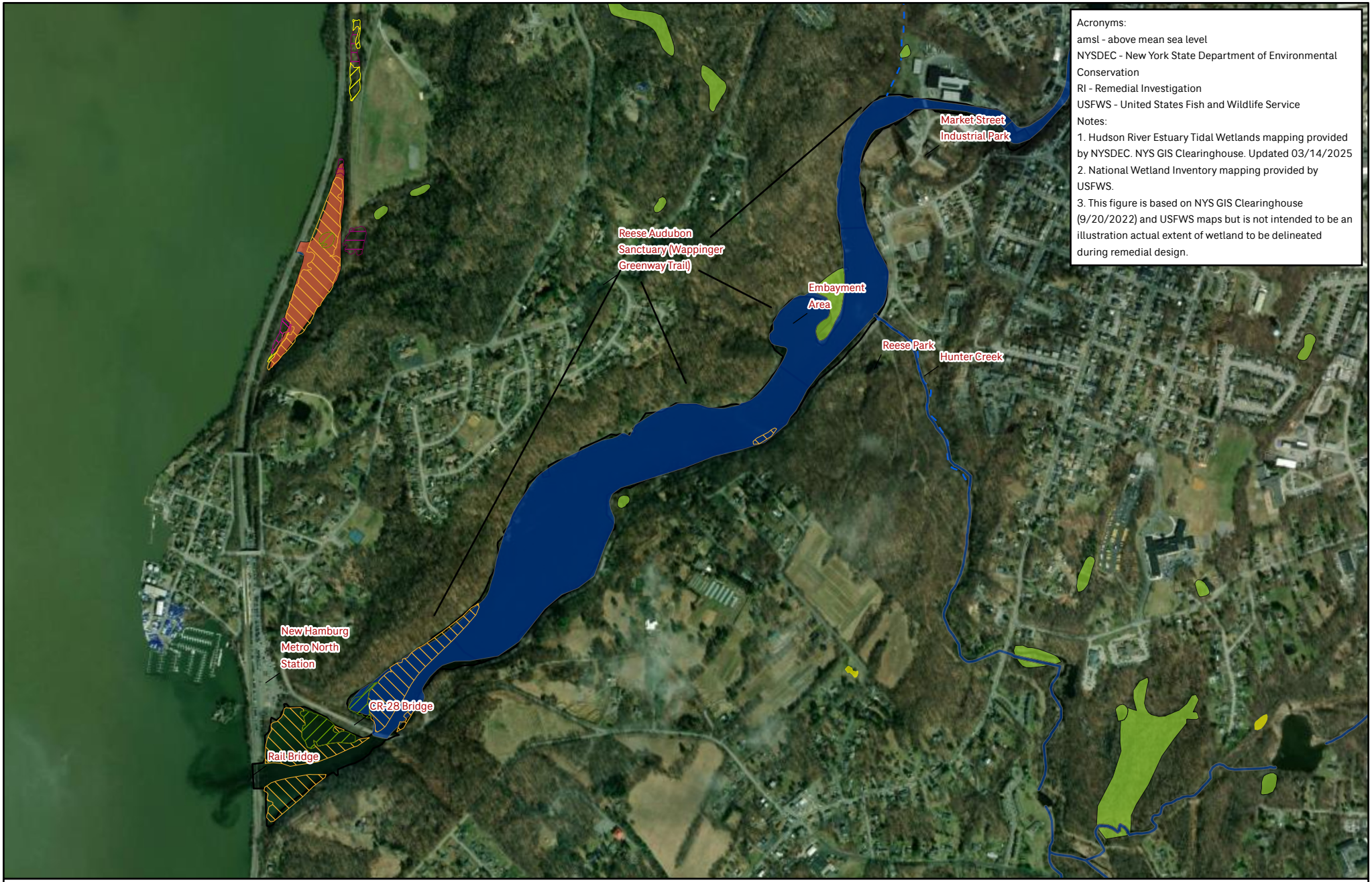


Figure 2-1
Industrial Park Area

Wappinger Creek Superfund Site
Wappingers Falls, New York

CDM Smith



Acronyms:
amsl - above mean sea level
NYSDEC - New York State Department of Environmental Conservation
RI - Remedial Investigation
USFWS - United States Fish and Wildlife Service

Notes:
1. Hudson River Estuary Tidal Wetlands mapping provided by NYSDEC. NYS GIS Clearinghouse. Updated 03/14/2025
2. National Wetland Inventory mapping provided by USFWS.
3. This figure is based on NYS GIS Clearinghouse (9/20/2022) and USFWS maps but is not intended to be an illustration actual extent of wetland to be delineated during remedial design.

N

Scale: 1:14,000

0 500 1,000 US Feet

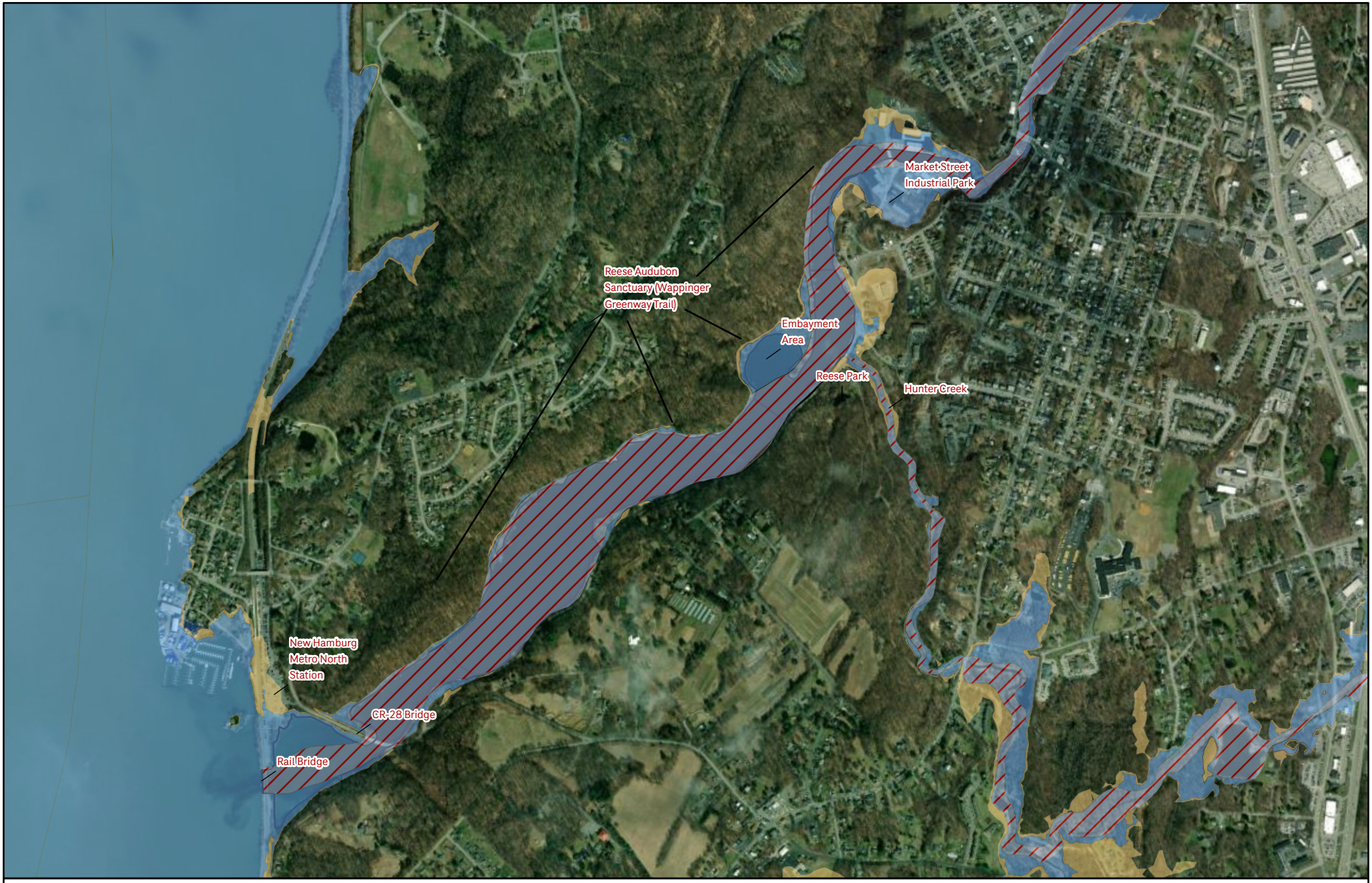
Hudson River Estuary Tidal Wetlands
- Phragmites australis
- Shrub/Scrub
- Trapa natans
- Upper Intertidal Mix
- Vegetated Lower Intertidal

National Wetland Inventory
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Riverine
- Unnamed Tributaries
- Creek Sections

Figure 2-2
Wetland Map

Wappinger Creek Superfund Site
Wappinger Falls, New York

CDM Smith



N

Scale: 1:15,000

0 500 1,000 US Feet

- 0.2% Annual Chance Flood Hazard
- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- Creek Sections

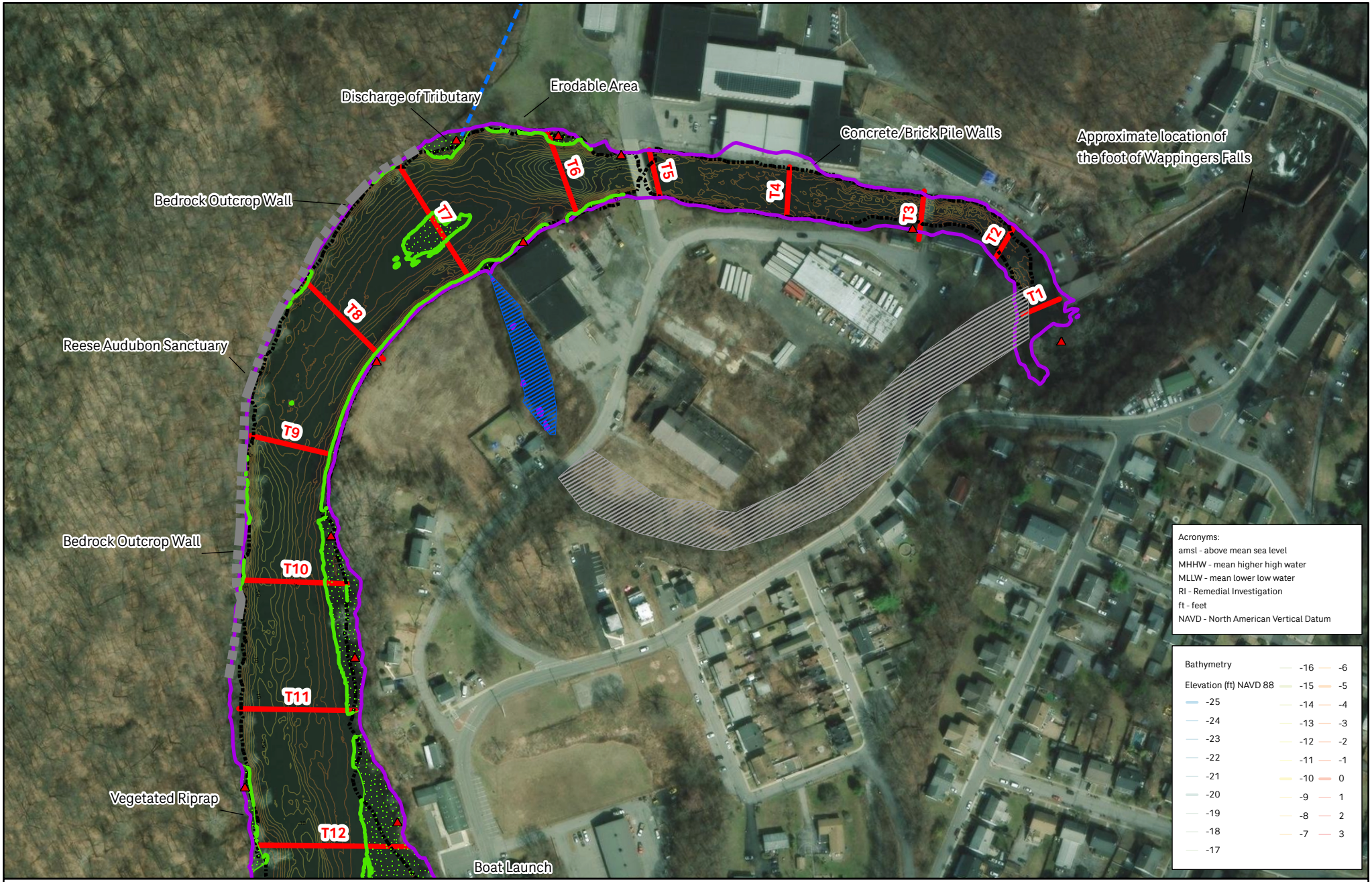
Acronyms:
amsl - above mean sea level
FEMA - Federal Emergency Management Agency

Notes:
1. FEMA National Flood Hazard mapping provided by FEMA.
2. Base flood elevation for the tidal portion of Wappinger Creek is approximately 8-feet amsl.

Figure 2-3
FEMA Flood Map

Wappinger Creek Superfund Site
Wappingers Falls, New York

CDM Smith



N

Scale: 1:3,000

0 100 200 Feet

- Intertidal Zone
- Mean Lower Low Water (-1.67 ft NAVD88)
- Mean Higher High Water (-2.22 feet NAVD88)
- Tributaries
- RI Sampling Transects
- Creek Shoreline
- Bedrock Outcrop Wall
- Former Raceway
- Three Star Lagoon
- Streambank Samples

Notes:
1. MHHW calculated to be 2.22 ft NAVD88.
2. MLLW calculated to be -1.74 ft NAVD88.
3. Intertidal zone - the area between MHHW and MLLW. This zone is intermittently exposed to the atmosphere at lower tides and inundated at higher tides.
4. Bathymetric contours ae presented in feet amsl in NAVD88.

Figure 2-4a

Site Features, Bathymetry, and Sampling Transects

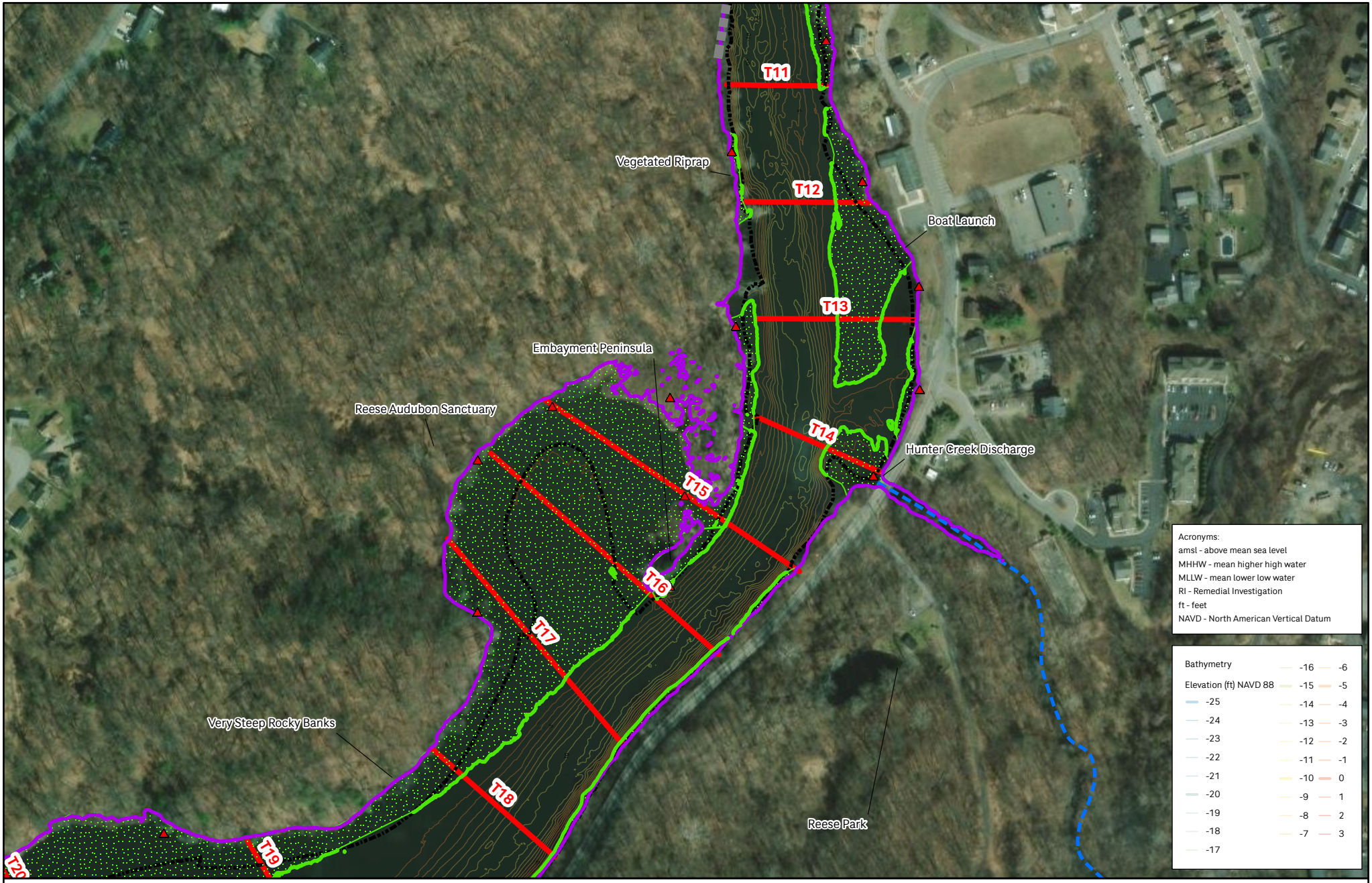
Industrial Park

Wappinger Creek Superfund Site

Wappinger Falls, New York

CDM Smith

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N

Scale: 1:3,500

0 100 200 Feet

Intertidal Zone

Mean Lower Low Water (-1.67 ft NAVD88)

Mean Higher High Water (~2.22 feet NAVD88)

Tributaries

RI Sampling Transects

Creek Shoreline

Bedrock Outcrop Wall

Streambank Samples

Notes:

1. MHHW calculated to be 2.22 ft NAVD88.
2. MLLW calculated to be -1.74 ft NAVD88.
3. Intertidal zone - the area between MHHW and MLLW. This zone is intermittently exposed to the atmosphere at lower tides and inundated at higher tides.
4. Bathymetric contours ae presented in feet amsl in NAVD88.

Figure 2-4b

Site Features, Bathymetry, and Sampling Transects

Embayment / Upper Shoal

Wappinger Creek Superfund Site

Wappinger Falls, New York

CDM Smith



N

Scale: 1:6,000

0 100 200 Feet

Intertidal Zone

Mean Lower Low Water (-1.67 ft NAVD88)

Mean Higher High Water (~2.22 feet NAVD88)

Tributaries

RI Sampling Transects

Creek Shoreline

Streambank Samples

Notes:
1. MHHW calculated to be 2.22 ft NAVD88.
2. MLLW calculated to be -1.74 ft NAVD88.
3. Intertidal zone - the area between MHHW and MLLW. This zone is intermittently exposed to the atmosphere at lower tides and inundated at higher tides.
4. Bathymetric contours ae presented in feet amsl in NAVD88.

Figure 2-4c

Site Features, Bathymetry, and Sampling Transects

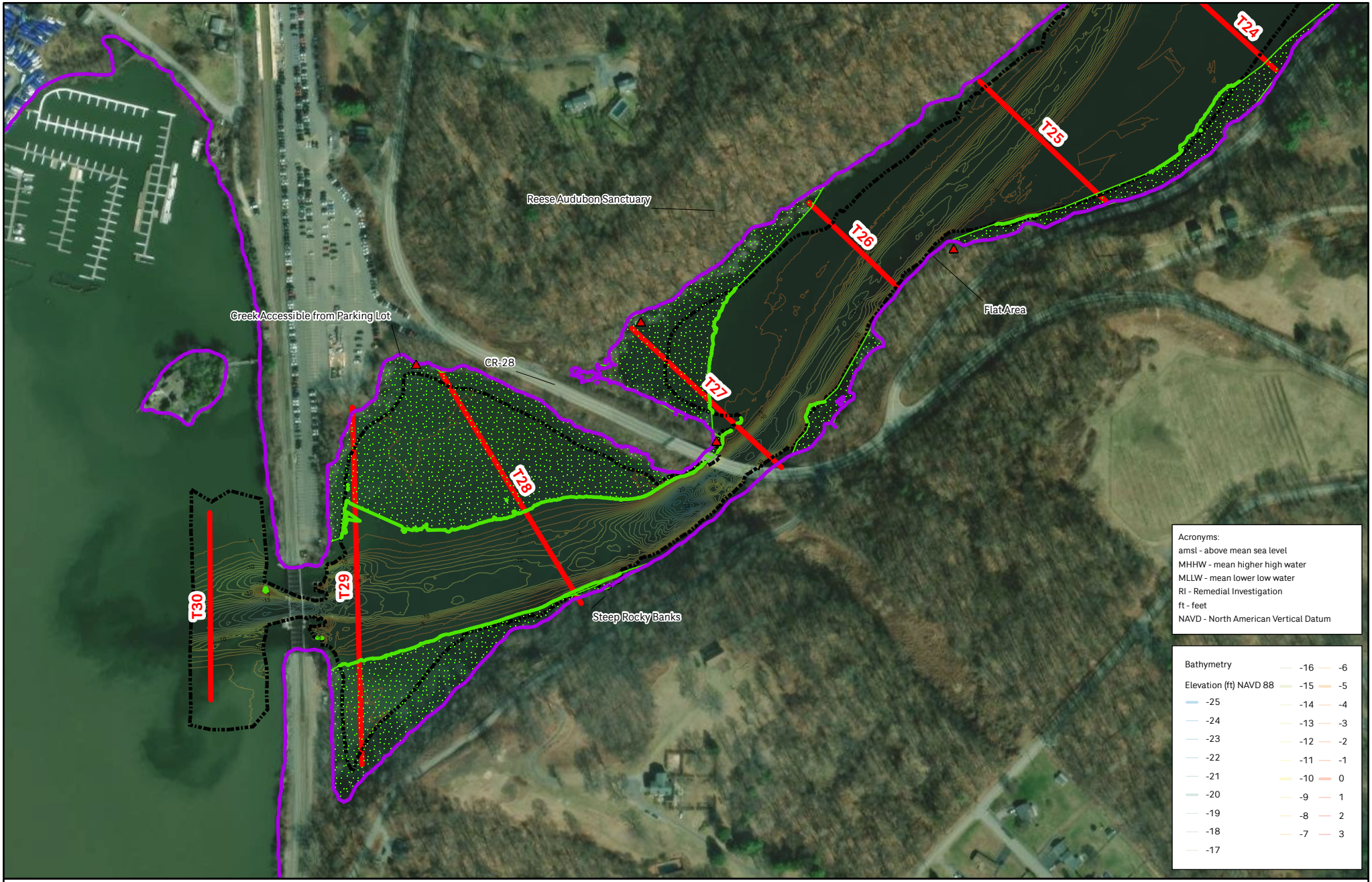
Lower Shoal

Wappinger Creek Superfund Site

Wappinger Falls, New York

CDM Smith

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N

Scale: 1:4,000

0 100 200 Feet

Intertidal Zone

Mean Lower Low Water (-1.67 ft NAVD88)

Mean Higher High Water (~2.22 feet NAVD88)

RI Sampling Transects

Creek Shoreline

Streambank Samples

Notes:
1. MHHW calculated to be 2.22 ft NAVD88.
2. MLLW calculated to be -1.74 ft NAVD88.
3. Intertidal zone - the area between MHHW and MLLW. This zone is intermittently exposed to the atmosphere at lower tides and inundated at higher tides.
4. Bathymetric contours ae presented in feet amsl in NAVD88.

Figure 2-4d

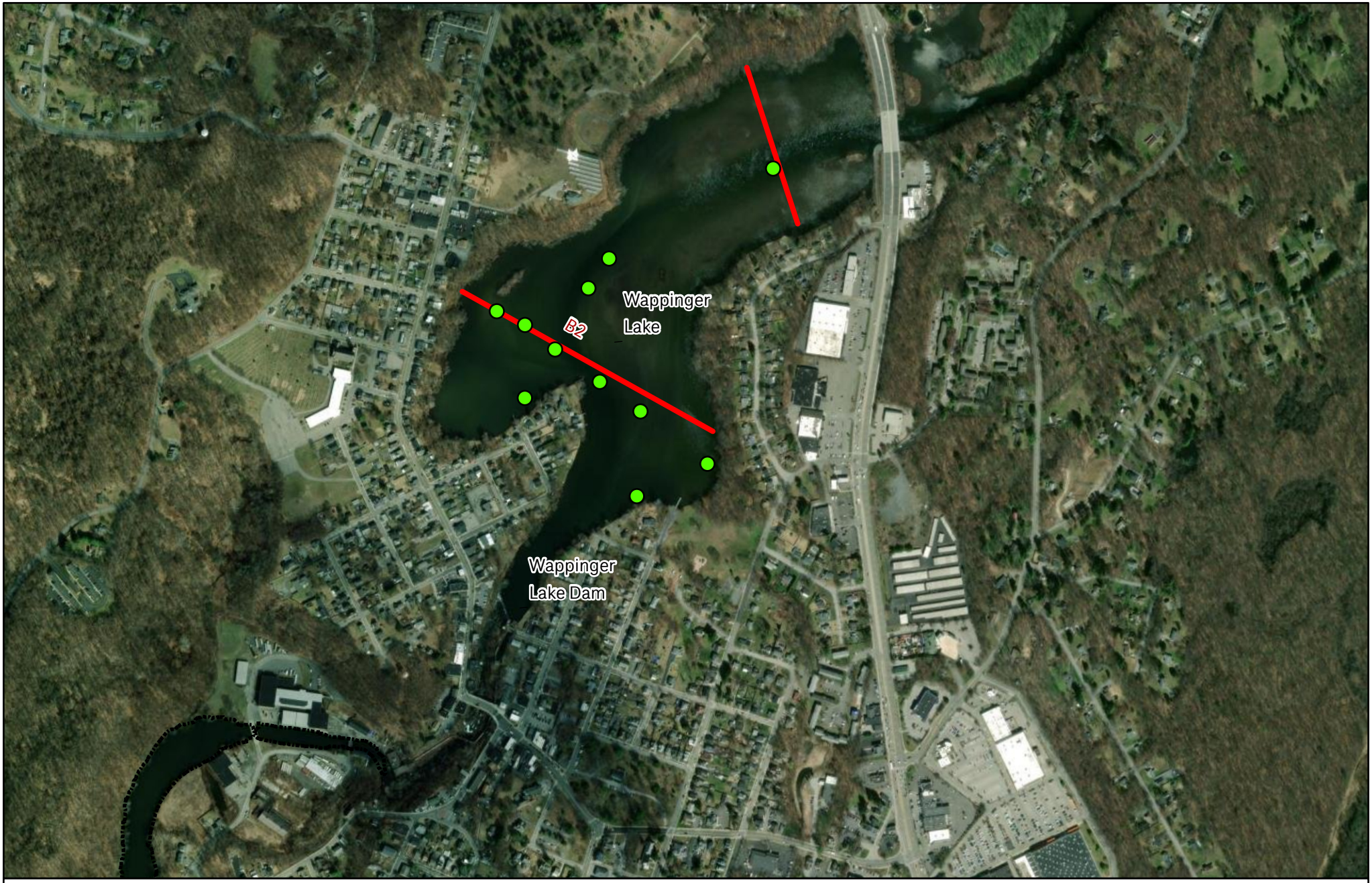
Site Features, Bathymetry, and Sampling Transects

Confluence Section

Wappinger Creek Superfund Site

Wappinger Falls, New York

CDM Smith



N

Scale: 1:9,000

0 250 500 US Feet

Background Sediment Core Location

RI Sampling Transects

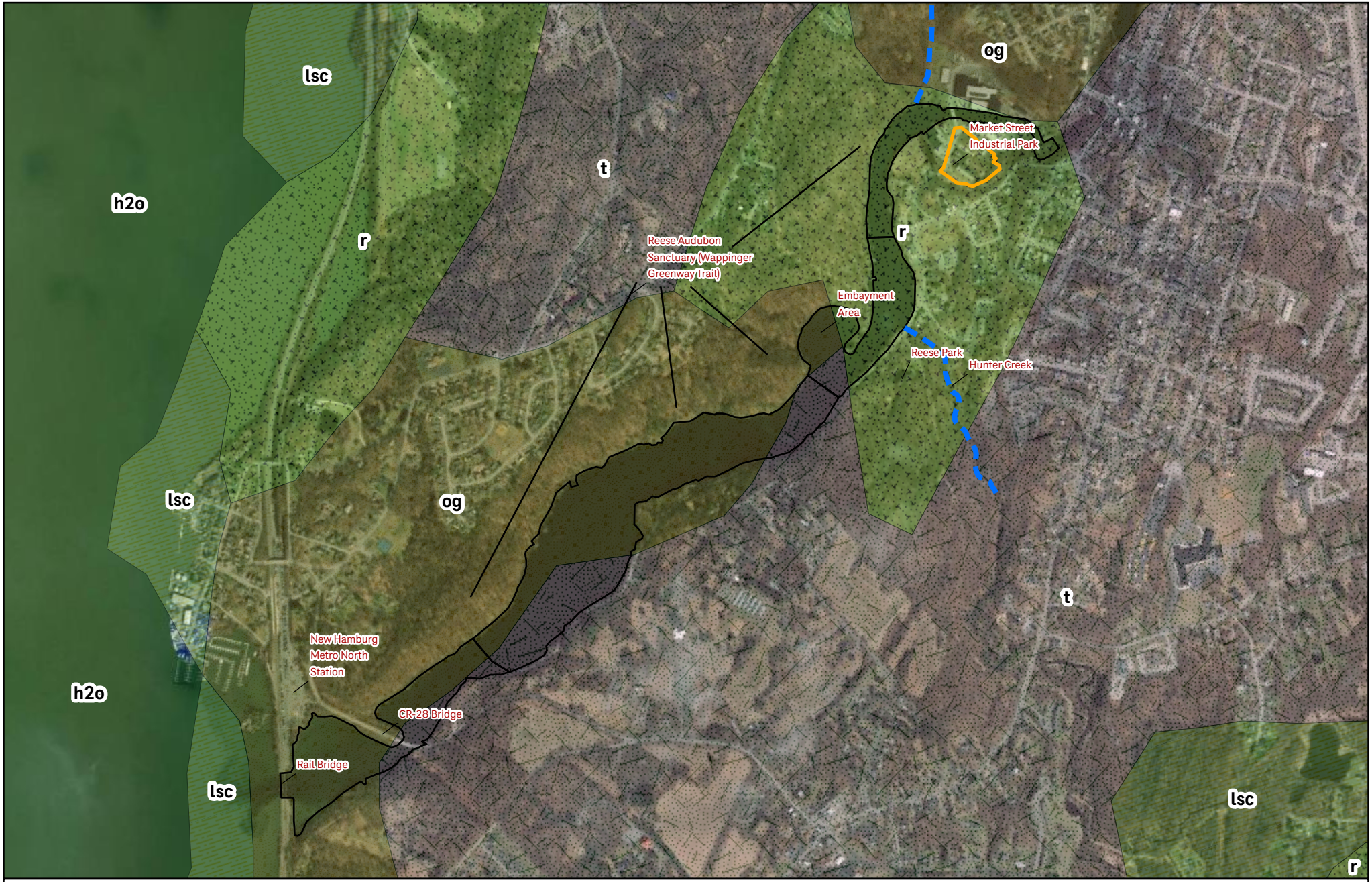
Creek Shoreline

Acronyms:
RI - Remedial Investigation

Notes:
1. Transect B1 was completed as individual points throughout the lake rather than a transect due to access constraints.

Figure 2-4e
Site Features and Sampling Transects
Wappinger Lake
Wappinger Creek Superfund Site
Wappinger Falls, New York

CDM Smith



N

Scale: 1:14,000

0 500 1,000 US Feet

Lower Hudson Surficial Geology

Material

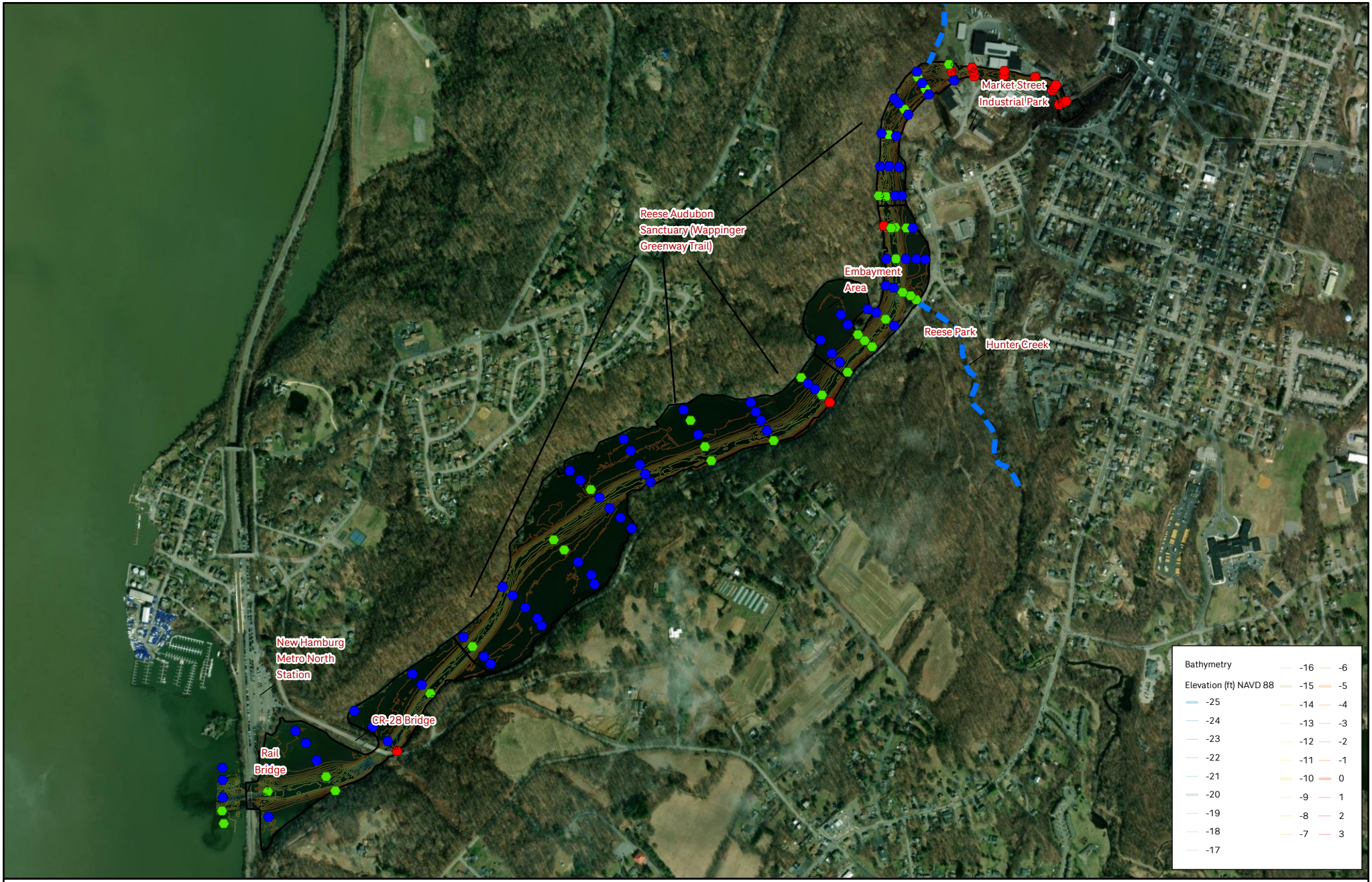
- al - Recent Alluvium
- lsc - Lacustrine Silt and Clay
- og - Outwash Gravel
- t - Glacial Till
- r - Bedrock (within 1 meter of surface)
- Unnamed Tributaries
- Creek Sections
- Former Three-Star Anodizing

Figure 2-5

Surficial Geology Map

Wappinger Creek Superfund Site
Wappingers Falls, New York

CDM Smith



N

Scale: 1:13,000

0 500 1,000 US Feet

Surface Sediment Texture

- bedrock, boulders,or cobbles
- sands and gravels
- soft sediment (mucky fines, silts, clays to silty sands)
- Unnamed Tributaries
- Creek Sections

Acronyms:
amsl - above mean sea level
RI - Remedial Investigation
NAVD - North American Vertical Datum

Notes:
1. Bathymetric contours ae presented in feet amsl in NAVD88.
2. Sediment texture described from visual observations of sediment cores.

Figure 2-6

General Surficial Sediment Type

Wappinger Creek Superfund Site
Wappingers Falls, New York

CDM Smith

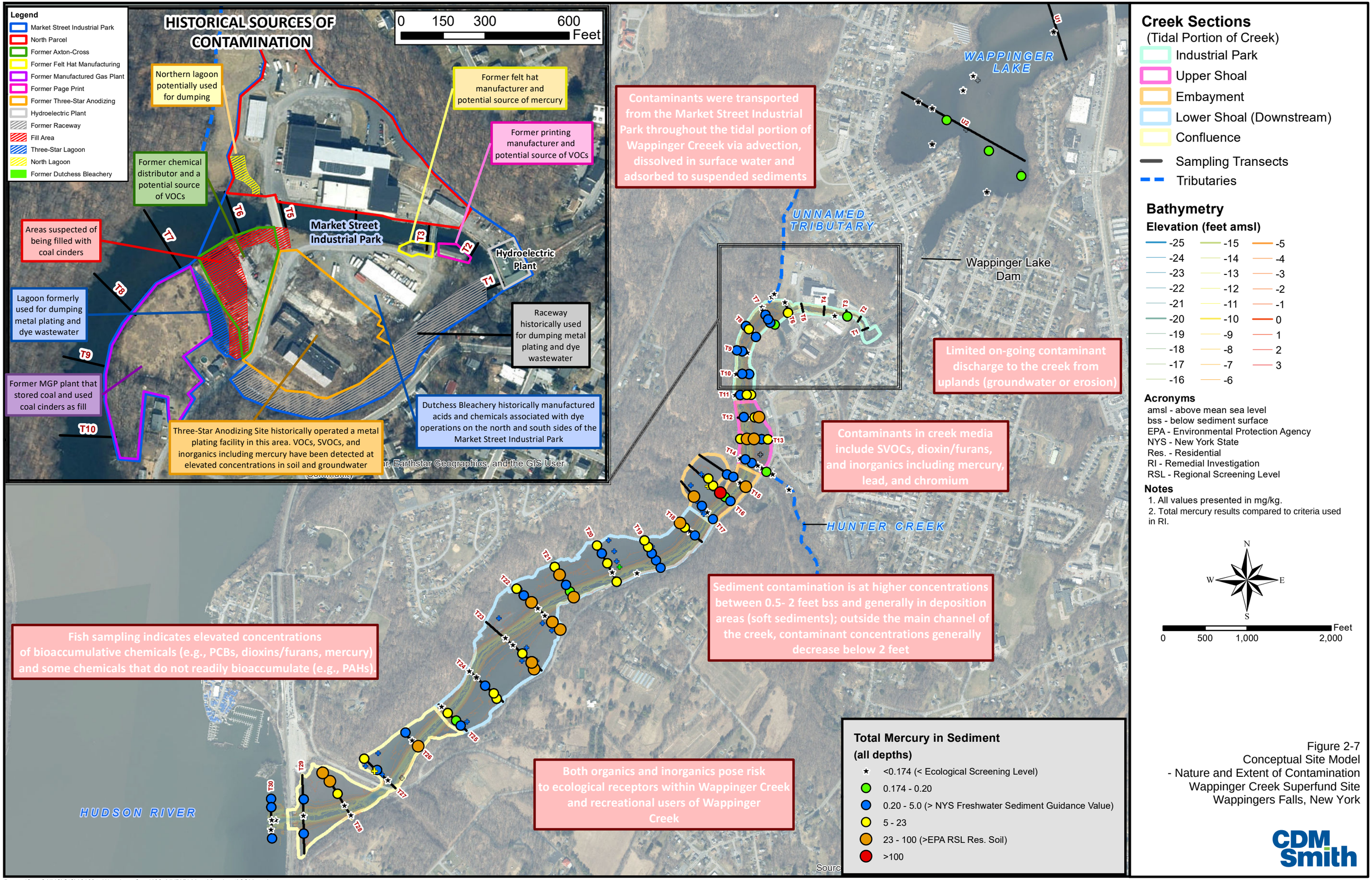
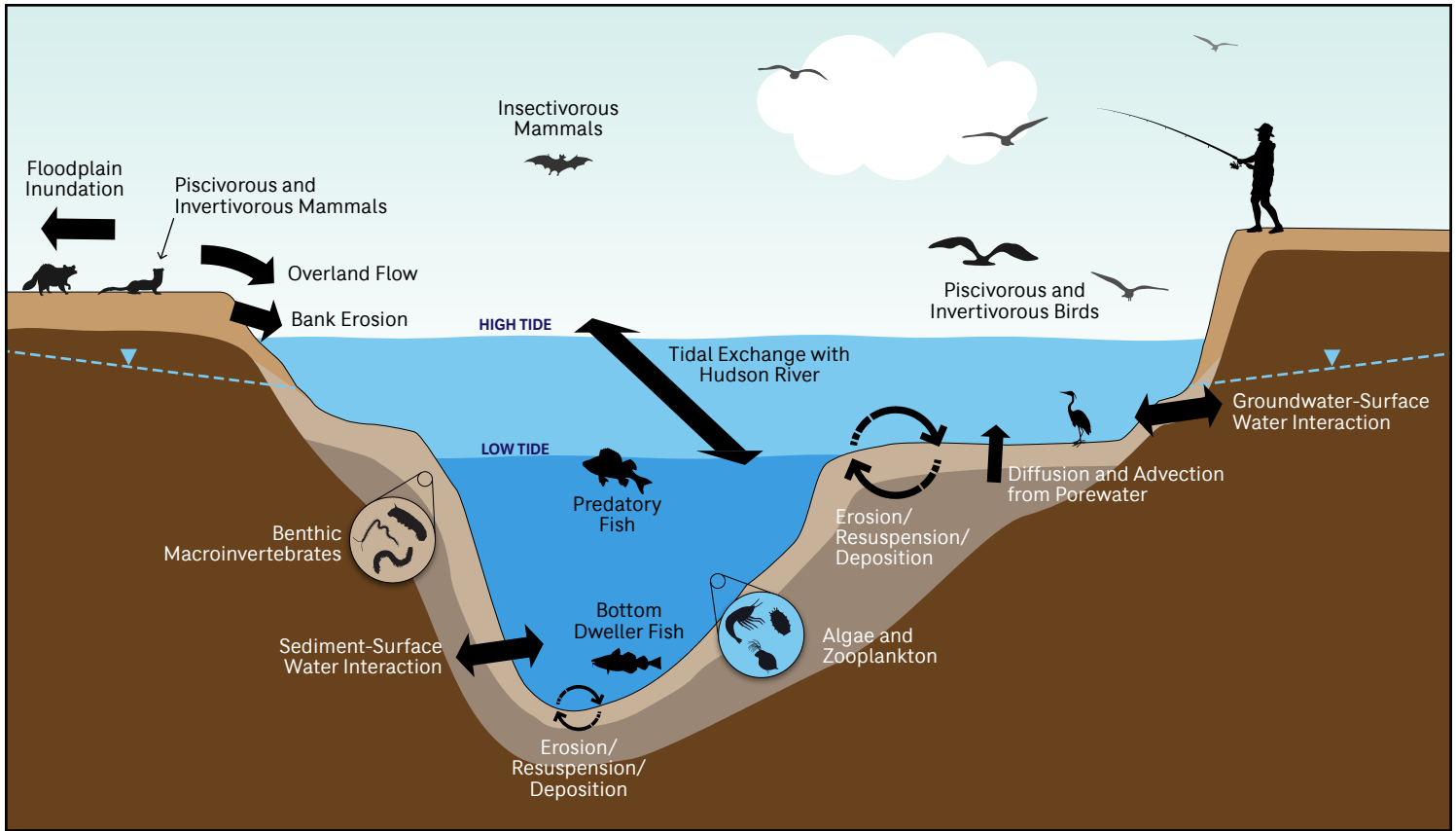


Figure 2-7
Conceptual Site Model
- Nature and Extent of Contamination
Wappinger Creek Superfund Site
Wappingers Falls, New York

CDM Smith

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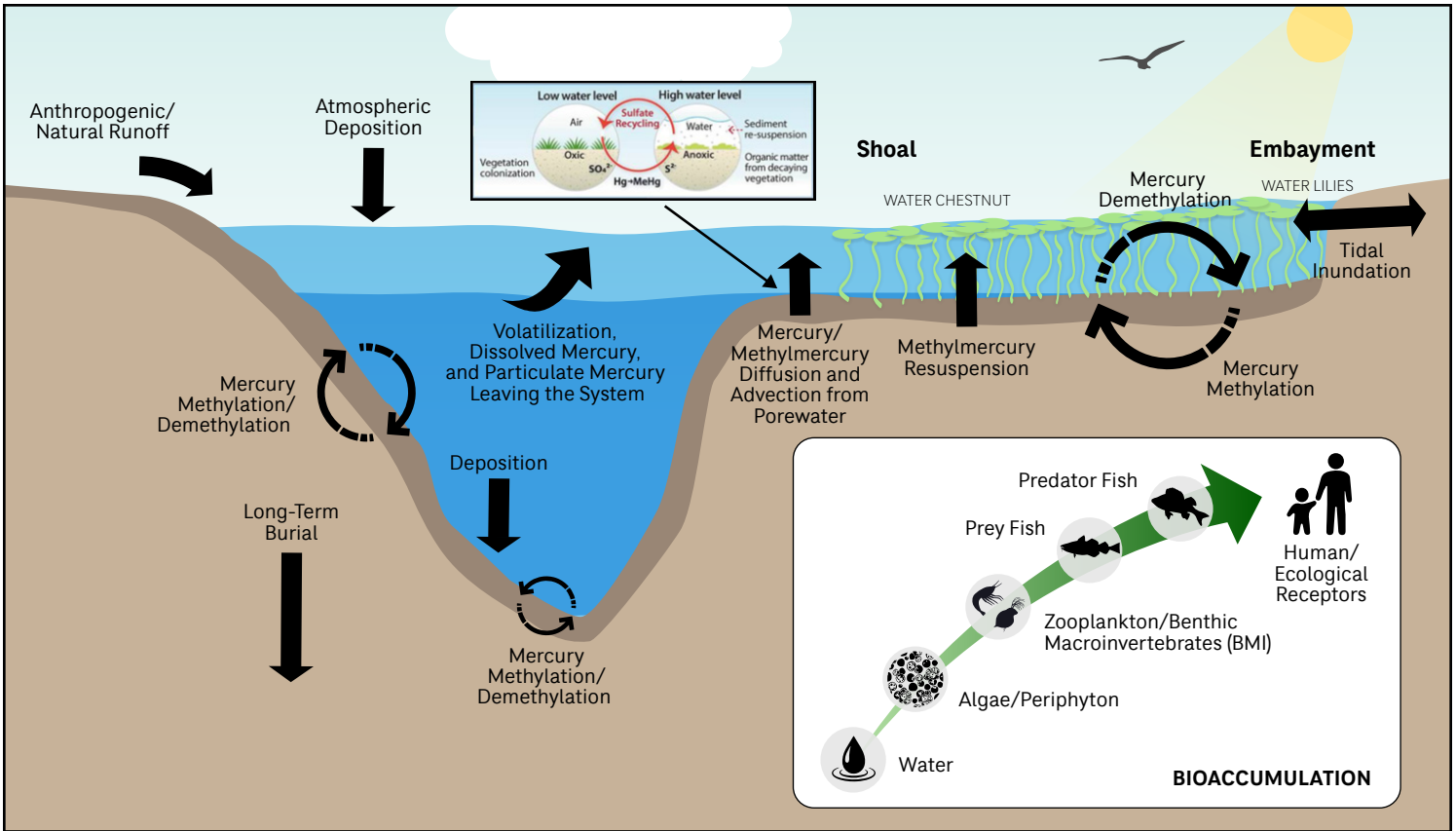
Stratigraphy

- Surface Soil
- Surface Sediment
- Subsurface Sediment
- Subsurface Soil

- Groundwater Table
- Wappinger Creek

CDM Smith

Figure 2-8
Conceptual Site Model
Fate and Transport of Contamination
Wappinger Creek Superfund Site
Wappingers Falls, New York

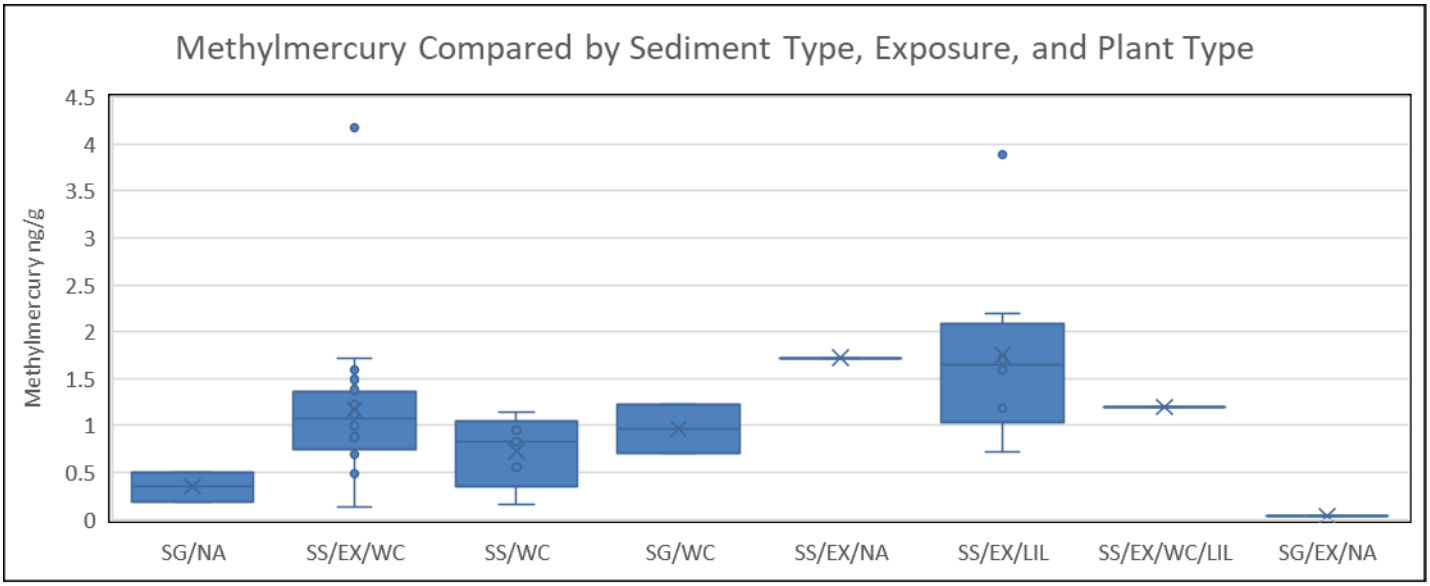


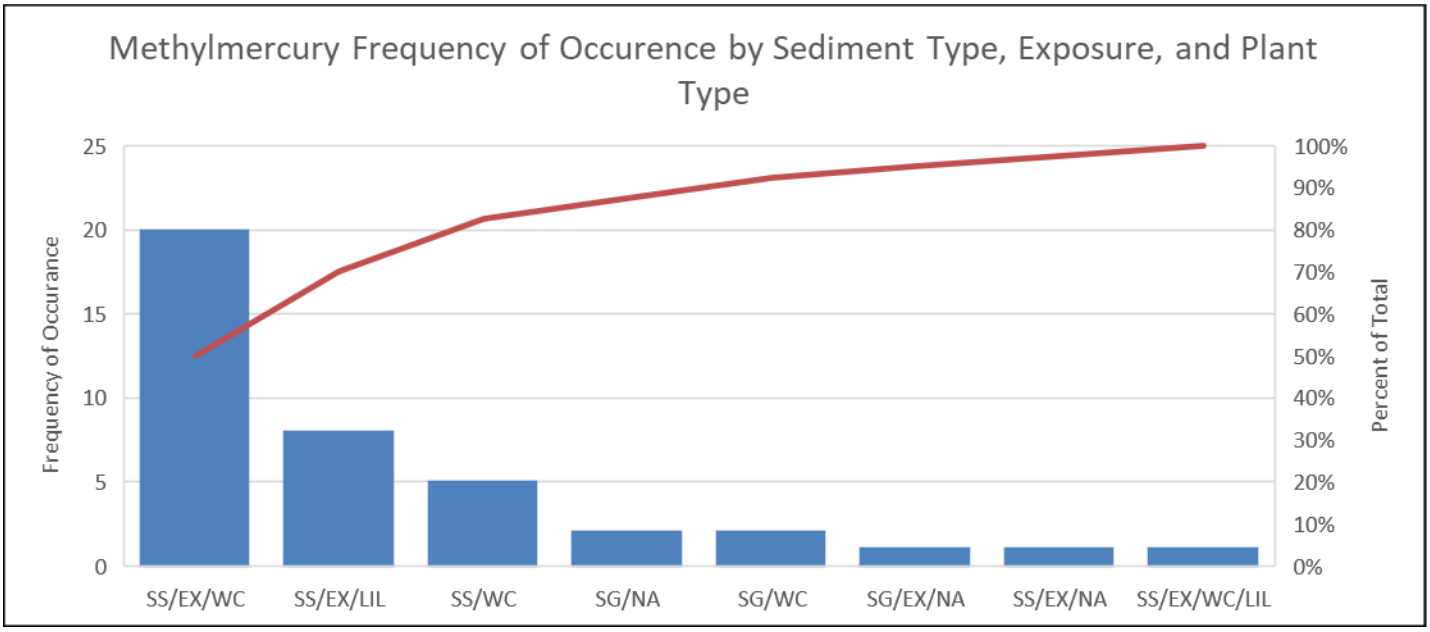
Surface Sediment

Subsurface Sediment

CDM Smith

Figure 2-9
Biogeochemical Cycle of Mercury
Wappinger Creek Superfund Site
Wappingers Falls, New York

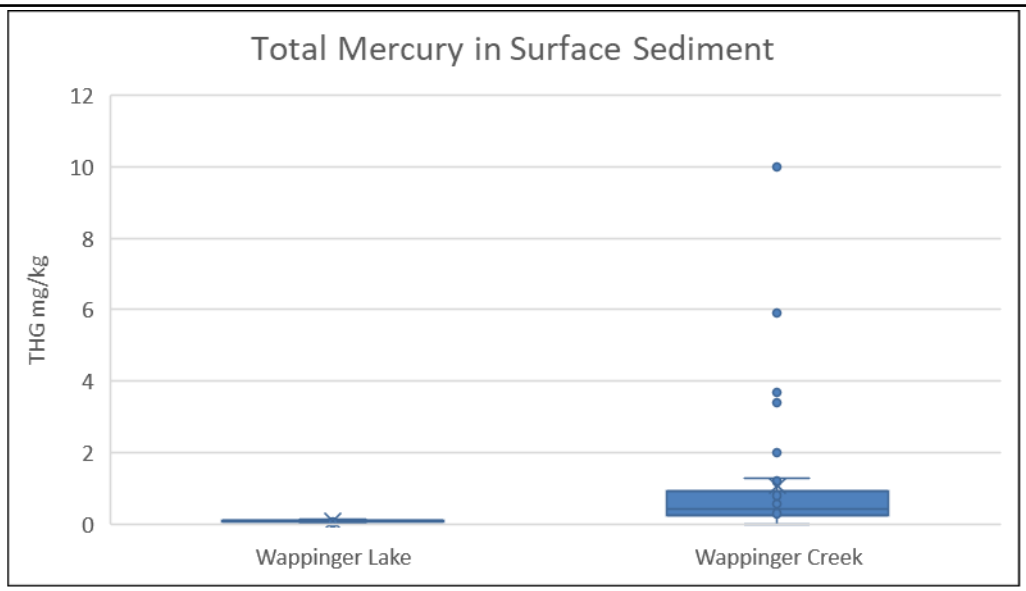


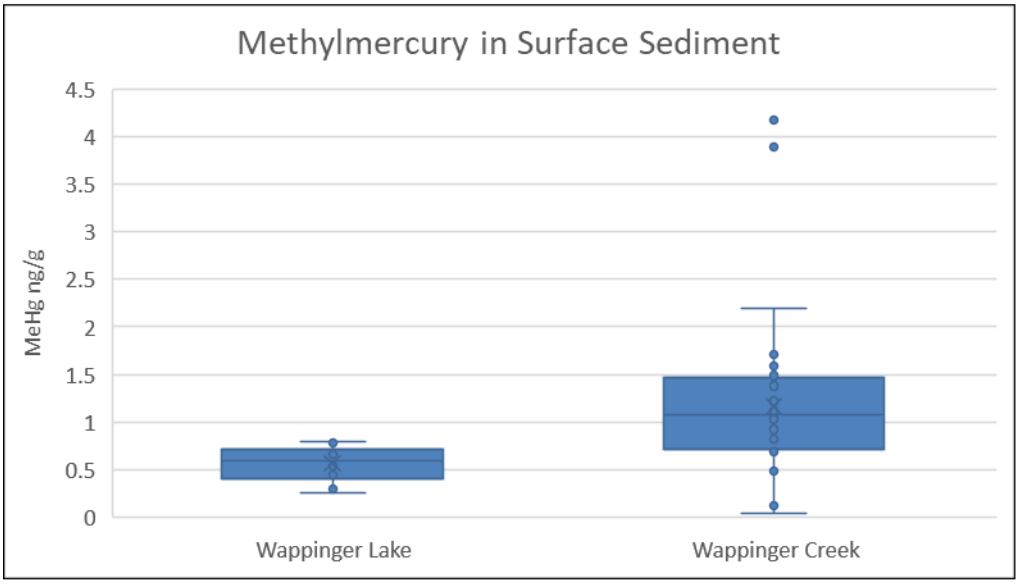


SS: Soft sediment
SG: Sandy gravel
EX: Sediment exposed during low tide
WC: Water Chestnut
LIL: Water Lily
WC/LIL: Boundary between water chestnut and water lily zones
NA: No vegetation

Figure 2-10
Methylmercury in Sediment Grouped by Sediment Type, Exposure, and Plant Type with the Associated Frequency of Occurrence of Each
Wappinger Creek Superfund Site
Wappingers Falls, New York

CDM Smith





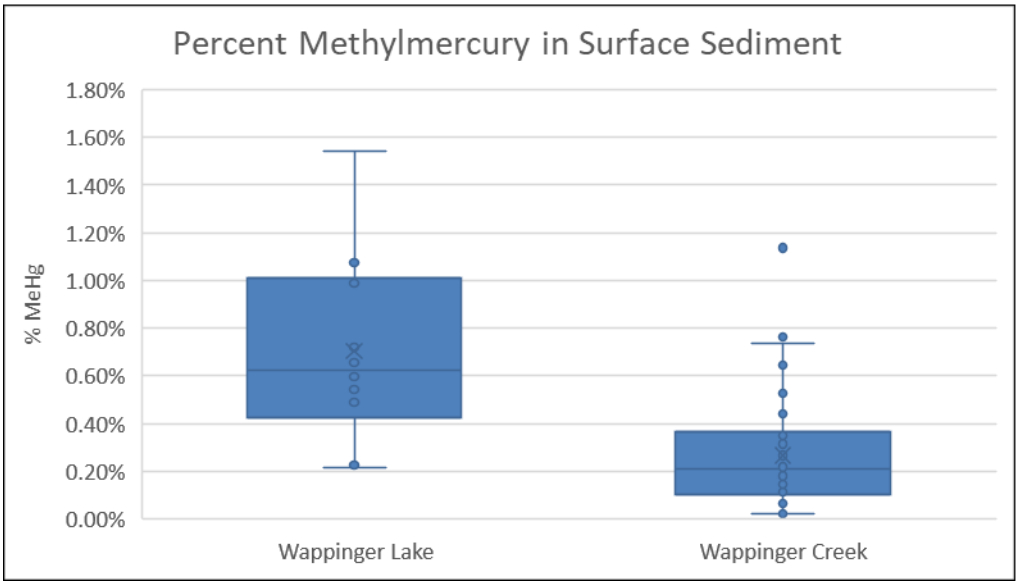
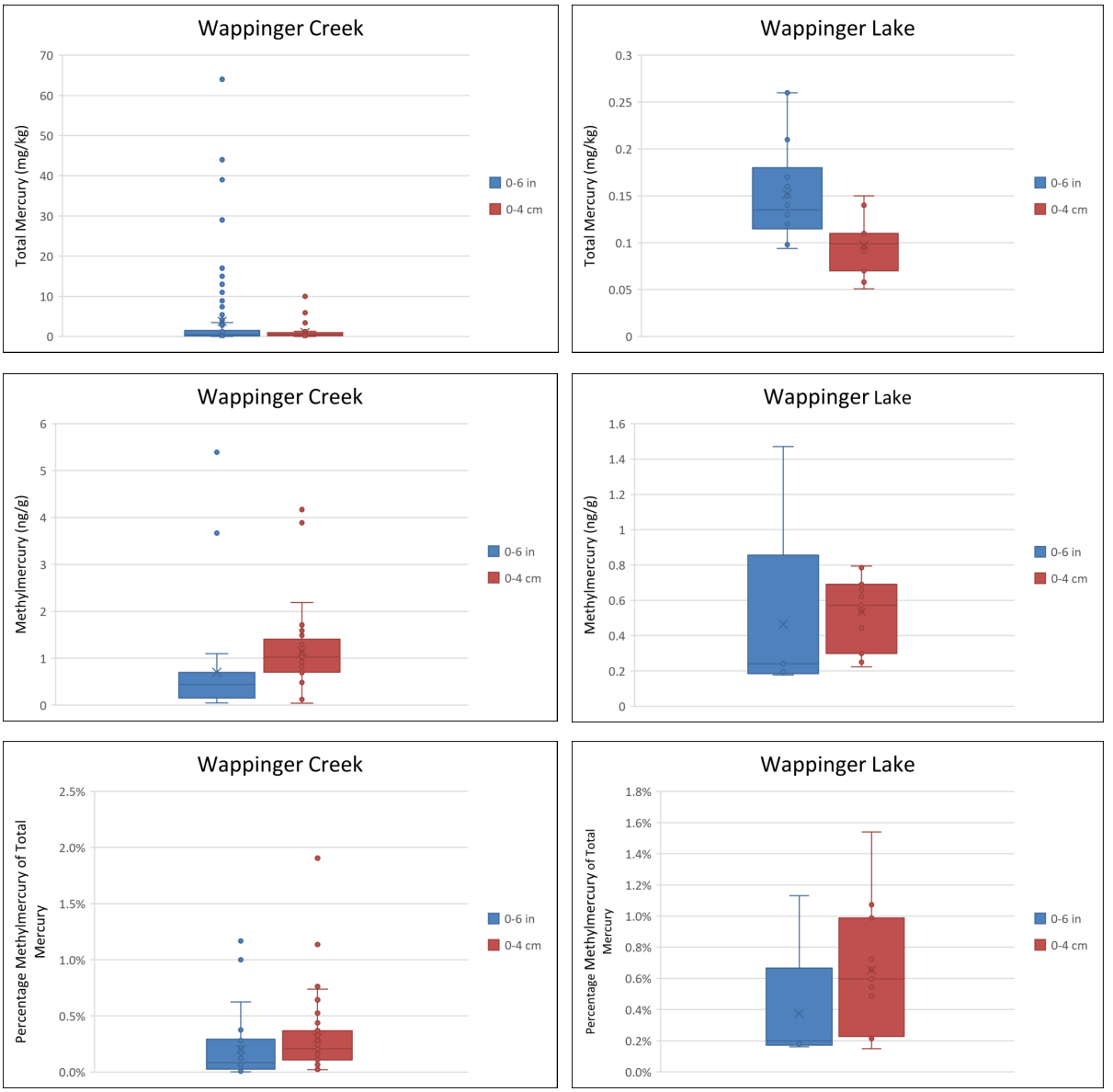


Figure 2-11
Total Mercury, Methylmercury, and Percent Mercury
in Wappinger Lake vs Wappinger Creek
Wappinger Creek Superfund Site
Wappingers Falls, New York

CDM Smith



Notes:

Top Panel - Comparison of total mercury concentrations within the top 6 inches of sediment and the top 4 centimeters of sediment (top 1.5 inches) in Wappinger Lake and Wappinger Creek.

Middle Panel - Comparison of methylmercury concentrations within the top 6 inches of sediment and the top 4 centimeters of sediment (top 1.5 inches) in Wappinger Lake and Wappinger Creek.

Bottom Panel - Comparison of the percentage of methymercury to total mercury within the top 6 inches of sediment and the top 4 centimeters of sediment (top 1.5 inches) in Wappinger Lake and Wappinger Creek.

The purpose of each comparison is to show the difference in mercury and methylmercury concentrations between the two depth intervals and highlight the increased methylmercury production within the top 4 cm of sediment.

Figure 2-12
Total Mercury, Methylmercury, and Percent Mercury from Top 6-inches vs Top 4-cm in Surface Sediment
Wappinger Creek Superfund Site
Wappingers Falls, New York

CDM Smith

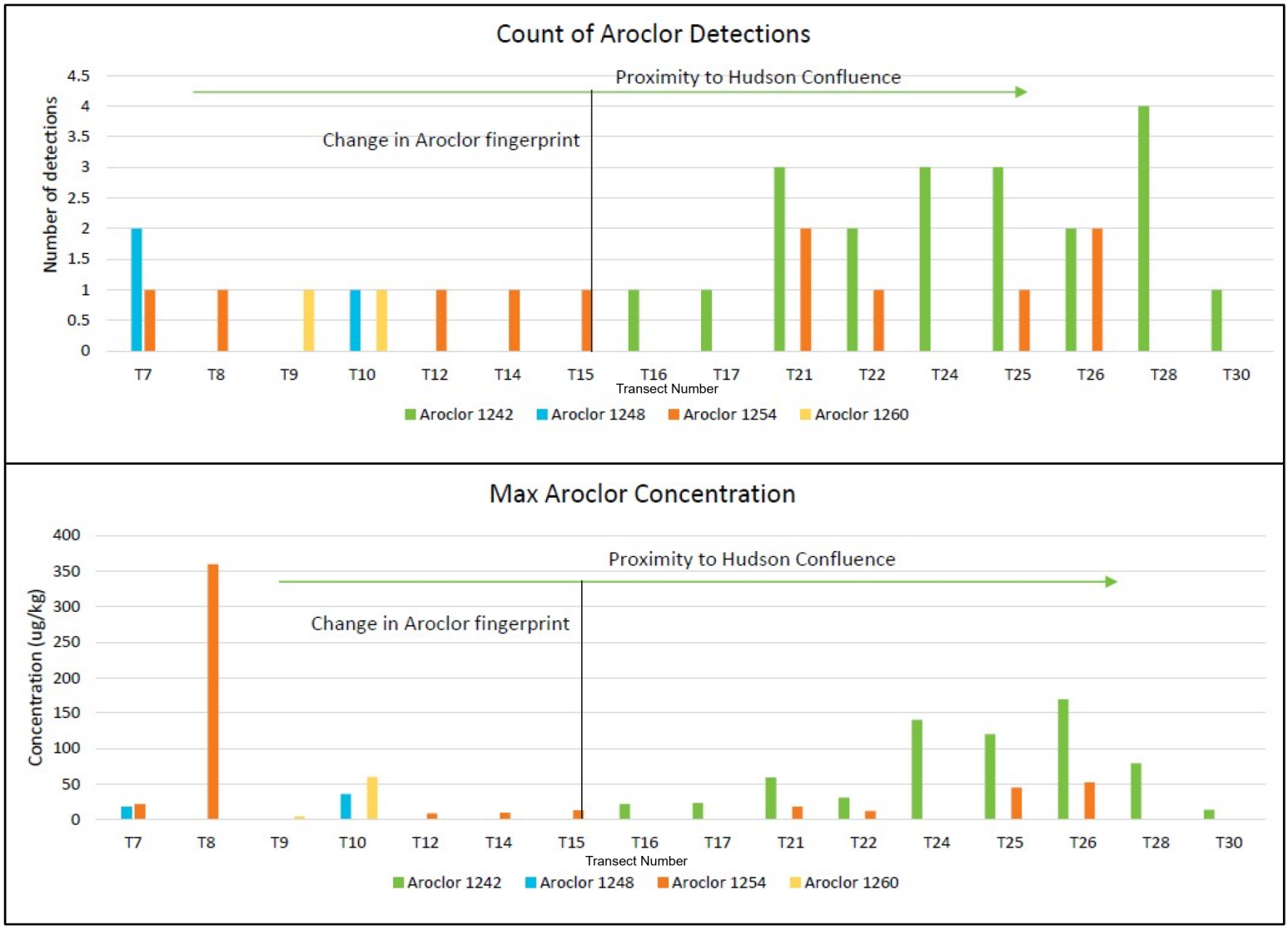
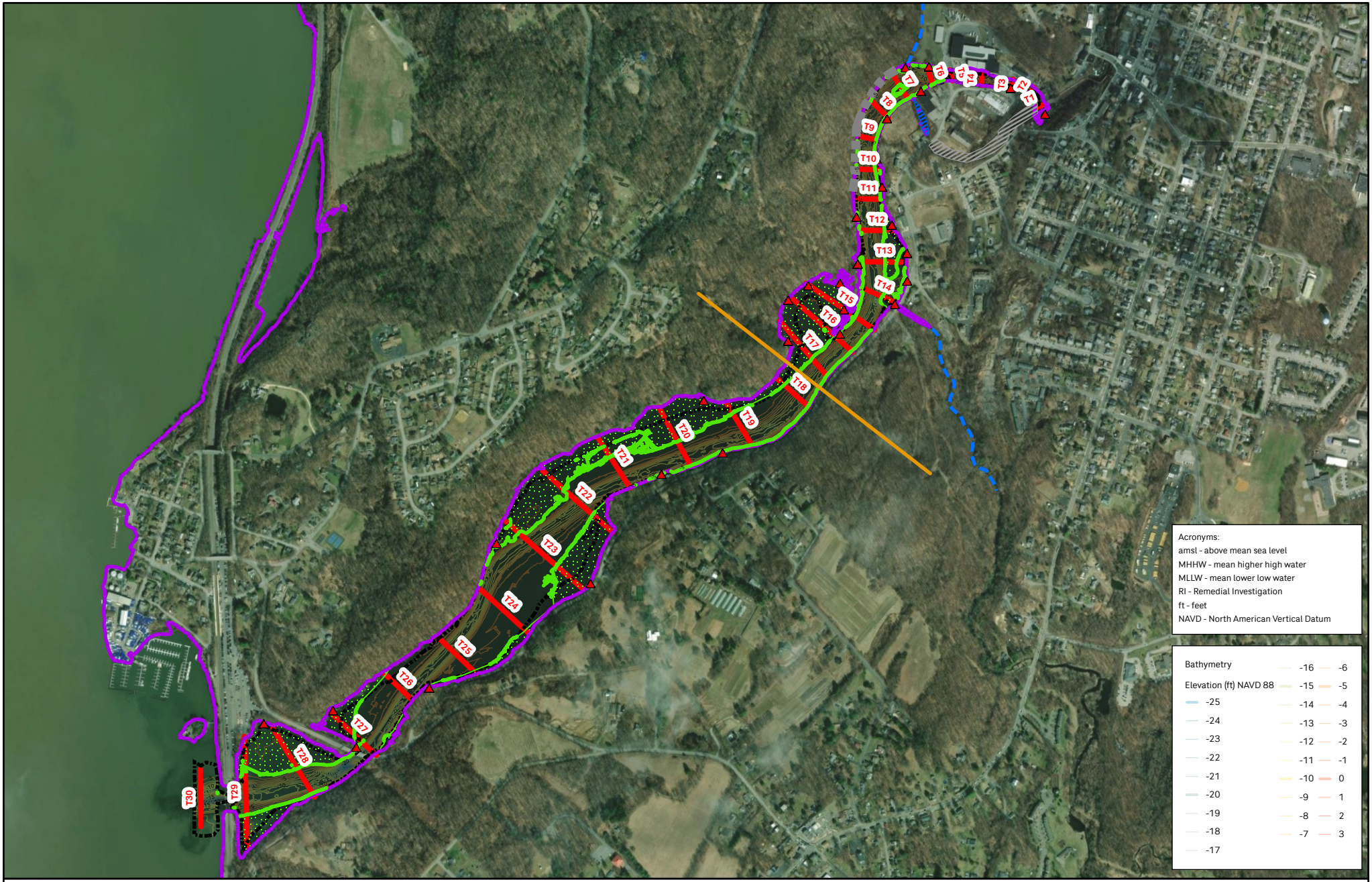


Figure 2-13
PCB Aroclor Detections and Max Concentrations in Sediments
Wappinger Creek Superfund Site
Wappingers Falls, New York

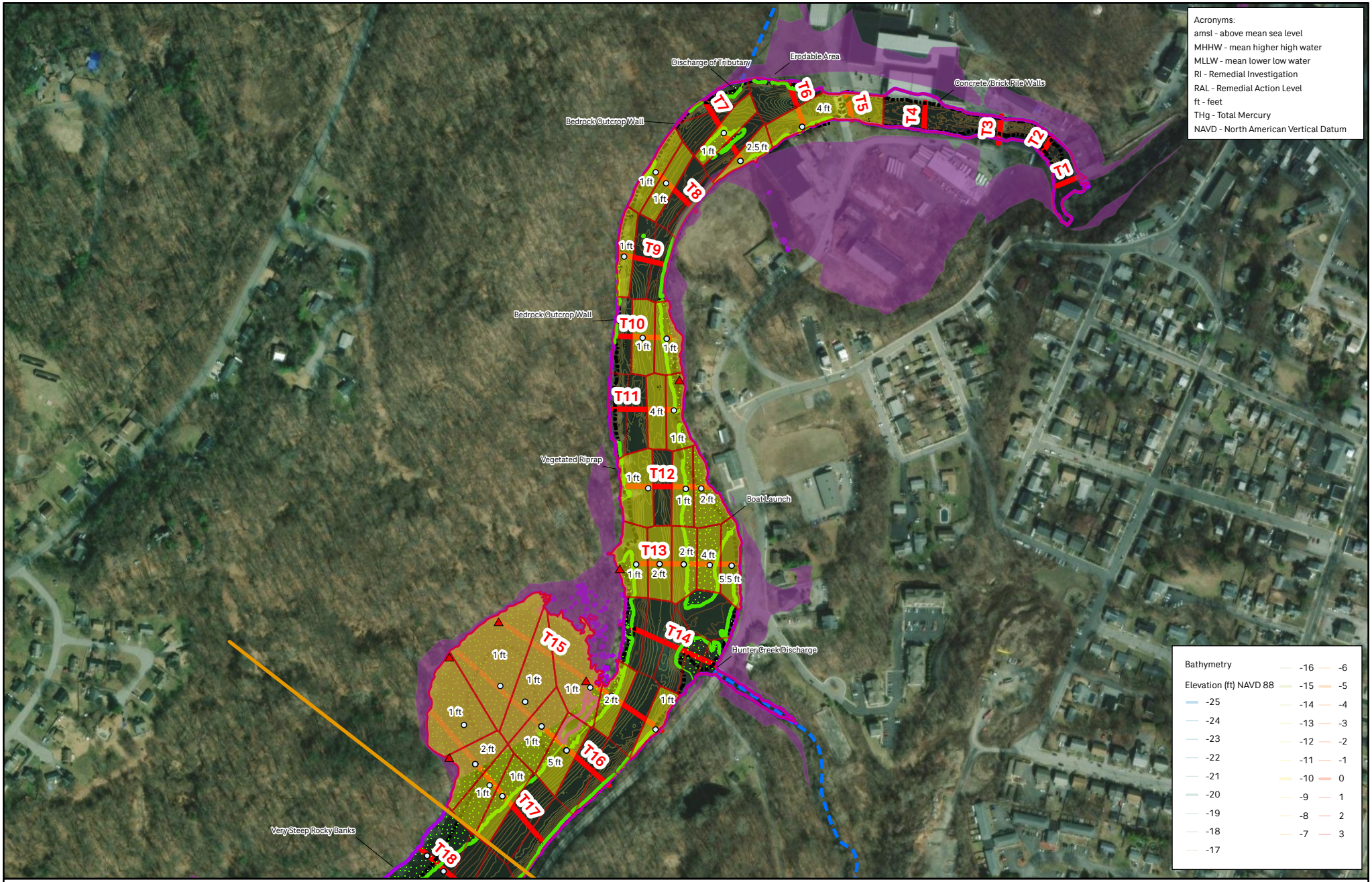


Notes:
1. MHHW calculated to be 2.22 ft NAVD88.
2. MLLW calculated to be -1.74 ft NAVD88.
3. Intertidal zone - the area between MHHW and MLLW. This zone is intermittently exposed to the atmosphere at lower tides and inundated at higher tides.
4. Bathymetric contours ae presented in feet amsl in NAVD88.

Figure 2-14
Estimated Hudson River line

Wappinger Creek Superfund Site
Wappinger Falls, New York

CDM Smith



N

Scale: 1:5,300

0 200 400 US Feet

Intertidal Zone
MLLW (-1.67 ft NAVD88)
MHHW (-2.22 ft NAVD88)
Tributaries
RI Sampling Transects
Creek Shoreline

Estimated Hudson River Line
Streambank Sample > RAL (all depths)
Sample Locations > RAL (all depths)
THg greater than RAL
1% Annual Chance Flood Hazard area immediately outside floodway
2 ft Depth of RAL exceedance below sediment surface

Notes:
1. MHHW calculated to be 2.22 ft NAVD88.
2. MLLW calculated to be -1.74 ft NAVD88.
3. Intertidal zone - the area between MHHW and MLLW. This zone is intermittently exposed to the atmosphere at lower tides and inundated at higher tides.
4. Bathymetric contours are presented in feet amsl in NAVD88.
5. Depth: THg exceeds RAL

Figure 3-1

Extent of RAL Exceedance for All Depth

Wappinger Creek Superfund Site
Wappinger Falls, New York

CDM Smith



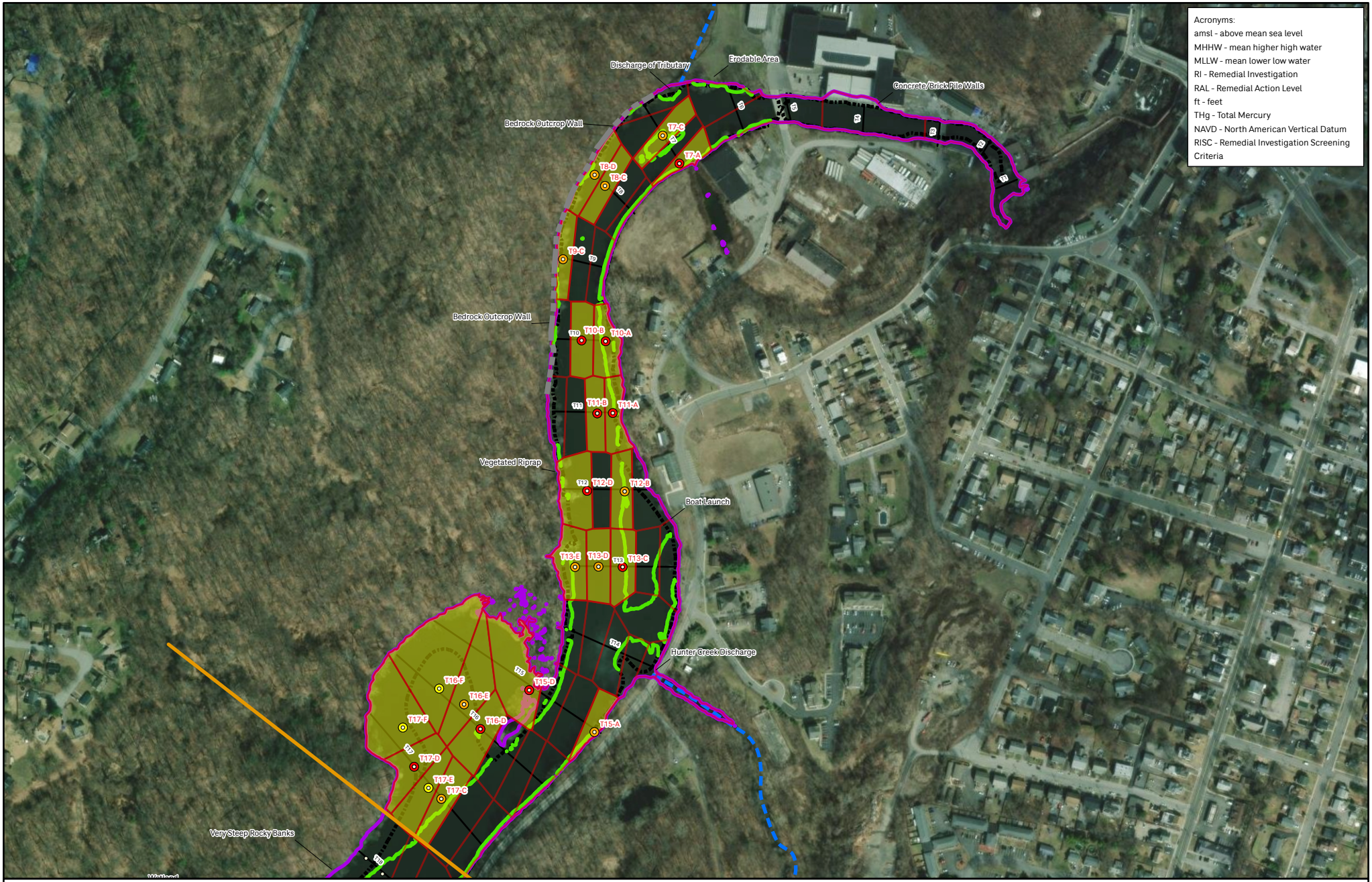
Notes:
1. MHHW calculated to be 2.22 ft NAVD88.
2. MLLW calculated to be -1.74 ft NAVD88.
3. Intertidal zone - the area between MHHW and MLLW. This zone is intermittently exposed to the atmosphere at lower tides and inundated at higher tides.
4. Bathymetric contours ae presented in feet amsl in NAVD88.
5. Reactive cap thickness assumed to be full sediment removal depth to maintain existing bathymetry.
6. Streambank soil removal will be generally in the vicinity of the streambank RAL exceedances and will be refined as part of the PDI.

Figure 6-1

Alternative 2 Extent of Remediation Area

Wappinger Creek Superfund Site
Wappingers Falls, New York

CDM Smith



Notes:

1. MHHW calculated to be 2.22 ft NAVD88.
2. MLLW calculated to be -1.74 ft NAVD88.
3. Intertidal zone - the area between MHHW and MLLW. This zone is intermittently exposed to the atmosphere at lower tides and inundated at higher tides.
4. Bathymetric contours ae presented in feet amsl in NAVD88.

Figure 6-1b

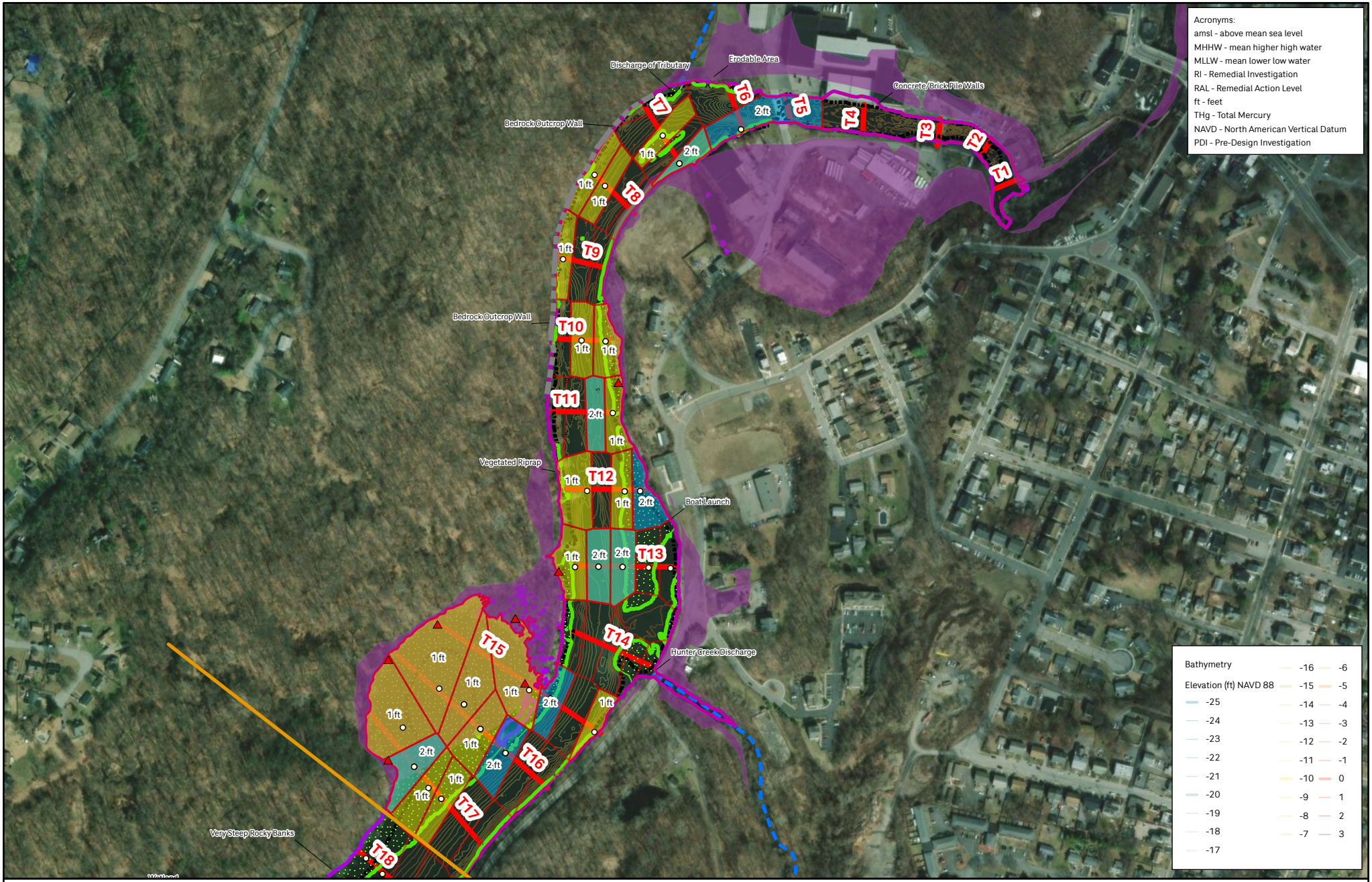
Other Site-Related Contaminants RISC Exceedances

0 to 1 Feet Below Mudline

Wappinger Creek Superfund Site

Wappingers Falls, New York

CDM Smith



N

Scale: 1:5,300

0 200 400 US Feet

- Intertidal Zone
- MLLW (-1.67 ft NAVD88)
- MHHW (-2.22 ft NAVD88)
- Tributaries
- RI Sampling Transects
- Creek Shoreline
- Estimated Hudson River Line
- > RAL sample location (All Depth)
- Streambank Sample > RAL (All Depths)

Sediment Sample Thiessen Polygons

- Area not targeted for sediment removal
- Area targeted for one-foot sediment removal
- Area targeted for two feet of sediment removal
- 1% Annual Chance Flood Hazard area immediately outside floodway
- Bedrock Outcrop Wall
- 2 ft Depth of removal below sediment surface

Notes:
1. MHHW calculated to be 2.22 ft NAVD88.
2. MLLW calculated to be -1.74 ft NAVD88.
3. Intertidal zone - the area between MHHW and MLLW. This zone is intermittently exposed to the atmosphere at lower tides and inundated at higher tides.
4. Bathymetric contours ae presented in feet amsl in NAVD88.
5. Reactive cap thickness assumed to be full sediment removal depth to maintain existing bathymetry.
6. Streambank soil removal will be generally in the vicinity of the streambank RAL exceedances and will be refined as part of the PDI.

Figure 6-2

Alternative 3 Extent of Remediation Area

Wappinger Creek Superfund Site
Wappingers Falls, New York

CDM Smith



Notes:

1. MHHW calculated to be 2.22 ft NAVD88.
2. MLLW calculated to be -1.74 ft NAVD88.
3. Intertidal zone - the area between MHHW and MLLW. This zone is intermittently exposed to the atmosphere at lower tides and inundated at higher tides.
4. Bathymetric contours ae presented in feet amsl in NAVD88.

Figure 6-2b

Other Site-Related Contaminants RISC Exceedances

1 to 2 Feet Below Mudline

Wappinger Creek Superfund Site

Wappingers Falls, New York

CDM Smith



N

Scale: 1:5,300

0 200 400 US Feet

- Intertidal Zone
- Mean Lower Low Water (-1.67 ft NAVD88)
- Mean Higher High Water (-2.22 feet NAVD88)
- Tributaries
- RI Sampling Transects
- Creek Shoreline
- Estimated Hudson River Line
- > RAL sample location (All Depth)
- Streambank Sample > RAL (All Depths)
- 1% Annual Chance Flood Hazard area immediately outside floodway
- Area not targeted for sediment removal
- Area targeted for one foot of sediment removal
- Area targeted for two feet of sediment removal
- Area targeted for deeper than 2 feet of sediment removal
- Bedrock Outcrop Wall

Notes:
1. MHHW calculated to be 2.22 ft NAVD88.
2. MLLW calculated to be -1.74 ft NAVD88.
3. Intertidal zone - the area between MHHW and MLLW. This zone is intermittently exposed to the atmosphere at lower tides and inundated at higher tides.
4. Bathymetric contours ae presented in feet amsl in NAVD88.
5. Reactive cap thickness assumed to be full sediment removal depth to maintain existing bathymetry.
6. Streambank soil removal will be generally in the vicinity of the streambank RAL exceedances and will be refined as part of the PDI.

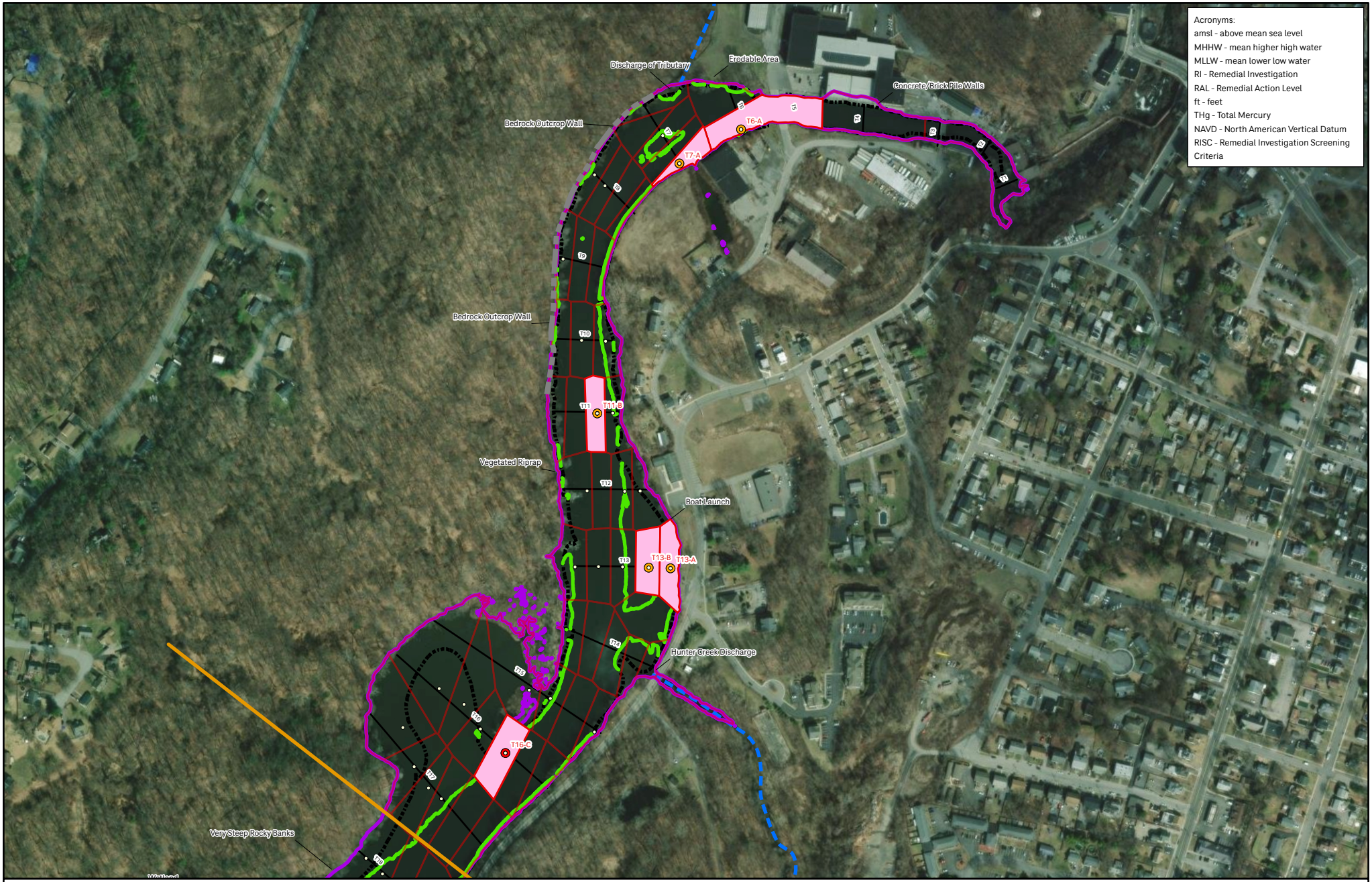
2 ft Depth of removal below sediment surface

Figure 6-3

Alternative 4 Extent of Remediation Area

Wappinger Creek Superfund Site
Wappingers Falls, New York

CDM Smith



Notes:

1. MHHW calculated to be 2.22 ft NAVD88.
2. MLLW calculated to be -1.74 ft NAVD88.
3. Intertidal zone - the area between MHHW and MLLW. This zone is intermittently exposed to the atmosphere at lower tides and inundated at higher tides.
4. Bathymetric contours ae presented in feet amsl in NAVD88.

Figure 6-3b

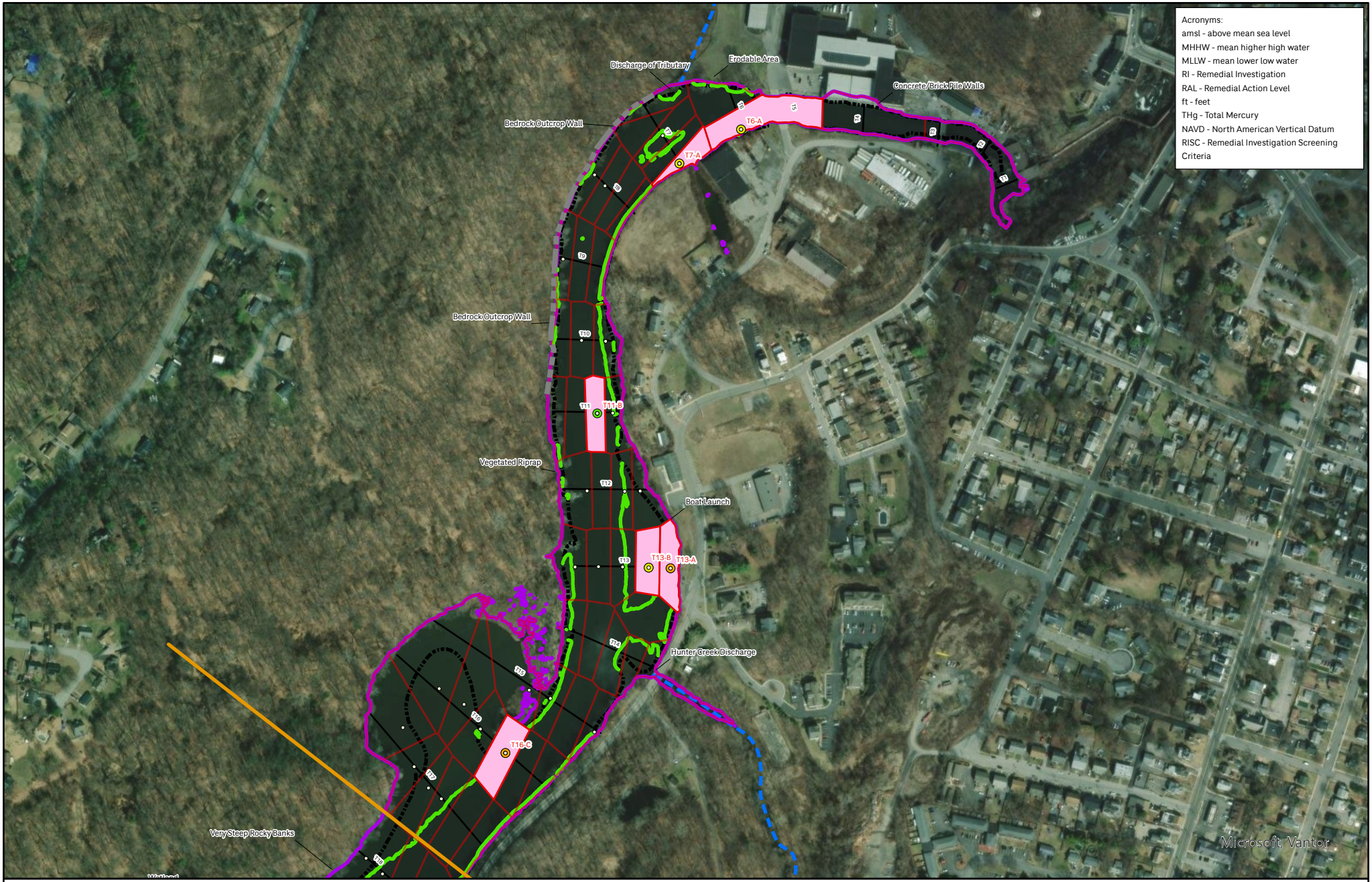
Other Site-Related Contaminants RISC Exceedances

2 to 4 Feet Below Mudline

Wappinger Creek Superfund Site

Wappingers Falls, New York

CDM Smith



N

Scale: 1:5,300

0 200 400 US Feet

MLLW (-1.67 ft NAVD88)
MHHW (-2.22 ft NAVD88)
Tributaries
RI Sampling Transects
Creek Shoreline
Estimated Hudson River Line
> RAL sample location (All Depth)

Area targeted for deeper than 2 feet of sediment removal
Bedrock Outcrop Wall

Number of Non-THg Contaminant Exceedances of RISC at RI Sampling Locations

0 exceedance
3 - 15
16 - 29

Notes:
1. MHHW calculated to be 2.22 ft NAVD88.
2. MLLW calculated to be -1.74 ft NAVD88.
3. Intertidal zone - the area between MHHW and MLLW. This zone is intermittently exposed to the atmosphere at lower tides and inundated at higher tides.
4. Bathymetric contours ae presented in feet amsl in NAVD88.

Figure 6-3c

Other Site-Related Contaminants RISC Exceedances

4 to 8 Feet Below Mudline

Wappinger Creek Superfund Site
Wappingers Falls, New York

CDM Smith

Appendix A
Applicable or Relevant and Appropriate Requirements and To-Be-Considered Information

Appendix A-1. Potential Federal and State Chemical-Specific Applicable or Relevant and Appropriate Requirements

Media/Location/Action	Requirements	Prerequisite	Citation(s)
Potential Federal Chemical-Specific Applicable or Relevant and Appropriate Requirement (ARARs)			
Protection of Surface-Water Quality			
Contaminants from CERCLA releases found in/discharged to surface water	Section 303(c) of the Clean Water Act (CWA) authorizes the requirements and procedures for developing, reviewing, revising, and approving water-quality standards by the states to protect existing and attainable use or uses of the receiving waters. Section 304(a) defines the federal water quality criteria (FWQC). These are nonenforceable numerical guidelines for contaminants that can be considered by states when establishing water quality standards for protection of human health and aquatic life. Mercury chronic aquatic life criterion: 0.77 micrograms per liter (µg/L); human health criterion: 0.05 µg/L.	Concentrations of substances, pollutants, or contaminants from CERCLA releases found in/discharged to surface water exposure to mercury-contaminated sediment may affect aquatic life or human health through fish consumption–**potentially relevant and appropriate.** FWQC are not legally enforceable standards but are potentially relevant and appropriate to CERCLA actions. CERCLA §121(d)(2)(B)(i) requires consideration of four factors when determining whether FWQC are relevant and appropriate: (1) the designated or potential use of the surface or groundwater, (2) the environmental media affected, (3) the purposes for which such criteria were developed, and (4) the latest information available. Wappinger Creek is considered Class C surface water per the New York State Department of Environmental Conservation (NYSDEC). The best usage for Class C surface waters is fishing. FWQC may be relevant and appropriate to this remedial action because surface water has been identified as an impacted medium from the CERCLA releases of hazardous substances, pollutants, or contaminants. In addition, fish consumption was identified as the only contributor to unacceptable risk in the Human Health Risk Assessment. Therefore, the human health criteria for consumption of organisms and the aquatic life criteria are considered potentially relevant and appropriate.	CWA, 33 U.S.C. § 1313 and 1314 (Sections 303(c) and 304(a)), and Implementing Regulations 40 CFR § 131.11
Potential State Chemical Specific ARARs			
Protection of Surface-Water Quality			
Contaminants from CERCLA releases found in/discharged to surface water	This statute and implementing regulation establishes criteria for New York State enforceable water-quality standards for approximately 200 contaminants in surface water. It says no residue attributable to sewage, industrial wastes, or other wastes; visible oil film; nor globules of grease should be present in surface waters. Per NYSDEC, Wappinger Creek is considered Class C, where the best usage is fishing. These waters will be suitable for fish, shellfish, and wildlife propagation and survival. The water quality will be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes. Wappinger Creek is also designated as trout waters, meaning it is subject to additional standards for trout or trout waters. Mercury standard for water column: 0.70 µg/L (total recoverable, human health).	Concentrations of substances, pollutants, or contaminants from CERCLA releases found in/discharged to surface water in New York State impacted by a remedial action–**potentially applicable** Mercury may leach into water from disturbed sediment.	Surface Waters of New York State, New York State Environmental Conservation Law (ECL) Article 15, Title 3; Article 17, Titles 3 and 8 and implementing regulation 6 New York Codes, Rules, and Regulations (NYCRR) Part 703.2 (narrative water quality standards) and 703.5 (water quality standards for toxic substances).

Appendix A-1. Potential Federal and State Chemical-Specific Applicable or Relevant and Appropriate Requirements

Media/Location/Action	Requirements	Prerequisite	Citation(s)
Protection of Soil Quality			
Contamination from CERCLA releases found in/discharged to sediments	This statute and implementing regulation provides the soil cleanup objectives (SCOs) for use in remedial programs under New York State's Environmental Remediation Programs. Mercury SCO: 0.18 milligrams per kilogram (mg/kg) (protection of groundwater); 0.81 mg/kg (unrestricted use or residential use); 5.7 mg/kg (restricted residential or commercial use); 0.4 mg/kg (industrial use).	Concentrations of mercury in dredged sediment resulting from CERCLA releases need to be evaluated against applicable SCOs to ensure protection of human health and the environment during handling, staging, or disposal of excavated material— **potentially relevant and appropriate** The SCO may guide sediment clean-up levels and off-site disposal criteria.	New York State ECL Article 1, Title 1; Article 27, Titles 13 & 14; Article 52, Title 3; Article 56, Title 5; Article 71, Title 36; and Article 3, Section 0301, and Implementing Regulations 6 NYCRR Part 375-6.8 (Soil cleanup objective tables)

Appendix A-2. Potential Federal and State Location-Specific Applicable or Relevant and Appropriate Requirements

Media/Location/Action	Requirements	Prerequisite	Citation(s)
Potential Federal Location-Specific ARARs			
Floodplain			
Presence of floodplains within remediation work areas	This regulation requires that federal agencies take measures to incorporate floodplain management goals into planning, regulatory, and decision-making processes. It also requires that agencies promote the preservation and restoration of floodplains so that their natural and beneficial values can be realized. Long- and short-term impacts associated with the occupancy and modification of floodplains will be avoided wherever possible. Agencies will avoid direct and indirect support of floodplain development wherever there is a practicable alternative.	Presence of floodplains–**potentially applicable.** Much of the site is within the Federal Emergency Management Agency (FEMA) designated Special Flood Hazard Area. Wappinger Creek, itself, is a floodway per FEMA.	Floodplain Management Regulations, 44 CFR § 9 and 40 CFR § 6 Appendix A
Presence of floodplain within remediation work areas	This regulation prohibits encroachments such as capping or placement of material in the river or on riverbanks that would result in any increase in flood levels during base flood discharge.	Presence of floodplains–**potentially relevant and appropriate.** This regulation is relevant and appropriate to the site because it is applicable to communities that establish requirements to manage floodplains. Remedial actions that involve capping or other placement of material in the creek or on adjacent creek banks may increase flood levels. Much of the site is within FEMA designated Special Flood Hazard Area. Wappinger Creek, itself, is a floodway.	Floodplain Management Criteria for Flood-Prone Areas, 44 CFR § 60.3(d)(2) and (3)
Wetlands			
Presence of wetlands within remediation work areas	This regulation requires that federal agencies take measures to incorporate wetlands protection considerations into planning, regulatory, and decision-making processes. It also requires that agencies minimize the destruction, loss, or degradation of wetlands and preserve and enhance the natural and beneficial values of wetlands. Agencies will avoid direct and indirect support of wetlands development wherever there is a practicable alternative.	Presence of jurisdictional wetlands–**potentially applicable.** Wappinger Creek is listed as a Riverine wetland habitat in the National Wetlands Inventory. There are also several freshwater ponds nearby and one location of freshwater forested/shrub wetland.	Protection of Wetlands Regulations, 40 CFR § 6 Appendix A

Appendix A-2. Potential Federal and State Location-Specific Applicable or Relevant and Appropriate Requirements

Media/Location/Action	Requirements	Prerequisite	Citation(s)
Potential Federal Location Specific ARARs (Continued)			
Protection of Historic Buildings and Cultural Resources			
Presence of cultural resources within remediation work areas	This statute and implementing regulation requires federal agencies to take into account the effect of this response action upon any district, site, building, structure, or object that is included in or eligible for the National Register of Historic Places (generally, 50 years old or older). Federal agencies are required to take into account their undertakings on historic properties and must determine if there will be an adverse effect and, if so, how the effect may be minimized or mitigated in consultation with the appropriate State Historic Preservation Office (SHPO). Potential actions could impact cultural resources eligible for the National Register of Historic Places. Developing a Phase IB cultural resources survey with the remedial action is recommended so historic artifacts associated with National Register of Historic Places-listed properties or eligible properties can be preserved. Monitoring by a qualified archaeologist may be needed during remedial action.	Identification of cultural resources on or eligible for the National Register – **potentially applicable.** A cultural resources survey was completed for the project in 2021. The results indicate the site is within the boundaries of the Wappinger Falls Historic District, which is listed on the National Register of Historic Places. In addition, the Industrial Park, specifically, has been active for more than 100 years, suggesting National Register of Historic Places eligibility.	National Historic Preservation Act 54 U.S.C. § 306101 (Section 106), and 16 U.S.C. § 470 and Implementing Regulations 36 CFR §§ 60, 63, 6.301(b), 800
Presence of archaeological or historical artifacts within remediation work areas	This statute and implementing regulation establish requirements for the evaluation and preservation of historical and archaeological data that may be destroyed through alteration of terrain because of a federal construction project or a federally licensed activity or program. The unauthorized removal of archaeological resources from a federal project or federally managed lands is prohibited without a permit. Any archaeological investigations at a site must be conducted by a professional archaeologist. Potential actions could impact cultural resource features, both in water at the Industrial Park and along creek banks. Developing a Phase IB cultural resources survey with the remedial action is recommended so historic artifacts associated with National Register of Historic Places-listed properties or eligible properties can be preserved. Monitoring by a qualified archaeologist may be needed during remedial action. Note that under CERCLA 121(e), a permit is not required for on-site CERCLA response actions. CERCLA requires that only substantive aspects of the permits will be complied with. Administrative component will not be addressed.	Identification of archaeological resources by an archaeological investigation– **potentially applicable.** A cultural resources survey was completed for the project in 2021. The results of the Phase IA indicate the site has a moderate to high potential for the presence of precontact Native American sites, and the northeast portion of the site has a moderate to high sensitivity for the presence of nineteenth- and early-twentieth-century archaeological deposits associated with the Dutchess Print Works and the industrial history of Wappingers Falls. Five cultural resources were identified during the site visit. In addition, the site is within the boundaries of the National Register of Historic Places-listed Wappinger Falls Historic District. Therefore, the potential exists for archaeological resources that contribute to the significance of the Wappingers Falls Historic District in that area.	Preservation of Historical and Archeological Data 54 U.S.C. §§ 312501-312504, 312506-312508, and Implementing Regulations 43 CFR § 7, Protection of Archaeological Resources
Conservation of Protected Species and Habitats			
Presence of habitat for bald and/or golden eagles within remediation work areas	This statute makes it unlawful for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter any bald or golden eagle or the parts, nests, or eggs of such a bird. In addition to immediate impacts, this requirement also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits and causes injury, death, or nest abandonment. If bald or golden eagles are identified during remedial design and remedial action, activities must be modified and conducted to conserve the species and their habitat.	Identification of bald or golden eagles and actions that could impair the species and their habitat–**potentially applicable.** During ecological reconnaissance visits performed as part of the Screening Level Ecological Risk Assessment (SLERA), a bald eagle was observed. In addition, the United States Fish and Wildlife Service (USFWS) lists bald eagles as one of the avian species of concern that exist in the project area. There is the potential for eagle nests to exist on top of shoreline structures at the Industrial Park or in trees lining the banks of the creek that could be affected by a remedial action.	Bald and Golden Eagle Protection Act 16 U.S.C. § 668(a), and Implementing Regulations 50 CFR § 22.12

Appendix A-2. Potential Federal and State Location-Specific Applicable or Relevant and Appropriate Requirements

Media/Location/Action	Requirements	Prerequisite	Citation(s)
Presence of habitat for migratory birds in remediation work areas	This statute and implementing regulations make it unlawful for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter any migratory bird or the parts, nests, or eggs of such a bird. If migratory birds are identified during remedial design and remedial action, activities must be modified and conducted to conserve the species and their habitat.	Actions that may negatively impact the migratory birds and their habitat–**potentially applicable.** Remedial actions may impact migratory birds because they may be conducted within and near water bodies. There are numerous migratory birds species that exist in the area or have particular vulnerabilities in the area per the USFWS Birds of Conservation Concern List. During ecological reconnaissance visits performed as part of the SLERA, several migratory bird species were observed along the water.	Migratory Bird Treaty Act 16 U.S.C. § 703 and Implementing Regulations 50 CFR § 10.13 (List of Migratory Birds)
Presence of any stream or other body of water to be impounded, diverted, controlled, or modified for drainage	This statute and implementing regulations require coordination with federal and state agencies for federally funded projects to ensure that any modification of any stream or other water body affected by any action authorized or funded by the federal agency provides for adequate protection of fish and wildlife resources. Consultation with the federal agencies will be conducted to identify substantive requirements for adequate protection of fish and wildlife resources. *NOTE:* Federal agencies must comply with substantive requirements identified by UFWS and the relevant state agency with jurisdiction over wildlife resources.	Modification of any stream or water bodies that affect nongame fish and wildlife resources–**potentially applicable.** Remedial actions may involve federally funded modification of water bodies. The creek is known to be habitat for nongame fish and wildlife.	Fish and Wildlife Coordination Act 16 U.S.C. §§ 662 and 663 and Implementing Regulations 43 CFR § 24.4(i)
Potential Federal Location-Specific ARARs (Continued)			
Presence of essential fish habitat within remediation work areas	Requires federal agencies to consult with National Marine Fisheries Service (NMFS) on actions that may adversely affect Essential Fish Habitat (EFH), defined as "those waters the substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Consultation with the federal agencies will be conducted to identify substantive requirements for protection of EFH.	Actions that may adversely affect EFH–**potentially applicable.** The creek is known to be habitat for fish and wildlife, as the area is designated as EFH. Wappinger Creek is also a designated habitat area of particular concern for summer flounder per NMFS and marked on the New York State Environmental Resource Mapper as being in the vicinity of significant anadromous fish concentrations. Potential effects to EFH from the proposed remedial actions have not yet been evaluated.	Magnuson-Stevens Fishery Conservation and Management Act 16 U.S.C. §1855(b)(2) and Implementing Regulations 50 CFR § 600.920
Presence of federally listed threatened or endangered (T&E) species or their habitat within remediation work areas	This statute and implementing regulations provide that federal activities do not jeopardize the continued existence of any T&E species. 16 U.S.C. 1536(a) of the Endangered Species Act requires consultation with USFWS to identify the possible presence of protected species and mitigate potential impacts on such species. Substantive compliance with the Endangered Species Act means that the lead agency must identify whether a T&E species, or its critical habitat, will be affected by a proposed response action. If so, the agency must avoid the action or take appropriate mitigation measures so that the action does not affect the species or its critical habitat. If, at any point, the conclusion is reached that endangered species are not present or will not be affected, no further action is required. If T&E species are identified during remedial design and remedial action, activities must be modified and conducted to conserve the species and their habitat.	Presence of federally listed T&E species or their habitat within the site–**potentially applicable**. The USFWS reported the site is within areas that provide habitat for the endangered Indiana bat, threatened northern long-eared bat, and a species of concern, the monarch butterfly. In addition, several species of anadromous fish are federally listed as T&E. The New York State Environmental Resource Mapper marks the area as being in the vicinity of significant anadromous fish concentrations.	Endangered Species Act, 16 U.S.C. § 1536(a)(2), Implementing Regulations 50 CFR § 17.11 (Endangered and Threatened Wildlife) and 50 CFR § 17.12 (Endangered and Threatened Plants), or 50 CFR § 17.95 (Designation of Critical Habitat Area)

Appendix A-2. Potential Federal and State Location-Specific Applicable or Relevant and Appropriate Requirements

Media/Location/Action	Requirements	Prerequisite	Citation(s)
Coastal Zone Management			
Presence of coastal zone management area within remediation work areas	Requires activities affecting land or water uses in a coastal zone to certify non-interference with coastal zone management. It establishes that federal agencies that conduct or support activities that directly affect a coastal use or resource must undertake those activities in a manner that is consistent, to the maximum extent practicable, with State coastal management programs that have been approved by the NOAA.	Presence of coastal zone management areas within the site– **potentially applicable** Remedial actions may impact coastal zones. A portion of the site boundary of the Wappinger Creek is within the coastal zone management act boundary designated by NOAA for the State of New York.	Coastal Zone Management Act 16 U.S.C. § 1455b and 1456 and Implementing Regulations 15 CFR 930.32 through 930.34

Appendix A-2. Potential Federal and State Location-Specific Applicable or Relevant and Appropriate Requirements

Media/Location/Action	Requirements	Prerequisite	Citation(s)
Potential State Location-Specific ARARs			
Floodplain			
Actions that take place on floodplains in New York State	This regulation establishes floodplain management criteria for state projects in New York to minimize flood damage and protect public safety. It requires state agencies to identify flood hazard areas and design projects—such as structures and utilities—so they are resistant to flooding, properly elevated above base-flood levels, and constructed to prevent damage or collapse during floods.	Actions that could potentially adversely impact floodplains–**potentially applicable**. Much of the site is within the FEMA designated Special Flood Hazard Area corresponding to inundation by the 1 percent (%) annual chance flood (100-year flood). Wappinger Creek, itself, is a floodway per FEMA.	New York State ECL Article 15 Water Resources, Title 5 Flood Control and Flood Plan Management § 15-0505 (Floodplain Management Policy), and Implementing Regulations 6 NYCRR Part 502 (State Floodplain Management)
Wetland			
Presence of tidal wetlands within remediation work areas	This statute and implementing regulation establish requirements for undertaking activities in or adjacent to tidal wetlands to preserve, protect, and enhance present and potential values of tidal wetlands within New York State including development restrictions. Remedial actions will comply with substantive requirements of the permits. Alternatives should be evaluated to minimize the destruction, loss, or degradation of tidal wetlands to the extent practicable.	Presence of tidal wetlands within Wappinger Creek or surrounding area–**potentially applicable.** Though Wappinger Creek is not identified as tidal wetlands in the NYSDEC Info Locator tool mapping regulatory tidal wetlands, it does meet the definition of tidal wetland in New York State ECL, Article 25. In addition, Wappinger Creek is considered "lower Hudson River" where NYSDEC indicates tidal wetlands are found. Therefore, for purposes of this assessment, the area surrounding Wappinger Creek is considered tidal wetlands. The remedial action may include activities such as dredging and/or placement of fill, which is regulated under the Tidal Wetlands Act.	New York State ECL Article 25 Tidal Wetlands, Title 4 and Implementing Regulation 6 NYCRR Part 661.6
Presence of State-Owned Tidal Wetlands	This statute and implementing regulation prohibits the following activities within state owned tidal wetlands: (1) any use of a motor vehicle, including parking, more than one hour before sunrise or more than one hour after sunset except for specifically permitted nature appreciation, educational or research activities; (3) fires; (5) removal of naturally occurring or introduced flora, whether living or dead, except for specifically permitted research or educational activities; (6) operation of motorized, wheeled or tracked vehicles and air boats except as specifically permitted activities; (7) construction, erection or maintenance of any structure, except temporary blinds or temporary structures associated with specifically permitted research or educational activities which are permissible under section 51-0713 of the Environmental Conservation Law; or (8) disposal of any solid, liquid or toxic waste material. Note that under CERCLA 121(e), a permit is not required for on-site CERCLA response actions. CERCLA requires that only substantive aspects of the permits will be complied with. Administrative component will not be addressed.	Use of state-owned tidal wetlands within Wappinger Creek or surrounding are – **potentially applicable.** Though Wappinger Creek is not identified as tidal wetlands in the NYSDEC Info Locator tool mapping regulatory tidal wetlands, it does meet the definition of tidal wetland in New York State ECL, Article 25. In addition, Wappinger Creek is considered "lower Hudson River" where NYSDEC indicates tidal wetlands are found. Therefore, for purposes of this assessment, the area surrounding Wappinger Creek is considered tidal wetlands. The remedial action may include activities such as dredging and/or placement of fill, which is regulated under the Tidal Wetlands Act.	New York State ECL Article 3, Title 3 and implementing regulation 6 NYCRR Part 46

Appendix A-2. Potential Federal and State Location-Specific Applicable or Relevant and Appropriate Requirements

Media/Location/Action	Requirements	Prerequisite	Citation(s)
Presence of state-owned freshwater wetlands	This statute and implementing regulation preserve and protect freshwater wetlands and the benefits they provide, such as water filtration, flood control, habitat for fish and wildlife, and maintenance of natural hydrology. They regulate any activities that may impact designated freshwater wetlands or their adjacent areas, including dredging, filling, draining, or construction.	Presence of freshwater wetlands–**potentially applicable**. Wappinger Creek is listed as riverine habitat in the National Wetlands Inventory. There are also several freshwater ponds nearby and one location of freshwater forested/shrub wetland. The embayment area, located along the northern bank, of Wappinger Creek is approximately 240,000 square feet (approximately 800 by 300 feet) and is fronted by palustrine freshwater forested/shrub wetland. The remedial action, including dredging, staging, or disposal activities, occurs within or adjacent to NYSDEC regulated freshwater wetlands.	Freshwater Wetlands Protection Act, NY ECL Article 24, and Implementing Regulations 6 NYCRR Part 663 (Regulations for Freshwater Wetlands Protection)
Protection of Historic Buildings and Cultural Resources			
Presence of archaeological or historical artifacts within remediation work areas	This statue protects New York's historic and archaeological resources by requiring state-level review and consultation with the New York SHPO for projects that could impact those resources, helping to balance development and preservation. Relevant for projects involving ground disturbance, construction, or alteration that could impact archaeological sites, historic buildings, structures, or landscapes. For remediation actions like dredging or construction near historic sites, the State Historic Preservation Act (SHPA) may require surveys, documentation, or mitigation plans before work can proceed. Consultation with agencies such as SHPO will be conducted to identify substantive requirements for adequate protection of archaeological or historical artifacts.	Wappinger Creek and surrounding areas may contain historic or archaeological resources potentially affected by dredging or remediation activities. Identification of archaeological resources by an archaeological investigation–**potentially applicable.** A cultural resources survey was completed for the project in 2021. The results of the Phase IA indicate the site has a moderate to high potential for the presence of precontact Native American sites, and the northeast portion of the site has a moderate to high sensitivity for the presence of nineteenth- and early-twentieth-century archaeological deposits associated with the Dutchess Print Works and the industrial history of Wappingers Falls. Five cultural resources were identified during the site visit. In addition, the site is within the boundaries of the National Register of Historic Places-listed Wappinger Falls Historic District. Therefore, the potential exists for archaeological resources that contribute to the significance of the Wappingers Falls Historic District to be in that area.	SHPA, NY Parks, Recreation and Historic Preservation Law § 14.09 and Implementing Regulations 9 NYCRR Part 427 (SHPA Review Procedures)
Potential State Location-Specific ARARs (Continued)			
Conservation of Protected Species and Habitats			
Presence of state-listed T&E species or species of special concern and their habitats within remediation work areas	This statute and implementing regulation provide protection for T&E species and species of special concern within New York State. The taking of any T&E species is prohibited, except under a permit or license issued by NYSDEC. Note that under CERCLA 121(e), a permit is not required for on-site CERCLA response actions. CERCLA requires that only substantive aspects of the permits will be complied with. Administrative component will not be addressed. Consultation with agencies will be conducted to identify substantive requirements for adequate protection of T&E species.	Presence of state-listed T&E species or their habitat within the site–**potentially applicable.** The site may contain endangered, threatened, or species of special concern. The New York State Environmental Resource Mapper identifies the area as being within the vicinity of bats listed as T&E. In addition, New York State Environmental Resource Mapper marks the area as being in the vicinity of significant anadromous fish concentrations, and there is one anadromous fish (shortnose sturgeon) that is a state-listed endangered species.	New York Endangered Species Act New York State ECL Article 11, Title 5, Section 11-0535 (Endangered and threatened species) and Implementing Regulation 6 NYCRR Part 182

Appendix A-2. Potential Federal and State Location-Specific Applicable or Relevant and Appropriate Requirements

Media/Location/Action	Requirements	Prerequisite	Citation(s)
Presence of fish and wildlife within remediation work areas	This statute establishes fish and wildlife management practices to preserve and develop fish and wildlife resources and improve access to them for recreational purposes. The regulation prohibits the discharge of deleterious or poisonous substances into any public or private waters in quantities injurious to fish life, protected wildlife or waterfowl inhabiting those waters, or the propagation of fish, protected wildlife, or waterfowl therein.	Presence of fish and wildlife within Wappinger Creek–**potentially applicable.** Wappinger Creek is designated as a significant coastal fish and wildlife habitat. It provides essential spawning, nursery, overwintering, and foraging habitat for fish species, including striped bass, largemouth bass, smallmouth bass, catfish, and carp. The area also supports protected wildlife, such as the endangered Indiana bat, the threatened northern long-eared bat, and the monarch butterfly, a species of concern. Several migratory bird species of conservation concern—such as the bald eagle, cerulean warbler, and wood thrush—use the creek for breeding and foraging.	New York State ECL Article 11 Fish and Wildlife, Title 5, Section 11-0503 (Polluting streams prohibited)
Presence of protected fish, wildlife, shellfish, crustacea, and insects within remediation work areas	This regulation prohibits the pursuing, taking, wounding, or killing of protected fish, game, wildlife, shellfish, harbor seals, crustacea, or protected insects at any time of year, except as permitted by the Fish and Wildlife Law. Remedial activities must be conducted in a manner that avoids direct harm, disturbance, or unauthorized take of protected species. Note that under CERCLA 121(e), a permit is not required for on-site CERCLA response actions. CERCLA requires that only substantive aspects of the permits will be complied with. Administrative components will not be addressed.	Presence of protected fish, shellfish, and wildlife within Wappinger Creek – **potentially applicable.** Wappinger Creek is designated as a significant coastal fish and wildlife habitat. This area may contain New York state protected fish, wildlife, shellfish, crustacea, and insects.	New York State ECL Article 11 Fish and Wildlife, Title 5, Section 11-0107 (Application of fish and wildlife law)
Presence of protected native plants within remediation work areas	This statute and implementing regulation provide protection for endangered, threatened, rare, and exploitable vulnerable native plants within New York State. All listed species are “protected plants” and may not be removed or damaged without consent. If it is determined that response actions may destroy or degrade New York State-listed protected native plants or cause a "taking" of any protected native plants, activities must be modified and conducted to conserve the species and their habitat. Consultation with NYSDEC will be conducted during remedial design to identify substantive requirements for protection of the native plants.	Presence of endangered or threatened species or their habitat within Wappinger Creek– **potentially applicable.** The study area may contain New York State protected native plant species. Surveys for protected native plant species, that would indicate this is not an ARAR have not been conducted within the site.	New York State ECL Lands and Forests Article 9, Removal of Trees and Protected Plants Title 15 and implementing regulation Protected native plants 6 NYCRR Part 193.3
Coastal Zone Management			
Presence of coastal areas and inland waterways within remediation work areas	This statute and implementing regulation establish policies for the designation of use coastal and inland waterway resources while preventing the loss of living marine resources and wildlife, diminution of open space area or public access to the waterfront, shoreline erosion, and impairment of scenic beauty or permanent adverse changes to ecological systems.	Presence of coastal areas or inland waterways within Wappinger Creek **– potentially applicable.** The remediation work area is within a New York State coastal waterway.	New York State Waterfront Revitalization of Coastal Areas and Inland Waterways New York State ECL Article 42; Sections 910-923 and implementing regulation 19 NYCRR Parts 600-603
Presence of coastal erosion hazard areas	This statute and implementing regulation establish guidelines for coastal erosion management for natural and structural protection of erosion hazard areas. Regulated activities include dredging and/or placing of capping materials. The remedial action must be designed in accordance with substantive requirements to address coastal erosion hazard areas which include restrictions on regulated activities and standards for erosion protection structures.	Presence of coastal erosion hazard areas within Wappinger Creek – **potentially applicable.** The remediation work area is within a designated coastal erosion hazard area.	New York State ECL Article 34 and implementing regulation 6 NYCRR Part 505 (Coastal Erosion Management)

Appendix A-3. Potential Federal and State Action-Specific Applicable or Relevant and Appropriate Requirements (ARARs)

Media/Location/Action	Requirements	Prerequisite	Citation(s)
Potential Federal Action-Specific ARARs			
Discharge to Waters of the United States and Navigable Waters			
Actions with point source discharges into Waters of the U.S.	Section 402 of the CWA regulates discharges of pollutants from point sources to waters of the United States, and requires compliance with the standards, limitations, and regulations promulgated per Sections 301, 304, 306, 307, 308 of the CWA. The National Pollutant Discharge Elimination System (NPDES) authorizes permits for the discharge of treatment system effluents, stormwater or sediment dewater discharges associated with industrial/remedial activities. These permits establish water-quality standards to be met using the best available technology and best management practices. Part 122.44 establishes permit conditions, which include effluent limitations and standards for discharges. CERCLA requires that only substantive aspects of permits be complied with. Administrative components will not be addressed.	Discharge of pollutants from any point source into waters of the United States, including the Wappinger Creek or its tributaries–**potentially applicable.** Wappinger Creek is classified as a water of the U.S., supporting the determination of applicability. Remedial action could involve discharge of stormwater and/or sediment dewater to the creek, its tributaries, or other waters of the United States during implementation, construction, or operation of the remedy.	CWA 33 U.S.C. § 1342 (Section 402), et seq. and Implementing Regulations 40 CFR §122 (NPDES) Subpart C (Permit Conditions)
Actions that discharge dredged or fill material into waters of the United States	CWA §404 regulates the discharge of dredged or fill material into waters of the United States, including return flows from such activity. This program is implemented through regulations set forth in the 404(b)(1) guidelines, 40 CFR Part 230. The guidelines specify the restrictions on discharge (40 CFR 230.10); the factual determinations that need to be made on short-term and long-term effects of a proposed discharge of dredged or fill material on the physical, chemical, and biological components of the aquatic environment (40 CFR 230.11) in light of Subparts C through F of the guidelines; and the findings of compliance on the restrictions (40 CFR 230.12). Subpart J of the guidelines provides the standards and criteria for the use of all types of compensatory mitigation when the response action will result in unavoidable impacts to the aquatic environment. CERCLA requires that only substantive aspects of permits be complied with. Administrative components will not be addressed.	Discharge of dredged or fill material into waters of the United States, including return flows from such activity–**potentially applicable.** Actions to implement the remedial action that may result in discharges of dredged or fill material to waters of the United States include, but may not be limited to, dredging contaminated sediment, placement of capping material and enhanced monitored natural recovery material, and in situ treatment of sediments that will occur in implementing the remedy.	CWA, 33 U.S.C. § 1344 (Section 404(b)(1)) Guidelines, and Implementing Regulations 40 CFR § 230 (Guidelines for Specification of Disposal Sites for Dredged or Fill Material)
Actions that discharge pollutants to navigable waters of the United States	CWA 401 requires, if more stringent than state implementation regulations, that in-water response actions that result in a discharge of pollutants comply with water-quality standards through the placement of water quality-based conditions and other requirements on the discharge deemed necessary Any federally authorized activity that may result in any discharge into navigable waters requires reasonable assurances that the activity will be conducted in a manner that will not violate applicable water-quality standards by the imposition of any effluent limitations, other limitations, and monitoring requirements necessary to assure the discharge will comply with applicable provisions of the CWA. CERCLA requires that only substantive aspects of certifications be complied with. Administrative components will not be addressed.	Activity that may result in any discharge into navigable waters–**potentially applicable.** Wappinger Creek is classified as a navigable water by the U.S. Army Corps of Engineers, supporting the determination of applicability. Actions to implement the remedial action that may result in discharges to waters of the United States include, but may not be limited to, dredging, capping, placement of material for enhanced natural recovery, riverbank remediation, return flows, or dewatering sediments. Conditions and other requirements deemed necessary so that water-quality standards are not violated will be placed on any such discharge.	CWA, 33 U.S.C. § 1341 (Section 401), and Implementing Regulations 40 CFR § 121

Appendix A-3. Potential Federal and State Action-Specific Applicable or Relevant and Appropriate Requirements (ARARs)

Media/Location/Action	Requirements	Prerequisite	Citation(s)
Actions that discharge pollutants to the contiguous coastal zone	This act and regulation establishes the criteria for issuance of NPDES permits for the discharge of pollutants from a point source into the territorial seas, the contiguous zone, and the oceans. Prohibits discharges causing unreasonable degradation of the marine environment. CWA § 403 requires that an NPDES permit be issued for discharges into marine waters, including territorial seas, the contiguous zone, and the oceans, as defined in 40 CFR 122.2. A permit is not required if the point of discharge is on-site; however, substantive requirements would be complied with as described in 40 CFR 125.123(b) and (d)(1).	Discharge of pollutants from a point source into the contiguous coastal zone–**potentially applicable.** The lower segment of Wappinger Creek, from the Hudson River upstream to Wappingers Falls, lies within the coastal zone designated by National Oceanic and Atmospheric Administration (NOAA) for New York State. New York State designated Wappinger Creek as a significant coastal fish and wildlife habitat between the creek's confluence with the Hudson River and the dam in Wappingers Falls.	CWA 33 U.S.C. § 1343 Ocean Discharge Criteria, and Implementing Regulations 40 CFR §§ 125.122, 125.123(b) and 125.123(d)(1)
Actions in federal navigation channels	The creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is prohibited; and it will not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States outside established harbor lines. 33 CFR 322.5(e) addresses placing aids to navigation in navigable waters under the purview of Section 10 and must meet requirements of the U.S. Coast Guard (33 CFR 330.5). 33 CFR Section 323.4(b) and (c) provide that any discharge of dredged or fill material contains any toxic pollutant listed under section 307 of the CWA will require compliance with Section 404 of the CWA. Placement of pilings or discharge of dredged material where the flow or circulation of waters of the United States may be impaired, or the reach of such waters are reduced, must comply with Section 10. 33 CFR 329.4 defines the term "navigable water of the United States" for purposes of the U.S. Army Corps of Engineers (USACE) regulations, including those addressing the discharge of dredged or fill material. CERCLA requires that only substantive aspects of certifications be complied with. Administrative components will not be addressed.	Actions taken or constructed in the navigation channel–**potentially relevant and appropriate** This regulation is considered relevant and appropriate because the portion of the Hudson River adjacent to the targeted section of Wappinger Creek is designated as a navigation channel. Potentially relevant and appropriate to the use of aids to navigation as institutional controls for maintaining the integrity of the selected remedy. The proposed remedial action involves dredging, which constitutes excavation and physical modification of the creek bed and potentially the banks.	River and Harbors Act of 1899, Section 10, 33 U.S.C. § 403, and Implementing Regulations 33 CFR §§ 322.5(e), 323.3, 323.4(b)-(c) and 329

Appendix A-3. Potential Federal and State Action-Specific Applicable or Relevant and Appropriate Requirements (ARARs)

Media/Location/Action	Requirements	Prerequisite	Citation(s)
Actions that transport material for dumping into the territorial sea or a contiguous coastal zone affecting the territorial sea	Establishes criteria for issuance of ocean dumping permits for the discharge of material into the territorial seas or the contiguous zone adjacent to the territorial sea. 40 CFR 220 requires that an NPDES permit be issued for discharges into marine waters, including territorial seas or the contiguous zone adjacent to the territorial sea. A permit is not required if point of discharge is on-site; however, substantive requirements would be complied with.	Discharge of dredged material into the contiguous coastal zone adjacent to the territorial sea–**potentially applicable.** The lower segment of Wappinger Creek, from the Hudson River upstream to Wappingers Falls, lies within the coastal zone designated by NOAA for New York State. New York State designated Wappinger Creek as a significant coastal fish and wildlife habitat between the creek's confluence with the Hudson River and the dam in Wappingers Falls.	Marine Protection, Research, and Sanctuaries Act 33 U.S.C. § 1412 and 1418, and Implementing Regulations 40 CFR §§ 220-223, 40 CFR §§ 225-228, and 40 CFR §§ 230-233
Discharge of CERCLA contaminants to publicly owned treatment works (POTW)	Establishes prohibitions on discharge of pollutants that pass through the POTW without treatment, interfere with POTW operation, contaminate POTW sludge, or endanger health/safety of POTW workers and establishes national pretreatment standards specifying quantities of pollutants or pollutant properties that may be discharged to a POTW.	Indirect discharge of treated dredge dewater to a POTW, including discharge to sewers leading to the POTW–**potentially applicable.**	CWA 33 U.S.C. § 1251 et seq., and Implementing Regulations 40 CFR §§ 403.5-403.20
Actions in federal navigation channels	The creation of any obstruction not affirmatively authorized by Congress to the navigable capacity of any of the waters of the United States is prohibited; and it will not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines. 33 CFR 322.5(e) addresses placing of aids to navigation in navigable waters is under the purview of Section 10 and must meet requirements of the U.S. Coast Guard (33 CFR 330.5). 33 CFR Section 323.4(b) and (c) provide if any discharge of dredged or fill material contains any toxic pollutant listed under section 307 of the CWA such discharge will require compliance with Section 404 of the CWA. Placement of pilings or discharge of dredged material where the flow or circulation of waters of the United States may be impaired, or the reach of such waters may be reduced, must comply with Section 10. 33 CFR 329.4 defines the term "navigable water of the United States" for purposes of the USACE regulations, including those addressing the discharge of dredged or fill material.	Applicable requirement for how remedial actions are taken or constructed in the navigation channel so as not to create an obstruction to the navigable capacity– **potentially applicable** Potentially applicable to the use of aids to navigation as institutional controls for maintaining the integrity of the selected remedy. The proposed remedial action involves dredging, which constitutes excavation and physical modification of the creek bed and potentially the banks. CERCLA requires that only substantive aspects of certifications be complied with. Administrative components will not be addressed.	River and Harbors Act of 1899, Section 10, 33 U.S.C. § 403, and Implementing Regulations 33 CFR §§ 322.5(e), 323.3, 323.4(b)-(c) and 329
Air Emissions and Control			
Actions that discharge particulate matter during implementation, operation, or maintenance of a response action,	This statute and regulations establish national primary and secondary ambient air quality standards (NAAQS) for PM 10 and PM 2.5 emissions to air. NAAQS are implemented through the New Source Review Program and State Implementation Plans (SIPs).	Discharges of hazardous substances, pollutants, or contaminants from CERCLA releases to air– **potentially relevant and appropriate.** While not applicable since the Federal New Source Review program addresses only major sources, NAAQS may be relevant and appropriate to this remedial action because air emissions related to PM in dust may be generated during drilling or other ground disturbing activities during the remedial action implementation.	Clean Air Act, 42 U.S.C. § 7401 et. seq. and Implementing Regulations: National Ambient Air Quality Standards: 40 CFR § 50.6; (PM 10); 40 CFR § 50.7 (PM 2.5) and 40 CFR § 50.12

Appendix A-3. Potential Federal and State Action-Specific Applicable or Relevant and Appropriate Requirements (ARARs)

Media/Location/Action	Requirements	Prerequisite	Citation(s)
Actions that discharge emissions during implementation, operation, or maintenance of a response action	Parts 64.3 and 64.7 provide substantive requirements for compliance assurance monitoring of pollutant-specific emissions units at a major source. Part 64.3 provides general criteria for the design of compliance assurance monitoring programs. Part 64.7 provides requirements for operation of the monitoring program.	Discharge of pollutants to air–**potentially relevant and appropriate.** While not applicable since the Federal New Source Review program addresses only major sources, compliance assurance monitoring for NAAQS related to PM 10 and PM 2.5 may be relevant and appropriate to this remedial action because air emissions related to PM in dust may be generated during ground disturbing activities during the remedial action implementation.	Clean Air Act, 42 U.S.C. §7409 et seq., and Implementing Regulations 40 CFR § 64 (Compliance Assurance Monitoring)
Waste Characterization and Disposal			
Actions generating solid wastes that could contain hazardous wastes for management and disposal	Wastes generated during construction, monitoring, or remediation must be characterized and managed in accordance with substantive RCRA requirements before off-site disposal. This regulation requires determination if solid waste is a hazardous waste by using the following method: First, determine if waste is excluded from regulation under 40 CFR 261.4, then determine if waste is listed as a hazardous waste under Subpart D 40 CFR Part 261 or whether the waste is (characteristic waste) identified in subpart C of 40 CFR Part 261 by either of the following: 1) Testing the waste according to the methods set forth in Subpart C of 40 CFR Part 261 or according to an equivalent method approved by the Administrator under 40 CFR §260.21 2) Applying knowledge of the hazard characteristic of the waste considering the materials or the processes used	Hazardous waste characterization and determination for management and disposal of dredged materials –**potentially applicable.** The remedial action including dredging may generate contaminated sediment that may exceed toxicity characteristic leaching procedure limits and be classified as hazardous waste.	RCRA 42 U.S.C. § 6901 et seq., and Implementing Regulations 40 CFR §§ 261.1 through 261.24
Actions generating RCRA regulated waste that will be disposed of in a disposal facility	Requires that, before an owner or operator treats, stores, or disposes of any hazardous wastes or nonhazardous wastes, they must obtain a detailed chemical and physical analysis on a representative sample of the waste(s), which at a minimum contains all the information that must be known to treat, store, or dispose of the waste in accordance with pertinent sections of 40 CFR 264 and 268.	Characterization of dredged materials for disposal–**potentially applicable.** The remedial action including dredging may generate contaminated sediment that may exceed toxicity characteristic leaching procedure limits and be classified as hazardous waste.	RCRA 42 U.S.C. § 6901 et seq., and Implementing Regulations 40 CFR § 264.13(a)(1)
Actions generating RCRA hazardous waste for disposal	This regulation requires that generators of hazardous waste determine if the hazardous waste must be treated before land disposal. This is done by determining if the waste meets the treatment standards in 40 CFR 268.40, 268.45, or 268.49 by testing in accordance with prescribed methods or use of generator knowledge of waste. This determination can be made concurrently with the hazardous waste determination required in 40 CFR 261.11. The generator must comply with the special requirements of 40 CFR § 268.9 in addition to any applicable requirements in 40 CFR § 268.7. The initial generator of solid waste must determine each EPA Hazardous Waste Number (waste code) applicable to the waste to determine the applicable treatment standards under 40 CFR 268 et seq. This determination may be made concurrently with the hazardous waste determination required in Sec. 261.11 of this chapter. The generator must determine the underlying hazardous constituents (as defined in 40 CFR 268.2(i)) in the characteristic waste.	Characterization and treatment of dredged materials slated for offsite disposal–**potentially applicable.** The remedial action including dredging may generate contaminated sediment that is classified as hazardous and would be managed and disposed of off-site at a hazardous waste facility.	RCRA 42 U.S.C. § 6901 et seq., and Implementing Regulations 40 CFR § 268.7(a)(1) and 40 CFR § 268.9(a)

Appendix A-3. Potential Federal and State Action-Specific Applicable or Relevant and Appropriate Requirements (ARARs)

Media/Location/Action	Requirements	Prerequisite	Citation(s)
Actions requiring temporary storage of hazardous waste	A generator may accumulate hazardous waste at the facility provided that (accumulation of RCRA hazardous waste on-site as defined in 40 CFR §260.10) the following criteria are met: • Waste is placed in containers that comply with 40 CFR 265.171–173 • Date upon which accumulation begins is clearly marked and visible for inspection on each container • Container is marked with the words "hazardous waste" or the container may be marked with other words that identify the contents; if accumulation of 55 gallons or less of RCRA hazardous waste or 1 quart of acutely hazardous waste listed in §261.33(e) at or near any point of generation of hazardous waste regulations further require the following: ○ In addition to the requirements of 40 CFR 262.34, a generator may accumulate hazardous waste on-site for 90 days or less without a permit provided that, if storing more than 100 containers, the waste is placed in a storage unit that meets the accumulation requirements of 40 CFR 264.175 A generator will comply with provisions found in 40 CFR, Part 262 and each applicable requirement of 40 CFR 262.34(a), (b), (c), (d), (e), and (f). CERCLA requires that only substantive aspects of permits be complied with. Administrative components will not be addressed.	Temporary storage of hazardous waste for offsite disposal –**potentially applicable.** The remedial action including dredging may generate contaminated sediment that is classified as hazardous and would be managed and disposed of off-site at a hazardous waste facility.	RCRA 42 U.S.C. § 6901 et seq., and Implementing Regulations 40 CFR § 262.34(a) 40 CFR §262.34(a)(1)(i) 40 CFR § 262.34(a)(2) and (3) 40 CFR § 262.34(c)(1)
Actions that involve storage and treatment of hazardous waste	These regulations provide standards for location, design, operation, and closure of units in which treatment of hazardous waste may occur. These regulations also provide requirements for use and management of containers, tank systems, surface impoundments, waste piles, and land treatment units one or more of which may be used for the storage and treatment of hazardous waste. Subparts AA, BB, and CC provide air emission standards for process vents, equipment leaks, and tanks, surface impoundments, and containers that may be used.	Storage (more than 90 days) and/or treatment of hazardous waste on-site prior to disposal off-site–**potentially applicable.** The remedial action including dredging may generate contaminated sediment that is classified as hazardous and would be managed and disposed of off-site at a hazardous waste facility.	RCRA 42 U.S.C. § 6901 et seq., and Implementing Regulations 40 CFR §§ 264, Subparts B, C, F, G, I, J, K, L, M, AA, BB, CC, and DD
Toxic Waste Management			
Actions handling PCB remediation wastes and PCB-containing material	TSCA Subpart D regulates storage and disposal of polychlorinated biphenyl (PCB) wastes and establishes requirements for handling, storage, and disposal of PCB-containing materials, including PCB remediation wastes, and sets performance standards for disposal technologies for materials/wastes with concentrations in excess of 50 milligrams per kilogram (mg/kg). Establishes decontamination standards for PCB- contaminated debris.	Disposal of remediation wastes with PCB contamination – **potentially applicable ARAR.** The remedial action including dredging may generate contaminated sediment that may be classified as PCB remediation waste.	Toxic Substances Control Act (TSCA), 15 U.S.C. §§ 2601 et seq., and 40 CFR §§ 761.50-761.79

Appendix A-3. Potential Federal and State Action-Specific Applicable or Relevant and Appropriate Requirements (ARARs)

Media/Location/Action	Requirements	Prerequisite	Citation(s)
Potential State Action-Specific ARARs			
Disturbance to State-Protected Waters			
Actions that disturb the bed or banks of protected waters in New York State	This statute and implementing regulations require permits to modify, change or disturb any protected stream, its bed or banks; to remove from its bed or banks sand or gravel or any other material; or to excavate or place fill in any of the navigable waters of the state. Any applicant for a federal license or permit to conduct any activity that may result in any discharge into navigable waters must obtain a State Water Quality Certification under Section 401 of the Federal Water Pollution Control Act, 33 U.S.C. §1341. In accordance with CERCLA Sections 121(d)(2) and 121(e), neither a permit nor a water quality certification is required for on-site CERCLA response actions, although such actions must comply with substantive requirements of these regulations. Preventative measures should be established to minimize suspension of sediment during dredging and/or cap placement. Additional monitoring may be required to ensure remedial activities do not exceed water-quality standards. CERCLA requires that only substantive aspects of permits be complied with. Administrative components will not be addressed.	Activities that result in any disturbance on the bed or banks of Wappinger Creek or its tributaries that are protected waters in New York State–**potentially applicable.** Wappinger Creek is classified as a protected water under 6 NYCRR Part 608 due to its water quality designation as Class C(T). The remedial action may include dredging and/or capping that would disturb and remove material from the creek bed and/or banks with the placement of material on top.	New York State ECL Article 15 Water Resources, Protection of Water Title 5; Water Pollution Control Article 17, Jurisdiction of the Department; Authority; Powers and Duties Title 3 and Implementing Regulations 6 NYCRR Part 608 (Use and Protection of Waters), Part 701 (Classifications--Surface Waters and Groundwaters) and 703 (Surface Water and Groundwater-quality standards)
Discharge to Waters of the State of New York and Navigable Waters			
Actions that take place in navigable waters in New York State	Sections 31 and 32 of the New York State Navigation Law prohibit unauthorized excavation, filling, or other physical alterations of navigable waterways—including their beds, banks, and shores—to preserve the integrity and navigability of watercourses. These sections also regulate the placement and construction of structures such as docks, piers, or barriers to prevent obstruction of navigation and interference with public use. If dredging occurs in navigable waters used by boats or public use, consultation will be conducted during remedial design to identify substantive requirements for protection of public waters. CERCLA requires that only substantive aspects of certifications be complied with. Administrative components will not be addressed.	Activities that result in any discharge into navigable waters–**potentially applicable** Wappinger Creek is a navigable waterway under New York State jurisdiction. The proposed remedial action involves dredging, which constitutes excavation and physical modification of the creek bed and potentially the banks.	New York State Navigation Law Article 3 Navigable Waters of the State; Title 31 (Excavation, Fill or Other Modification of Water Course), and Title 32 (Location of Structures in or on Navigable Waters)
Actions that discharge pollutants to waters of New York State	This statute and implementing regulations prohibit any person, directly or indirectly, from throwing, draining, running, or otherwise discharging into such waters organic or inorganic matter that will cause or contribute to a condition in contravention of applicable standards adopted by NYSDEC pursuant to ECL 17-0301.	Activities that result in any discharge into Wappinger Creek or its tributaries that are waters of New York State–**potentially applicable.** Wappinger Creek is a navigable waterway under New York State jurisdiction. The remedial action may include dredging and/or capping that would result in discharge into Wappinger Creek or its tributaries.	New York State ECL Article 17 Water Pollution Control, Title 5 Prohibitions, and Implementing Regulation 6 NYCRR Parts 701 (Classifications--Surface Waters and Groundwaters) and 703 (Surface Water and Groundwater-quality standards)
Actions that involve point source discharge pollutants to surface water in New York State	This statute and implementing regulations establish standards for point source discharges of wastewater and storm water to surface water and groundwater. In general, no person will discharge or cause a discharge to New York State waters of any pollutant without a permit under the New York State Pollutant Discharge Elimination System (SPDES) program. In accordance with CERCLA Section 121(e), a permit is not required for on-site CERCLA response actions, although the selected remedy will comply with substantive requirements of 6 NYCRR Part 750, which includes prohibited discharges and effluent limitations.	Activities that result in discharges into Wappinger Creek or its tributaries–**potentially applicable**. Wappinger Creek is a navigable waterway under New York State jurisdiction. The remedial action including dredging, may generate dewatering effluent or stormwater that may result in discharge to surface water subject to SPDES requirements.	New York State ECL Article 17 Water Pollution Control, Title 8 SPDES and Implementing Regulation 6 NYCRR Part 750 (Regulations for SPDES)

Appendix A-3. Potential Federal and State Action-Specific Applicable or Relevant and Appropriate Requirements (ARARs)

Media/Location/Action	Requirements	Prerequisite	Citation(s)
Air Emissions and Control			
Actions that involve discharge of contaminants to air in New York State	This statute and implementing regulations establish New York air quality standards (AQS) for suspended particulates.	Activities that result in discharges to air–**potentially applicable.**	New York State ECL Article 19 Air Pollution Control Title 3 Powers and Duties, and Implementing Regulations 6 NYCRR Part 257-3 (Air Quality Standards – Particulates)
Actions that involve discharge of contaminants to air in New York State	This statute and implementing regulations establish that the emission of air contaminants to the outside atmosphere that jeopardize human, plant, or animal life, are injurious to property, or which unreasonably interfere with the comfortable enjoyment of life or property is prohibited (6 NYCRR 211.2).	Activities that result in discharges to air–**potentially applicable**. The remedial action, including dredged sediment, may release mercury vapors or vapors from treatment media during processing.	New York State ECL Article 19 Air Pollution Control Title 3 Powers and Duties, and Implementing Regulations 6 NYCRR Parts 211 (General Prohibitions)
Waste Characterization and Disposal			
Actions that involve the generation of solid waste for management and disposal in New York State	This statute and implementing regulation establish requirements for the management and disposal of solid waste and operation of solid waste facilities. Under 6 NYCRR Part 360.13, excavated materials can be reused as fill without being classified as solid waste if they meet predetermined beneficial use determination (BUD) criteria in Parts 360.12 and 360.13. Non-hazardous sediment removed from a site is considered solid waste unless it qualifies for a BUD; once approved and reused according to the BUD, it is no longer regulated as solid waste.	Activities that result in generation of solid waste that require management and disposal at an off-site solid waste management facility or off-site beneficial reuse in New York State–**potentially applicable**. The remedial action may include dredging and removal of material that requires off-site disposal as solid waste and/or reuse of dredged material.	New York State ECL Article 27, Title 7 Solid Waste Management and Resource Recovery Facilities, and Implementing Regulation 6 NYCRR Part 360 (Solid Waste Management Facilities General Requirements)
Actions that involve the generation of hazardous waste for management and disposal in New York State	This statute and implementing regulations establish New York State requirements for the identification, listing, and handling of hazardous wastes.	Activities that result in generation of hazardous waste that require management and off-site disposal in New York State –**potentially applicable**. The remedial action including dredging may generate contaminated sediment that may exceed toxicity characteristic leaching procedure limits and be classified as hazardous waste.	New York State ECL Article 27, Title 9 Industrial Hazardous Waste Management, and Implementing Regulation 6 NYCRR Parts 370 (Hazardous Waste Management System) and 371 (Identification and Listing of Hazardous Wastes)
Actions that involve the generation of hazardous waste for management and disposal in New York State	This statute and implementing regulation establish requirements for treatment, storage, and disposal of hazardous waste, including permit requirements (from which on-site response actions are exempt, although substantive requirements would be met) and standards for construction and operation of hazardous waste management facilities within New York State. CERCLA requires that only substantive aspects of certifications be complied with. Administrative components will not be addressed.	Activities that result in generation of hazardous waste that require management and off-site disposal in New York State –**potentially applicable.** The remedial action including dredging may generate contaminated sediment that is classified as hazardous and would be managed and disposed of off-site at a hazardous waste facility.	New York State ECL Article 3, Title 3; Article 27, Title 7 Solid Waste Management and Resource Recovery Facilities and 9 Industrial Hazardous Waste Management, and Implementing Regulation 6 NYCRR Part 373 (Hazardous Waste Management Facilities)
Actions that involve land disposal of hazardous waste in New York State	This statute and implementing regulation restrict specified hazardous wastes from land disposal and defines circumstances under which an otherwise prohibited hazardous waste may be land disposed. Land disposal restrictions (LDRs) apply to mercury-bearing waste. Specific treatment standards for various mercury wastes must be met before disposal.	Activities that result in generation of hazardous waste that require off-site disposal in New York State–**potentially applicable**. The remedial action may require dredging or generation of material that is a listed hazardous waste and subject to these requirements. If sediment contains mercury above threshold limits, it may be subject to LDRs. Stabilization or other treatment may be required before disposal.	New York State ECL Article 27, Title 9 Industrial Hazardous Waste Management, and Implementing Regulation 6 NYCRR Part 376 (LDRs)

NOTE: A STRINGENCY DETERMINATION BETWEEN FEDERAL AND STATE ARARS HAS NOT BEEN COMPLETED FOR THIS TABLE.

Appendix A-4. Potential Federal and State To-Be-Considered Information, Wappinger Creek Superfund Site, Wappingers Falls, New York

Media	Requirement	Prerequisite	Citation(s)
Federal Potential Chemical-Specific To-Be-Considered (TBC) Information			
Mercury contamination that poses potential risks to aquatic life in sediments	The document provides information and guidance for screening, classifying, and assessing contaminated sediments in New York State and determining whether a given sediment is toxic and poses a risk to aquatic life The mercury-related criteria for Class A sediments may be considered in remedial action level development for the protection of aquatic life.	Presence of mercury in creek sediment that could adversely impact aquatic life– **potentially TBC**	Table 5 within *Screening and Assessment of Contaminated Sediment,* New York State Department of Environmental Conservation, Division of Fish, Wildlife, and Marine Resources, Bureau of Habitat
Mercury contamination from CERCLA releases found in/discharged to sediment	Recommends surface-water mercury concentrations to protect aquatic life and human health (e.g., 0.77 µg/L chronic freshwater). Not enforceable but scientifically relevant.	Presence of mercury in sediment from CERCLA releases and/or because of a CERCLA action that could adversely impact human or ecological receptors– **potentially TBC**	Ambient Water Quality Criteria for Mercury, EPA 440/5-84-026 (1984), updated in 2001
Mercury contamination from CERCLA releases found in/discharged to sediment	Provides recommended bioaccumulation factors for mercury. Useful for evaluating fish tissue risks and setting cleanup goals.	Presence of mercury in sediment from CERCLA releases and/or because of a CERCLA action that could adversely impact human or ecological receptors– **potentially TBC**	Bioaccumulation Factor Guidance, EPA 822-R-03-030
Mercury contamination from CERCLA releases found in/discharged to sediment	Technical background for evaluating heavy metals like mercury in soil during site assessments.	Presence of mercury in sediment from CERCLA releases and/or because of a CERCLA action that could adversely impact human or ecological receptors– **potentially TBC**	Soil Screening Guidance for Metals, OSWER 9355.4-23

Appendix A-4. Potential Federal and State To-Be-Considered Information, Wappinger Creek Superfund Site, Wappingers Falls, New York

Media/Action	Requirement	Prerequisite	Citation(s)
State Potential Chemical-Specific TBC Information			
Contamination from CERCLA releases found in/discharged to sediments	The guidance provides protocols for screening and assessing sediment contamination to determine the need for further investigation or remediation. It includes sampling strategies, analytical methods, and sediment quality benchmarks for various contaminants, including mercury.	Presence of mercury, PCBs and other contaminants in sediment from CERCLA releases that could adversely impact human or ecological receptors– **potentially TBC**	NYSDEC Technical Guidance for Screening Contaminated Sediments
Contamination from CERCLA releases found in/discharged to sediments	This guidance provides a comprehensive manual guiding the investigation, evaluation, and remediation of contaminated sites in New York State. It outlines step-by-step processes for site characterization, risk assessment, remedial alternatives evaluation, and cleanup standards, including mercury and other hazardous substances.	Presence of mercury, PCBs and other contaminants in sediment from CERCLA releases that could adversely impact human or ecological receptors– **potentially TBC**	NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation
Contamination from CERCLA releases found in/discharged to sediments	This guidance recommends mercury concentrations in water to protect fish consumption and aquatic life (e.g., 0.7 nanograms per liter (ng/L) for human health).	Presence of mercury, PCBs and other contaminants in sediment from CERCLA releases that could adversely impact human or ecological receptors– **potentially TBC**	Technical and Operational Guidance Series (TOGS) 1.1.1–Ambient Water Quality Standards and Guidance Values
Contamination from CERCLA releases found in/discharged to sediments	This advisory issues local consumption limits for mercury-contaminated fish.	Presence of mercury, PCBs and other contaminants in sediment from CERCLA releases that could adversely impact human or ecological receptors– **potentially TBC**	Fish Consumption Advisories, New York State Health Advisories New York State Department of Health (NYS DOH)

Appendix A-4. Potential Federal and State To-Be-Considered Information, Wappinger Creek Superfund Site, Wappingers Falls, New York

Location	Requirement	Prerequisite	Citation
Federal Potential Location-Specific TBC Information			
Presence of Wetlands	Requires federal agencies to minimize the destruction, loss, or degradation of wetlands; to preserve and enhance beneficial values of wetlands; and to avoid direct or indirect support of new construction in wetlands when there are practicable alternatives.	Federal actions that involve potential impacts to, or take place within, wetlands of Wappinger Creek or its tributaries– **potentially TBC** Note: Federal agencies required to comply with Executive Order 11990 requirements.	Executive Order 11990 Section 1(a) *Protection of Wetlands*
	Agencies will avoid undertaking construction located in wetlands aside from the following conditions: (1) There is no practicable alternative to such construction. (2) The proposed action includes all practicable measure to minimize harm to wetlands which may result from such use.		Section 2(a) *Protection of Wetlands*
Presence of floodplains	Agencies will take action to reduce the risk of flood loss; to minimize the impact of floods on human safety, health, and welfare; and to restore and preserve the natural and beneficial values served by floodplains.	Federal actions that involve potential impacts to, or take place within, floodplains of Wappinger Creek or its tributaries– **potentially TBC** As provided in 44 CFR § 9.7, Determination of proposed action's location, Paragraph (c), Floodplain determination, one generally should consult the FEMA Flood Insurance Rate Map (FIRM), the Flood Boundary Floodway Map (FBFM), and the Flood Insurance Study (FIS) to determine if the agency-proposed action is within the base floodplain. Note: Federal agencies required to comply with Executive Order 11988 requirements.	Executive Order 11988 Section 1. *Floodplain Management*
	Agencies will consider alternatives to avoid, to the extent possible, adverse effects and incompatible development in the floodplain. Each agency will design or modify its action to minimize potential harm to or within the floodplain.		Executive Order 11988 Section 2(a)(2) *Floodplain Management*
	Where possible, an agency will use natural systems, ecosystem processes, and nature-based approaches when developing alternatives for consideration.	Federal actions that involve potential impacts to, or take place within, floodplains of Wappinger Creek or its tributaries– **potentially TBC** As provided in 44 CFR § 9.7 Determination of proposed action's location, Paragraph (c), Floodplain determination, one generally should consult the FEMA FIRM, the FBFM, and the FIS to determine if the agency-proposed action is within the base floodplain). Note: Federal agencies required to comply with Executive Order 13690 requirements	Executive Order 13690 Section 2(c)
State Potential Location-Specific TBC Information			
Presence of New York State designated estuaries	Provides guidance to prevent habitat loss and degradation, toxic contamination through dredge materials management, pathogen contamination, floatable debris, and nutrient and organic enrichment.	Actions that take place in Wappinger Creek and its tributaries designated as a New York State estuary– **potentially TBC**	Comprehensive Conservation and Management Plan, New York-New Jersey Harbor Estuary Program Including the Bight Restoration Plan, Final (1996)
Presence of New York State designated estuaries or embayments connected with the Atlantic Ocean	Provides guidance for restoring, strengthening and maintaining the ecological integrity of the ocean ecosystem, promote sustainable coastal development, and increase resiliency of ocean resources to climate change related impacts.	Actions that take place in Wappinger Creek and its tributaries designated as a New York State connecting estuary or embayment– **potentially TBC**	New York Ocean Action Plan 2017–2027 (2017)
Federal Potential Action-Specific TBC Information			
Management of mercury contamination from CERCLA releases found in/discharged to sediment	Provides guidance on mercury cleanup approaches, monitoring, and long-term stewardship.	Management of mercury in sediment from CERCLA releases– **potentially TBC**	Mercury Strategy for CERCLA Sites, OSWER Directive 9285.7-03

Appendix A-4. Potential Federal and State To-Be-Considered Information, Wappinger Creek Superfund Site, Wappingers Falls, New York

Location	Requirement	Prerequisite	Citation
State Potential Action-Specific TBC Information			
Management of contaminated sediments	This guidance offers sediment management criteria, including for mercury, and guidance on testing, classification, and disposal.	Management of mercury, PCBs and other contaminants in sediment from CERCLA releases– **potentially TBC**	TOGS 5.1.9–In-Water and Riparian Management of Sediment and Dredged Material
Management of contaminated sediments	This guidance offers specific recommendations for managing sediment contamination during dredging, capping, and disposal activities. It addresses techniques to minimize sediment resuspension and contaminant release, environmental monitoring during dredging, and disposal requirements.	Management of mercury, PCBs and other contaminants in sediment from CERCLA releases– **potentially TBC**	NYSDEC Sediment Management Guidance

Appendix B
Mercury IPM ProUCL Documentation

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options

Date/Time of Computation	From ProUCL 5.12/20/2024 11:29:49 AM
File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference Selected	0
Null Hypothesis Alternative Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1) Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: MeHgSite
Sample 2 Data: MeHgbackground

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	40	10
Number of Distinct Observations	36	10
Minimum	0.039	0.25
Maximum	4.17	0.794
Mean	1.165	0.565
Median	1.075	0.597
SD	0.827	0.187
SE of Mean	0.131	0.059

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	1143
Standardized WMW U-Stat	2.971
Mean (U)	200
SD(U) - Adj ties	41.23
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.00148

Conclusion with Alpha = 0.05
Reject H0, Conclude Sample 1 > Sample 2
P-Value < alpha (0.05)

UCL Statistics for Uncensored Full Data Sets

User Selected Options

Date/Time of Computation	ProUCL 5.12/20/2024 11:30:51 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operation:	2000

background

General Statistics

Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	0.25	Mean	0.565
Maximum	0.794	Median	0.597
SD	0.187	Std. Error of Mean	0.059
Coefficient of Variation	0.33	Skewness	-0.563

Normal GOF Test

Shapiro Wilk Test Statistic	0.935	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.842	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.142	Lilliefors GOF Test
5% Lilliefors Critical Value	0.262	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.673	95% Adjusted-CLT UCL (Chen-1995)	0.651
		95% Modified-t UCL (Johnson-1978)	0.672

Gamma GOF Test

A-D Test Statistic	0.46	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.727	Detected data appear Gamma Distributed at 5% Signific
K-S Test Statistic	0.191	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.267	Detected data appear Gamma Distributed at 5% Signific

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	8.289	k star (bias corrected MLE)	5.869
Theta hat (MLE)	0.0682	Theta star (bias corrected MLE)	0.0963
nu hat (MLE)	165.8	nu star (bias corrected)	117.4
MLE Mean (bias corrected)	0.565	MLE Sd (bias corrected)	0.233
		Approximate Chi Square Value (0.05)	93.37
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	89.65

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	0.71	95% Adjusted Gamma UCL (use when n<5	0.74

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.876	Shapiro Wilk Lognormal GOF Test
5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.213	Lilliefors Lognormal GOF Test
5% Lilliefors Critical Value	0.262	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.386	Mean of logged Data	-0.632
Maximum of Logged Data	-0.231	SD of logged Data	0.393

Assuming Lognormal Distribution

95% H-UCL	0.754	90% Chebyshev (MVUE) UCL	0.784
95% Chebyshev (MVUE) UCL	0.881	97.5% Chebyshev (MVUE) UCL	1.016
99% Chebyshev (MVUE) UCL	1.281		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	0.662	95% Jackknife UCL	0.673
95% Standard Bootstrap UCL	0.658	95% Bootstrap-t UCL	0.663
95% Hall's Bootstrap UCL	0.65	95% Percentile Bootstrap UCL	0.655
95% BCA Bootstrap UCL	0.651		
90% Chebyshev(Mean, Sd) UCL	0.742	95% Chebyshev(Mean, Sd) UCL	0.822
97.5% Chebyshev(Mean, Sd) UCL	0.934	99% Chebyshev(Mean, Sd) UCL	1.152

Suggested UCL to Use

95% Student's-t UCL	0.673

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

UCL Statistics for Uncensored Full Data Sets

User Selected Options

Date/Time of Computation	ProUCL 5.12/21/2024 1:57:03 PM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operation:	2000

bkg Thg

General Statistics

Total Number of Observations	10	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	0.051	Mean	0.0925
Maximum	0.14	Median	0.0975
SD	0.0267	Std. Error of Mean	0.00843
Coefficient of Variation	0.288	Skewness	-0.0388

Normal GOF Test

Shapiro Wilk Test Statistic	0.95	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.842	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.178	Lilliefors GOF Test
5% Lilliefors Critical Value	0.262	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.108	95% Adjusted-CLT UCL (Chen-1995)	0.106
		95% Modified-t UCL (Johnson-1978)	0.108

Gamma GOF Test

A-D Test Statistic	0.417	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.725	Detected data appear Gamma Distributed at 5% Signifi
K-S Test Statistic	0.215	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.267	Detected data appear Gamma Distributed at 5% Signifi

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	12.26	k star (bias corrected MLE)	8.652
Theta hat (MLE)	0.00754	Theta star (bias corrected MLE)	0.0107
nu hat (MLE)	245.3	nu star (bias corrected)	173
MLE Mean (bias corrected)	0.0925	MLE Sd (bias corrected)	0.0314
		Approximate Chi Square Value (0.05)	143.6
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	139

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	0.111	95% Adjusted Gamma UCL (use when n<	0.115

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.923	Shapiro Wilk Lognormal GOF Test
5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.232	Lilliefors Lognormal GOF Test
5% Lilliefors Critical Value	0.262	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.976	Mean of logged Data	-2.422
Maximum of Logged Data	-1.966	SD of logged Data	0.312

Assuming Lognormal Distribution

95% H-UCL	0.115	90% Chebyshev (MVUE) UCL	0.12
95% Chebyshev (MVUE) UCL	0.133	97.5% Chebyshev (MVUE) UCL	0.15
99% Chebyshev (MVUE) UCL	0.184		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	0.106	95% Jackknife UCL	0.108
95% Standard Bootstrap UCL	0.106	95% Bootstrap-t UCL	0.107
95% Hall's Bootstrap UCL	0.107	95% Percentile Bootstrap UCL	0.106
95% BCA Bootstrap UCL	0.105		
90% Chebyshev(Mean, Sd) UCL	0.118	95% Chebyshev(Mean, Sd) UCL	0.129
97.5% Chebyshev(Mean, Sd) UCL	0.145	99% Chebyshev(Mean, Sd) UCL	0.176

Suggested UCL to Use

95% Student's-t UCL	0.108

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 9
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Appendix C
Detailed Evaluation of Remedial Alternatives

Table C-1. Detailed Analysis of Remedial Alternatives for Wappinger Creek, Evaluation for Overall Protection of Human Health and the Environment

Evaluation Factors for Overall Protection of Human Health and the Environment	Remedial Alternative 1 No Action	Remedial Alternative 2 Dredge to Depth of 1 Foot; Capping of Underlying Contamination	Remedial Alternative 3 Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	Remedial Alternative 4 Dredge to Remove Any Interim Performance Metric Exceedance; Backfill to Grade in the Dredge Footprint
Adequate protection of human health and the environment (short- and long-term) from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the Site	• No remedial action would be taken. Contaminated sediment and streambank soils would be left physically unaddressed in their current condition without institutional controls, maintenance, or monitoring. • Contaminated sediment and streambank soils exceeding the remedial action levels (RALs) that are in place at the Site would result in continued contributions to unacceptable exposures to human and ecological receptors. Thus, this alternative would not achieve **Preliminary Remedial Action Objective (PRAO) 1 and 2**. • Contaminated sediment and streambank soils would have the potential to contribute further to contaminant migration of downstream media (sediments, streambank soils, and surface water). Thus, this alternative would not achieve **PRAO 3.** • Sediments or other contaminated media with elevated concentrations of contaminants other than THg may also still pose unacceptable risks.	• This alternative would provide adequate protection to human health and the environment in the interim until a final remedy for the Site is selected through the achievement of the remedial action objectives (RAOs). • Remaining sediments or other contaminated media with elevated concentrations of contaminants may still pose unacceptable risks and would be addressed by the final remedy for the Site. • Areas with contaminated sediment exceeding the RAL for THg would be addressed through targeted removal, followed by an in-place containment using a reactive cap, institutional controls (ICs), monitoring, and access controls. • These actions (targeted removal of 1 foot of sediments greater than the RAL) followed by reactive capping of sediments would reduce contributions to human exposure (through ingestion of contaminated fish from recreational fishing) and ecological exposure (through dietary exposure) to contaminated sediments by reducing concentrations of total mercury (THg). Lowering THg mass in sediment and lowering concentration of THg in surface sediment would be expected to reduce methyl mercury (MeHg) in sediment and subsequent uptake within the food web. Thus, **PRAOs 1** would be achieved under this alternative. • These actions would reduce direct contact exposure risks associated with contaminated sediment for ecological receptors through a combination of targeted removal and reactive capping. Thus, **PRAO 2** would be achieved under this alternative. • Migration of THg from the sediment bed and associated pore water to downstream media (sediments, streambank soils, and surface water) would be reduced by reactive capping following targeted removal. Thus, **PRAO 3** would be achieved under this alternative. • Potential short-term impacts to ecological receptors under this alternative would include temporary habitat loss and initial disturbance of sediment and associated pore water that could temporarily increase potential for exposure risk and containment migration during construction activities. • Long-term effectiveness and protectiveness of the remedy would be dependent on monitoring and maintenance as necessary to maintain the integrity of the cap and prevention or minimization of recontamination from sediment in Wappinger Lake, potential upland sources, potentially contaminated floodplain soil, and Hudson River impacts.	• This alternative would provide adequate protection to human health and the environment in the interim until a final remedy for the Site is selected through the achievement of the RAOs. • Remaining sediments or other contaminated media with elevated concentrations of contaminants may still pose unacceptable risks and would be addressed by the final remedy for the Site. • Areas with contaminated sediment exceeding RAL for THg would be addressed through targeted removal, followed by in-place containment using a reactive cap, ICs, monitoring, and access controls. • These actions (targeted removal [up to 2 feet] of sediments greater than the RAL followed by reactive capping of sediments) would reduce contributions to human exposure (through ingestion of contaminated fish from recreational fishing) and ecological exposure (through dietary exposure) to contaminated sediments by reducing concentrations of THg. Lowering THg mass in sediment and lowering concentration of THg in surface sediment would be expected to reduce MeHg in sediment and subsequent uptake within the food web. Thus, **PRAOs 1** would be achieved under this alternative. • These actions would reduce direct contact exposure risks associated with contaminated sediment for ecological receptors through a combination of targeted removal and reactive capping. Thus, **PRAO 2** would be achieved under this alternative. • Migration of THg from the sediment bed and associated pore water to downstream media (sediments, streambank soils, and surface water) would be reduced by reactive capping of areas above the RAL following targeted removal. Thus, **PRAO 3** would be achieved under this alternative. • Potential short-term impacts to ecological receptors under this alternative would include temporary habitat loss and initial disturbance of sediment and associated pore water that could temporarily increase potential for exposure risk and containment migration during construction activities. • Long-term effectiveness and protectiveness of the remedy would be dependent on monitoring and maintenance as necessary to maintain the integrity of the cap and prevention or minimization of recontamination from sediment in Wappinger Lake, potential upland sources, potentially contaminated floodplain soil, and Hudson River impacts.	• This alternative would provide adequate protection to human health and the environment in the interim until a final remedy for the Site is selected through the achievement of the RAOs. • Remaining sediments or other contaminated media with elevated concentrations of contaminants may still pose unacceptable risks and would be addressed by the final remedy for the Site. • Areas with contaminated sediment exceeding RAL for THg would be addressed through removal to depths with exceedance of RAL for Thg . Excavated sediment will be disposed of off-site. Excavated areas will be backfilled. • These actions (targeted removal of sediments followed by backfilling) would reduce human exposure (through ingestion of contaminated fish from recreational fishing) and ecological exposure (through dietary exposure) to contaminated sediments by reducing concentrations of THg. Lowering THg mass in sediment and lowering concentration of THg in surface sediment would be expected to reduce MeHg in sediment and subsequent uptake within the food web. Thus, **PRAOs 1** would be achieved under this alternative. • These actions would reduce direct contact exposure risks associated with contaminated sediment for ecological receptors through a combination of targeted removal and reactive capping. Thus, **PRAO 2** would be achieved under this alternative. • Migration of THg from the sediment bed and associated pore water to downstream media (sediments, streambank soils, and surface water) would be reduced through the residuals control layer following targeted removal. Thus, **PRAO 3** would be achieved under this alternative. • Potential short-term impacts to ecological receptors under this alternative would include temporary habitat loss and initial disturbance of sediment and associated pore water that could temporarily increase potential for exposure risk and containment migration during construction activities. • Long-term effectiveness and protectiveness of the remedy would be dependent on prevention or minimization of recontamination from sediment in Wappinger Lake, potential upland sources, potentially contaminated floodplain soil, and Hudson River impacts. • ICs involving risk communication would be implemented since this is an IRA focused on THg and not a final site-wide action addressing all contaminants.

Evaluation Factors for Overall Protection of Human Health and the Environment	Remedial Alternative 1	Remedial Alternative 2	Remedial Alternative 3	Remedial Alternative 4
	No Action	Dredge to Depth of 1 Foot; Capping of Underlying Contamination	Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	Dredge to Remove Any Interim Performance Metric Exceedance; Backfill to Grade in the Dredge Footprint
		• ICs would be implemented to maintain the integrity of remedy components for contaminated media contained or left in place. • ICs involving risk communication would be implemented since this is an interim remedial action (IRA) focused on THg and not a final site-wide action addressing all contaminants. • Sediments or other contaminated media with elevated concentrations of contaminants other than THg may also still pose unacceptable risks.	• ICs would be implemented to maintain the integrity of remedy components for contaminated media contained or left in place. • ICs involving risk communication would be implemented since this is an IRA focused on THg and not a final site-wide action addressing all contaminants. Sediments or other contaminated media with elevated concentrations of contaminants other than THg may also still pose unacceptable risks.	Sediments or other contaminated media with elevated concentrations of contaminants other than THg may also still pose unacceptable risks.
Overall Rating:	**Not Adequate**	**Adequate**	**Adequate**	**Adequate**

Table C-2. Evaluation Summary for Compliance with Applicable or Relevant and Appropriate Requirements

Evaluation Factors for Compliance with ARARs	Remedial Alternative 1	Remedial Alternative 2	Remedial Alternative 3	Remedial Alternative 4
	No Action	Dredge to Depth of 1 Foot; Capping of Underlying Contamination	Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	Dredge to Remove Any Interim Performance Metric Exceedance; Backfill to Grade in the Dredge Footprint
Compliance with chemical-specific applicable or relevant and appropriate requirements (ARARs)	• Chemical-specific ARARs would not be pertinent since no remedial measures would be undertaken.	The following types of contaminants/media identified as part of Alternative 2 would involve chemical-specific ARARs in Appendix A that would be complied with or waived: • Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) contaminants including organic and inorganic contaminants related to the soil and surface water during implementation of the remedy via stormwater runoff or dewatering. ○ Primary approaches for compliance would be dredging, treating dewater effluent, and reactive capping. • ARARs include soil cleanup objectives and surface water criteria under New York State Environmental Conservation (NYSDEC) regulations and aquatic life/human health criteria under the federal Clean Water Act (CWA). ○ An interim measures waiver might be invoked for these ARARs because this interim remediation action focuses on reducing concentrations of THg in sediment. While other contaminants may be incidentally addressed, they are not the primary focus and will not be closely monitored. This interim action is not anticipated to achieve surface water criteria or standards.	The following types of contaminants/media identified as part of Alternative 3 would involve chemical-specific ARARs in Appendix A that would be complied with or waived: • CERCLA contaminants including organic and inorganic contaminants related to the soil and surface water during implementation of the remedy via stormwater runoff or dewatering. ○ Primary approaches for compliance would be dredging, treating dewater effluent, and reactive capping. • ARARs include soil cleanup objectives and surface water criteria under NYSDEC regulations and aquatic life/human health criteria under the federal CWA. ○ An interim measures waiver might be invoked for these ARARs because this interim remediation action focuses on reducing concentrations of THg in sediment. While other contaminants may be incidentally addressed, they are not the primary focus and will not be closely monitored. This interim action is not anticipated to achieve surface water criteria or standards.	The following types of contaminants/media identified as part of Alternative 4 would involve chemical-specific ARARs in Appendix A that would be complied with or waived: • CERCLA contaminants including organic and inorganic contaminants related to the soil and surface water during implementation of the remedy via stormwater runoff or dewatering. ○ Primary approaches for compliance would be dredging, treating dewater effluent, and backfilling. • ARARs include soil cleanup objectives and surface water criteria under NYSDEC regulations and aquatic life/human health criteria under the federal CWA. ○ An interim waiver might be invoked for these ARARs because this interim remediation action focuses on reducing concentrations of THg in sediment. While other contaminants may be incidentally addressed, they are not the primary focus and will not be closely monitored. This interim action is not anticipated to achieve surface water criteria or standards.
Compliance with location-specific ARARs	• Location-specific ARARs would not be pertinent since no remedial measures would be undertaken.	• If the following are present, location-specific ARARs in Appendix A would be complied with for Alternative 2: ○ Endangered or threatened animal or plant species or their critical habitat ○ Nongame fish or wildlife or their habitat ○ Migratory birds or their habitat ○ Bald or golden eagles or their habitat ○ Cultural and archaeological resources and artifacts ○ Essential fish habitat ○ Protected fish, shellfish and wildlife ○ Streams or water bodies that affect nongame fish and wildlife resources ○ Wetlands ○ Floodplains ○ Coastal erosion hazard areas • If migratory birds, endangered species, or artifacts fall within the boundaries of the remedial action or are encountered during remedy implementation, consultation with other agencies could identify the substantive requirements to protect them and steps would be taken to implement measures for those substantive requirements to verify compliance with the pertinent ARAR. • If remedial action occurs within essential fish habitats, there should be consultation with the	• If the following are present, location-specific ARARs in Appendix A would be complied with for Alternative 3: ○ Endangered or threatened animal or plant species or their critical habitat ○ Nongame fish or wildlife or their habitat ○ Migratory birds or their habitat ○ Bald or golden eagles or their habitat ○ Cultural and archaeological resources and artifacts ○ Essential fish habitat ○ Protected fish, shellfish and wildlife ○ Streams or water bodies that affect nongame fish and wildlife resources ○ Wetlands ○ Floodplains ○ Coastal erosion hazard areas • If migratory birds, endangered species, or artifacts fall within the boundaries of the remedial action or are encountered during remedy implementation, consultation with other agencies could identify the substantive requirements to protect them and steps would be taken to implement measures for those substantive requirements to verify compliance with the pertinent ARAR. • If remedial action occurs within essential fish habitats, there should be consultation with the	• If the following are present, location-specific ARARs in Appendix A would be complied with for Alternative 4: ○ Endangered or threatened animal or plant species or their critical habitat ○ Nongame fish or wildlife or their habitat ○ Migratory birds or their habitat ○ Bald or golden eagles or their habitat ○ Cultural and archaeological resources and artifacts ○ Essential fish habitat ○ Protected fish, shellfish and wildlife ○ Streams or water bodies that affect nongame fish and wildlife resources ○ Wetlands ○ Floodplains ○ Coastal erosion hazard areas • If migratory birds, endangered species, or artifacts fall within the boundaries of the remedial action or are encountered during remedy implementation, consultation with other agencies could identify the substantive requirements to protect them and steps would be taken to implement measures for those substantive requirements to verify compliance with the pertinent ARAR. • If remedial action occurs within essential fish habitats, there should be consultation with the

Evaluation Factors for Compliance with ARARs	Remedial Alternative 1	Remedial Alternative 2	Remedial Alternative 3	Remedial Alternative 4
	No Action	Dredge to Depth of 1 Foot; Capping of Underlying Contamination	Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	Dredge to Remove Any Interim Performance Metric Exceedance; Backfill to Grade in the Dredge Footprint
		National Marine Fisheries Services to identify the substantive requirements to protect them and to mitigate any adverse effects to those waters and implement measures for those substantive requirements to verify compliance. • Direct take of protected fish, shellfish and wildlife would be avoided; however, if incidental collection, handling, or disturbance (e.g., shellfish etc.) occurs during remedial activities, such actions would be conducted in accordance with variance provisions of Environmental Conservation Law (ECL) § 11-0515 pertaining to propagation and scientific purposes. • Wetlands would be field-delineated. Temporarily disturbed wetlands will be restored in place at the end of remediation and monitored for up to five years to ensure reestablishment of wetlands. • The potential of THg contamination in floodplains and whether floodplain soil would require remediation would be determined during the remedial design. If remediation is necessary, action would be carried out in a manner to avoid adversely affecting the floodplain. • The lower segment of Wappinger Creek is designated as a Significant Coastal Fish and Wildlife Habitat between the creek's confluence with the Hudson River and the dam in Wappingers Falls (New York State Department of State 2012). • If remedial actions occurs within coastal erosion hazard areas, actions would be carried out in a manner to avoid adversely affecting the coastal zone.	National Marine Fisheries Services to identify the substantive requirements to protect them and to mitigate any adverse effects to those waters and implement measures for those substantive requirements to verify compliance. • Direct take of protected fish, shellfish and wildlife would be avoided; however, if incidental collection, handling, or disturbance (e.g., shellfish etc.) occurs during remedial activities, such actions would be conducted in accordance with variance provisions of ECL § 11-0515 pertaining to propagation and scientific purposes. • Wetlands would be field-delineated. Temporarily disturbed wetlands will be restored in place at the end of remediation and monitored for up to five years to ensure reestablishment of wetlands. • The potential of THg contamination in floodplains and whether floodplain soil would require remediation would be determined during the remedial design. If remediation is necessary, action would be carried out in a manner to avoid adversely affecting the floodplain. • The lower segment of Wappinger Creek is designated as a Significant Coastal Fish and Wildlife Habitat between the creek's confluence with the Hudson River and the dam in Wappingers Falls (New York State Department of State 2012). • If remedial actions occurs within coastal erosion hazard areas, actions would be carried out in a manner to avoid adversely affecting the coastal zone.	National Marine Fisheries Services to identify the substantive requirements to protect them and to mitigate any adverse effects to those waters and implement measures for those substantive requirements to verify compliance. • Direct take of protected fish, shellfish and wildlife would be avoided; however, if incidental collection, handling, or disturbance (e.g., shellfish etc.) occurs during remedial activities, such actions would be conducted in accordance with variance provisions of ECL § 11-0515 pertaining to propagation and scientific purposes. • Wetlands would be field-delineated. Temporarily disturbed wetlands will be restored in place at the end of remediation and monitored for up to five years to ensure reestablishment of wetlands. • The potential of THg contamination in floodplains and whether floodplain soil would require remediation would be determined during the remedial design. If remediation is necessary, action would be carried out in a manner to avoid adversely affecting the floodplain. • The lower segment of Wappinger Creek is designated as a Significant Coastal Fish and Wildlife Habitat between the creek's confluence with the Hudson River and the dam in Wappingers Falls (New York State Department of State 2012). • If remedial actions occurs within coastal erosion hazard areas, actions would be carried out in a manner to avoid adversely affecting the coastal zone.
Compliance with action-specific ARARs	• Action-specific ARARs would not be pertinent since no remedial measures would be undertaken.	The following aspects of Alternative 2 would involve action-specific ARARs in Appendix A that would be complied with: • Dredging activities will occur in waters that can be navigated by boats and the public; compliance with the substantive requirements of the New York State Navigation Law would be addressed during design to ensure the remedial alternative avoids does not impede public and private access to the navigable waters. • Intrusive groundwork, such as dredging and capping in the creek sections and excavating stream bank soils, could lead to erosion during stormwater flow. Erosion and sediment controls would be implemented to protect water quality, maintain a stable creek system, to comply with CWA and New York's State Pollutant Discharge Elimination System (SPDES)discharge limitations. • Particulate matter (PM)2.5, PM10, and lead released to air during implementation of remedial action. Primary approaches for compliance with New York Air Pollution Control regulations and the Clean Air Act would be dust suppression best management practices (BMPs)	The following aspects of Alternative 3 would involve action-specific ARARs in Appendix A that would be complied with: • Dredging activities will occur in waters that can be navigated by boats and the public; compliance with the substantive requirements of the New York State Navigation Law would be addressed during design to ensure the remedial alternative avoids does not impede public and private access to the navigable waters. • Intrusive groundwork, such as dredging and capping in the creek sections and excavating stream bank soils could lead to erosion during stormwater flow. Erosion and sediment controls would be implemented to protect water quality, maintain a stable creek system, to comply with CWA and New York's SPDES discharge limitations. • PM2.5, PM10, and lead released to air during implementation of remedial action. Primary approaches for compliance with New York Air Pollution Control regulations and the Clean Air Act would be dust suppression BMPs and engineering controls, erosion control, and air monitoring.	The following aspects of Alternative 4 would involve action-specific ARARs in Appendix A that would be complied with: • Dredging activities will occur in waters that can be navigated by boats and the public; compliance with the substantive requirements of the New York State Navigation Law would be addressed during design to ensure the remedial alternative avoids does not impede public and private access to the navigable waters. • Intrusive groundwork, such as dredging and backfilling in the creek sections and excavating stream bank soils could disturb sediments and lead to erosion during stormwater flow. Erosion and sediment controls would be implemented to protect water quality, maintain a stable creek system, to comply with CWA and New York's SPDES discharge limitations. • PM2.5, PM10, and lead released to air during implementation of remedial action. Primary approaches for compliance with New York Air Pollution Control regulations and the Clean Air Act would be dust suppression BMPs and engineering controls, erosion control, and air monitoring.

Evaluation Factors for Compliance with ARARs	Remedial Alternative 1	Remedial Alternative 2	Remedial Alternative 3	Remedial Alternative 4
	No Action	Dredge to Depth of 1 Foot; Capping of Underlying Contamination	Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	Dredge to Remove Any Interim Performance Metric Exceedance; Backfill to Grade in the Dredge Footprint
		and engineering controls, erosion control, and air monitoring. • Hazardous waste and nonhazardous solid waste dredged and disposed of as part of this alternative will be classified according to Resource Conservation and Recovery Act (RCRA) and New York's solid waste and hazardous waste management requirements. • Any dredged hazardous and nonhazardous solid waste will be stored or disposed of in accordance with RCRA and New York's solid waste and hazardous waste management requirements. • Any PCB remediation waste will be managed and disposed of in accordance with Toxic Substances Control Act (TSCA). • Point source discharges from dewatering to surface water and the coastal zone will comply with pertinent CWA and New York's SPDES requirements.	• Hazardous waste and nonhazardous solid waste dredged and disposed of as part of this alternative will be classified according to RCRA and New York's solid waste and hazardous waste management requirements. • Any dredged hazardous and nonhazardous solid waste will be stored or disposed of in accordance with RCRA and New York's solid waste and hazardous waste management requirements. • Any PCB remediation waste will be managed and disposed of in accordance with TSCA. • Point source discharges from dewatering to surface water and the coastal zone will comply with pertinent CWA and New York's SPDES requirements.	• Hazardous waste and nonhazardous solid waste dredged and disposed of as part of this alternative will be classified according to RCRA and New York's solid waste and hazardous waste management requirements. • Any dredged hazardous and nonhazardous solid waste will be stored or disposed of in accordance with RCRA and New York's solid waste and hazardous waste management requirements. • Any PCB remediation waste will be managed and disposed of in accordance with TSCA. • Point source discharges from dewatering to surface water and the coastal zone will comply with pertinent CWA and New York's SPDES requirements.
Overall Rating:	**None**	**Will Comply, but may require CERCLA ARAR waiver(s)**	**Will Comply, but may require CERCLA ARAR waiver(s)**	**Will Comply, but may require CERCLA ARAR waiver(s)**

Table C-3. Evaluation for Long-Term Effectiveness

Evaluation Factors for Long-Term Effectiveness and Permanence	Remedial Alternative 1 No Action	Remedial Alternative 2 Dredge to Depth of 1 Foot; Capping of Underlying Contamination	Remedial Alternative 3 Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	Remedial Alternative 4 Dredge to Remove Any Interim Performance Metric Exceedance; Backfill to Grade in the Dredge Footprint
Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities	• No remedial action would be undertaken to address the contaminated sediment present at the Site, which would continue to pose unacceptable risks to human and ecological receptors, and contaminants could continue to migrate in the upper portion of the site and to downstream media.	• Magnitude of residual risk from untreated waste, and treatment residuals would be reduced under this alternative through a combination of targeted removal and off-site disposal, containment, ICs, monitoring, and access controls by addressing THg in sediment exceeding the RAL. Risk contributions for exposure pathways to human and ecological receptors and migration to downstream media would be reduced. • However, remaining sediments or other media with elevated concentrations of contaminants may still pose unacceptable risks and would be addressed by the final remedy for the Site. • Targeted removal would remove the top 1 foot of sediments where THg is greater than the RAL, regardless of the depth of such exceedance. Contaminated sediment exceeding THg RAL within the remediation footprint and located more than 1 foot below the mudline would remain on-site, contained in place by a reactive cap. • After targeted removal of contaminated sediment, untreated sediment would remain indefinitely below the containment system. Use of reactive capping material with an assumed 100-year cap design life, would reduce the potential for underlying contamination to migrate upward to sediment surface and to downstream media, as well as reduce the potential for bioavailability of THg and MeHg to the food web. However, there could be potential residual risk from this material remaining at the conclusion of the remedial activities because of the potential breach of the containment system.	• Magnitude of residual risk from untreated waste and treatment residuals would be reduced under this alternative through a combination of targeted removal and off-site disposal, containment, ICs, monitoring, and access controls by addressing THg in sediment exceeding the RAL. Risk contributions for exposure pathways to human and ecological receptors and migration to downstream medial would be reduced. • However, remaining sediments or other media with elevated concentrations of contaminants may still pose unacceptable risks and would be addressed by the final remedy for the Site. • Targeted removal would remove the top 1 foot of sediments where THg greater than the RAL, regardless of the depth of such exceedance and targeted removal of another foot of sediment where THg greater than the RAL between 1 and 2 feet below mudline. Contaminated sediment exceeding THg RAL within the remediation footprint below removal depths would remain on-site, contained in place by a reactive cap. • After targeted removal of contaminated sediment, untreated sediment would remain indefinitely below the containment system. Use of reactive capping material with an assumed 100-year cap design life, would reduce the potential for underlying contamination to migrate upward to sediment surface and to downstream media, as well as reduce the potential for bioavailability of THg and MeHg to the food web. However, there could be potential residual risk from this material remaining at the conclusion of the remedial activities because of the potential breach of the containment system.	• Magnitude of residual risk from untreated waste would be reduced under this alternative through targeted removal of sediments in areas with THg exceeding the RAL,, off-site disposal of dredged materials at permitted facilities, and placement of a backfill layer. Risk contributions for exposure pathways to human and ecological receptors and migration to downstream media would be reduced. • However, remaining sediments or other media with elevated concentrations of contaminants may still pose unacceptable risks and would be addressed by the final remedy for the Site. • Targeted removal would remove the sediments where THg exceeds the RAL, regardless of the depth of such exceedance followed by placement of a backfill layer.
Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the Site	• No remedial action would be undertaken at the Site. Thus, no controls would be put in place under this alternative.	• Targeted dredging and disposal of contaminated sediments is a reliable control if implemented properly. • In-place containment is a reliable remediation method if properly designed to accommodate site-specific considerations, constructed, and maintained. The cap significantly reduces the potential for recontamination of surface sediment and surface water by reacting with contaminants that could migrate upward with groundwater discharge to the creek. A performance monitoring and maintenance plan would be implemented to ensure long-term effectiveness and permanence of the remedy. Inspections and repairs would be implemented as necessary. • Based on the stated assumptions, listed uncertainties, and modeling presented in Appendix D, a reactive cap should inhibit any	• Targeted dredging and disposal of contaminated sediments is a reliable control if implemented properly. • In-place containment is a reliable remediation method if properly designed to accommodate site-specific considerations, constructed, and maintained. The cap significantly reduces the potential for recontamination of surface sediment and surface water by reacting with contaminants that could migrate upward with groundwater discharge to the creek. A performance monitoring and maintenance plan would be implemented to ensure long-term effectiveness and permanence of the remedy. Inspections and repairs would be implemented as necessary. • Based on the stated assumptions, listed uncertainties, and modeling presented in Appendix D, a reactive cap should inhibit any	• Targeted dredging and disposal of contaminated sediments is a reliable control if implemented properly. • A backfill layer will be placed over the dredged area. This layer acts to stabilize the sediment bed across adjacent dredge prisms and maintain the bathymetry of the channel. • Performance monitoring would be conducted to assess both the performance of the remedy and the impact on the remedy's protectiveness from ongoing sources post-implementation. • ICs would be required under this alternative and could be a reliable control for preventing exposure to human receptors. Effectiveness of ICs is dependent on administrative and legal enforcement of the controls and could be enhanced through risk communication programs.

Evaluation Factors for Long-Term Effectiveness and Permanence	Remedial Alternative 1	Remedial Alternative 2	Remedial Alternative 3	Remedial Alternative 4
	No Action	Dredge to Depth of 1 Foot; Capping of Underlying Contamination	Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	Dredge to Remove Any Interim Performance Metric Exceedance; Backfill to Grade in the Dredge Footprint
		undredged mercury-contaminated sediment and associated pore water from recontaminating the top 6 inches of the remedy surface via dissolved-phase transport to sediment concentrations at or above the IPM within an assumed 100-year cap design life. • The long-term effectiveness and permanence of the in-place containment system is dependent on the integrity and design life of the cap, periodic inspection, post-construction monitoring and maintenance, and enforcement of ICs. • Resiliency measures could be implemented as part of this alternative to enhance long-term reliability of reactive caps. Examples of resiliency measures include using erosion protection cover materials such as rock armoring above the reactive cap. • ICs and access controls would be required under this alternative and could be a reliable control for preventing exposure to human receptors. Effectiveness of ICs is dependent on administrative and legal enforcement of the controls and could be enhanced through risk communication programs. • To enhance the permanence of caps, implementation of an erosion control layer to protect against erosion damage in the creek may be required in locations. • The reactive component of the cap would aid in reducing the potential for migration from underlying sediment and associated pore water in the long-term and is a reliable control. • A maintenance and monitoring program would be implemented to confirm the containment system remains effective over time. • Monitoring would be implemented to assess both the performance of the remedy and the impact on the remedy's protectiveness from ongoing sources post-implementation.	undredged mercury-contaminated sediment and associated pore water from recontaminating the top 6 inches of the remedy surface via dissolved-phase transport to sediment concentrations at or above the IPM within an assumed 100-year cap design life. • The long-term effectiveness and permanence of the in-place containment system is dependent on the integrity and design life of the cap, periodic inspection, post-construction monitoring and maintenance, and enforcement of ICs. • Resiliency measures could be implemented as part of this alternative to enhance long-term reliability of reactive caps. Examples of resiliency measures include using erosion protection cover materials such as rock armoring above the reactive cap. • ICs would be required under this alternative and could be a reliable control for preventing exposure to human receptors. Effectiveness of ICs is dependent on administrative and legal enforcement of the controls and could be enhanced through risk communication programs. • Permanence of caps is dependent on implementing an erosion control layer to protect against erosion damage in the creek, and it may be required in locations. • The reactive component of the cap would aid in reducing the potential for recontamination from underlying sediment and associated pore water in the long-term and is a reliable control. • A maintenance and monitoring program would be implemented to confirm the containment system remains effective over time. • Monitoring would be implemented to assess both the performance of the remedy and the impact on the remedy's protectiveness from ongoing sources post-implementation.	• Monitoring would be implemented to assess both the performance of the remedy and the impact on the remedy's protectiveness from ongoing sources post-implementation.
Overall Rating:	**None**	**Moderate**	**Moderate to High**	**High**

Table C-4. Evaluation for Reduction of Toxicity, Mobility, or Volume Through Treatment

Evaluation Factors for Reduction of Toxicity, Mobility, or Volume Through Treatment	Remedial Alternative 1 No Action	Remedial Alternative 2 Dredge to Depth of 1 Foot; Capping of Underlying Contamination	Remedial Alternative 3 Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	Remedial Alternative 4 Dredge to Remove Any Interim Performance Metric Exceedance; Backfill to Grade in the Dredge Footprint
The treatment processes the alternative uses and the materials they will treat	• No remedial action would be undertaken at the Site. Thus, there would be no treatment process used.	• Following targeted removal, dewatering dredged sediments using amendments (e.g., Portland cement) is a form of ex situ treatment because it reduces the toxicity and mobility of contaminants. • Remaining contaminated sediment that is contained in place after the targeted removal would not undergo treatment. However, the containment system implemented would be a reactive cap that would include amendment material. This amendment material would use passive treatment to aqueous media, which may contain dissolved-phase contamination moving through the cap layers. Contaminants that desorb from the contaminated sediments and dissolve in pore water would be treated only if the pore water migrates through the reactive cap. This treatment of dissolved-phase contaminant would occur for the design life of the cap. • Dewatering is an assumed component of this alternative because of the saturated nature of sediment following removal. It is assumed, for this focused feasibility study (FFS), that liquids generated from dewatering would be treated in a mobile treatment system prior to on-site discharge. • Dewatering treatment may also generate solid waste and/or characteristic hazardous waste from using treatment media such as granular activated carbon (GAC). Any GAC or other treatment media containing characteristic hazardous waste may also require additional treatment for regeneration.	• Following targeted removal, dewatering dredged sediments using amendments (e.g., Portland cement) is a form of ex situ treatment because it reduces the toxicity and mobility of contaminants. • Remaining contaminated sediment that is contained in place after the targeted removal would not undergo treatment. However, the containment system implemented would be a reactive cap that would include amendment material. This amendment material would use passive treatment to aqueous media, which may contain dissolved-phase contamination moving through the cap layers. Contaminants that desorb from the contaminated sediments and dissolve in pore water would be treated only if the pore water migrates through the reactive cap. This treatment of dissolved-phase contaminant would occur for the design life of the cap. • Dewatering is an assumed component of this alternative because of the saturated nature of sediment following removal. It is assumed, for this FFS, that liquids generated from dewatering would be treated in a mobile treatment system prior to on-site discharge. • Dewatering treatment may also generate solid waste and/or characteristic hazardous waste using treatment media such as GAC. Any GAC or other treatment media containing characteristic hazardous waste may also require additional treatment for regeneration.	• Following targeted removal, dewatering dredged sediments using amendments (e.g., Portland cement) is a form of ex situ treatment because it reduces the toxicity and mobility of contaminants. • Dewatering is an assumed component of this alternative because of the saturated nature of sediment following removal. It is assumed, for this FFS, that liquids generated from dewatering would be treated in a mobile treatment system prior to on-site discharge. • Dewatering treatment may also generate solid waste and/or characteristic hazardous waste using treatment media such as GAC. Any GAC or other treatment media containing characteristic hazardous waste may also require additional treatment for regeneration.
The amount of hazardous substances, pollutants, or contaminants that will be destroyed or treated, including how the principal threat(s) will be addressed	• No remedial action would be undertaken at the Site. Thus, there would be no material treated.	• As part of targeted removal, it is assumed that approximately 41,200 loose cubic yards (LCY) of contaminated sediments would undergo ex situ treatment after removal to facilitate transportation for off-site disposal. • Sediment exceeding the RAL that remains in place following the targeted removal would be capped with a reactive cap. While the reactive cap would not directly treat underlying contaminated sediments, it would use passive treatment to any aqueous media that may contain dissolved-phase contamination moving through the cap layers. The number of contaminants treated by the cap over time would be difficult to quantity. • The volume of liquids generated for treatment during dewatering would be uncertain. The amount of treatment media, such as GAC, and the mass of contaminants within it that would be destroyed or treated during GAC regeneration (usually thermal treatment) would be uncertain.	• As part of targeted removal, it is assumed that approximately 51,200 LCY of contaminated sediments would undergo ex situ treatment after removal to facilitate transportation for off-site disposal. • Sediment exceeding the RAL that remains in place following the targeted removal would be capped with a reactive cap. While the reactive cap would not directly treat underlying contaminated sediments, it would use passive treatment to aqueous media that may contain dissolved-phase contamination moving through the cap layers. The number of contaminants treated by the cap over time would be difficult to quantity. • The volume of liquids generated for treatment during dewatering would be uncertain. The amount of treatment media, such as GAC, and the mass of contaminants within it that would be destroyed or treated during GAC regeneration (usually thermal treatment) would be uncertain.	• As part of targeted removal, it is assumed that 69,200 LCY of contaminated sediments would undergo ex situ treatment after removal to facilitate transportation for off-site disposal. • The volume of liquids generated for treatment during dewatering would be uncertain. The amount of treatment media, such as GAC, and the mass of contaminants within it that would be destroyed or treated during GAC regeneration (usually thermal treatment) would be uncertain.

Evaluation Factors for Reduction of Toxicity, Mobility, or Volume Through Treatment	Remedial Alternative 1 No Action	Remedial Alternative 2 Dredge to Depth of 1 Foot; Capping of Underlying Contamination	Remedial Alternative 3 Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	Remedial Alternative 4 Dredge to Remove Any Interim Performance Metric Exceedance; Backfill to Grade in the Dredge Footprint
The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment	• No remedial action would be undertaken at the Site. Thus, there would be no treatment conducted. There would be no reduction in toxicity, mobility or volume of wastes.	• As part of targeted removal, it is assumed that contaminated sediments would undergo ex situ treatment after removal to facilitate transportation for off-site disposal. Ex situ treatment using a dewatering reagent would result in reducing the toxicity and mobility of contaminants in the sediment, but it may increase the overall volume. • For the reactive capping, contaminants that desorb from the contaminated sediments and dissolve in pore water would be passively treated only if the pore water migrates through the reactive cap. The passive treatment associated with a reactive cap would be expected to reduce the mobility and toxicity of the contaminants as they migrate through the reactive cap. • Dewatering treatment would result in reductions in the toxicity and mobility of contaminants within contaminated media. The contaminant would be transferred to treatment media, such as GAC, and subsequently destroyed (such as thermal GAC regeneration).	• As part of targeted removal, it is assumed that contaminated sediments would undergo ex situ treatment after removal to facilitate transportation for off-site disposal. Ex situ treatment using a dewatering reagent would result in reducing the toxicity and mobility of contaminants in the sediment, but it may increase the overall volume. • For the reactive capping, contaminants that desorb from the contaminated sediments and dissolve in pore water would be passively treated only if the pore water migrates through the reactive cap. The passive treatment associated with a reactive cap would be expected to reduce the mobility and toxicity of the contaminants as they migrate through the reactive cap. • Dewatering treatment would result in reductions in the toxicity and mobility of contaminants within contaminated media. The contaminant would be transferred to treatment media, such as GAC, and subsequently destroyed (such as thermal GAC regeneration).	• As part of targeted removal, it is assumed that contaminated sediments would undergo ex situ treatment after removal to facilitate transportation for off-site disposal. Ex situ treatment using a dewatering reagent would result in reducing the toxicity and mobility of contaminants in the sediment, but it may increase the overall volume. • Dewatering treatment would result in reductions in the toxicity and mobility of contaminants within contaminated media. The contaminant would be transferred to treatment media, such as GAC, and subsequently destroyed (such as thermal GAC regeneration).
The degree to which the treatment is irreversible	• No remedial action would be undertaken at the Site. Thus, there would be no treatment conducted.	• Stabilization amendments used for dewatering are considered irreversible if the stabilized material is placed into the controlled environment of a disposal facility isolated from conditions adverse to the reagent. • The reactive cap would use passive treatment to aqueous media moving through the cap layers. While the reactive cap would be designed to be a long-term solution for the design life of the cap, it is not intended to be reversible; If the treatment capacity of the cap is exceeded, its effectiveness in sequestering or degrading contaminants would be diminished. • Dewatering treatment and the treatment media used during dewatering operations would likely use a type of treatment that is irreversible.	• Stabilization amendments used for dewatering are considered irreversible if the stabilized material is placed into the controlled environment of a disposal facility isolated from conditions adverse to the reagent. • The reactive cap would use passive treatment to aqueous media moving through the cap layers. While the reactive cap would be designed to be a long-term solution for the design life of the cap, it is not intended to be reversible. If the treatment capacity of the cap is exceeded, its effectiveness in sequestering or degrading contaminants would be diminished. • Dewatering treatment and the treatment media used during dewatering operations would likely use a type of treatment that is irreversible.	• Stabilization amendments used for dewatering are considered irreversible if the stabilized material is placed into the controlled environment of a disposal facility isolated from conditions adverse to the reagent. • Dewatering treatment and the treatment media used during dewatering operations would likely use a type of treatment that is irreversible.

The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate such hazardous substances and their constituents	• No remedial action would be undertaken at the Site. Thus, there would be no treatment conducted.	• For the dredged sediments that are treated by dewatering agents, the contaminants are immobilized in a solid form and placed into a controlled environment of a disposal facility isolated from conditions adverse to the reagent. • The reactive amendment in the cap would remain in place and continue to sequester contaminants through its design life. • GAC would be a residual from dewatering treatment that would require appropriate characterization, handling, and/or disposal. GAC may be identified as containing characteristic hazardous waste. Contaminants in GAC, if placed in a permitted disposal facility, would not have toxicity or mobility. If the GAC is regenerated, contaminants would be transferred to a different condition and would require further characterization and proper disposal.	• For the dredged sediments that are treated by dewatering agents, the contaminants are immobilized in a solid form and placed into a controlled environment of a disposal facility isolated from conditions adverse to the reagent. • The reactive amendment in the cap would remain in place and continue to sequester contaminants through its design life. • GAC would likely be a residual from dewatering treatment that would require appropriate characterization, handling, and/or disposal. GAC may be identified as containing characteristic hazardous waste. Contaminants in GAC, if placed in a permitted disposal facility, would not have toxicity or mobility. If the GAC is regenerated, contaminants would be transferred to a different condition and would require further characterization and proper disposal.	• For the dredged sediments that are treated by dewatering agents, the contaminants are immobilized in a solid form and placed into a controlled environment of a disposal facility isolated from conditions adverse to the reagent. • GAC would likely be a residual from dewatering treatment that would require appropriate characterization, handling, and/or disposal. GAC may be identified as containing characteristic hazardous waste. Contaminants in GAC, if placed in a permitted disposal facility, would not have toxicity or mobility. If the GAC is regenerated, contaminants would be transferred to a different condition and would require further characterization and proper disposal.
Whether the alternative would satisfy the statutory preference for treatment as a principal element of the remedial action	• The statutory preference for treatment as a principal element of the remedial action would not be met.	• The statutory preference for treatment as a principal element of the remedial action would be met through the use of reactive cap, stabilization of sediment, and dewatering treatment prior to discharge.	• The statutory preference for treatment as a principal element of the remedial action would be met through the use of reactive cap, stabilization of sediment, and dewatering treatment prior to discharge.	• The statutory preference for treatment as a principal element of the remedial action would be met through stabilization of sediment and dewatering treatment prior to discharge.
Overall Rating:	**None**	**Moderate**	**Moderate to High**	**Moderate to High**

Table C-5. Evaluation for Short-Term Effectiveness

Evaluation Factors for Short-Term Effectiveness	Remedial Alternative 1	Remedial Alternative 2	Remedial Alternative 3	Remedial Alternative 4
	No Action	Dredge to Depth of 1 Foot; Capping of Underlying Contamination	Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	Dredge to Remove Any Interim Performance Metric Exceedance; Backfill to Grade in the Dredge Footprint
Short-term risks that might be posed to the community during implementation of an alternative	• No remedial action would be undertaken; thus, there would be no short-term risks posed to the community resulting from the alternative.	• Potential impacts to the community due to increased truck traffic required for off-site disposal of dredged sediments and import of amendments and cap materials. These community impacts could be reduced with careful selection of haul routes and the time windows that are used to minimize traffic safety hazards to the surrounding community. In addition, safety measures, such as signage and flaggers, could be used in areas where truck traffic could pose increased safety hazards. • Remedial activities associated with streambank soils may involve disturbance of contaminated media on residential, industrial, or recreational properties. Protective measures, such as dust suppression (water- or chemical-based), would be used to address risks to residents, workers, or recreational users. • Potential impacts to the community due to increased noise and odors associated with remedial activities. The Site is near residential, industrial, and public recreation areas. Careful selection of the location of the sediment processing area and implementation of appropriate work hour restrictions could reduce potential noise impacts to the community. Standard operating procedures and BMPs could be used to minimize odor generation, if necessary, such as use of foams or covering stockpiles. • Potential risks to trespassers who may enter the Site during remedial activities. These impacts could be mitigated through safety protocols such as signage, work zones, and security. However, it is possible that trespassers would ignore these methods. • Potential risks to the community resulting from dredging and processing contaminated sediment, which may liberate contaminated media and dust. Safety measures, such as dust suppression or containment during dewatering, would protect the community during implementation. • This alternative could also include treatment and discharge of liquids generated from dewatering. Adequate controls would be placed on the treatment equipment to limit contamination discharges that could affect the community. • Delivery of nonconventional/oversized equipment could pose safety hazards to the public, including long-reach hydraulic excavators and portable barges. • Community impacts would likely include restricted use of Wappinger Creek (e.g., restricting recreational use and fishing) during implementation of this alternative. Access controls could be used to limit access to	• Potential impacts to the community due to increased truck traffic required for off-site disposal of dredged sediments and import of amendments and cap materials. These community impacts could be reduced with careful selection of haul routes and the time windows that are used to minimize traffic safety hazards to the surrounding community. In addition, safety measures, such as signage and flaggers, could be used in areas where truck traffic could pose increased safety hazards. • Remedial activities associated with streambank soils may involve disturbance of contaminated media on residential, industrial, or recreational properties. Protective measures, such as dust suppression (water- or chemical-based), would be used to address risks to residents, workers, or recreational users. • Potential impacts to the community due to increased noise and odors associated with remedial activities. The Site is located near residential, industrial, and public recreation areas. Careful selection of the location of the sediment processing area and implementing appropriate work hour restrictions could reduce potential noise impacts to the community. Standard operating procedures and BMPs could be used to minimize odor generation, if necessary, such as use of foams or covering stockpiles. • Potential risks to trespassers who may enter the Site during remedial activities. These impacts could be mitigated through safety protocols such as signage, work zones, and security. However, it is possible that trespassers would ignore these methods. • Potential risks to the community resulting from dredging and processing contaminated sediment, which may liberate contaminated media and dust. Safety measures, such as dust suppression or containment during dewatering would protect the community during implementation. • This alternative could also include treatment and discharge of liquids generated from dewatering. Adequate controls would be placed on the treatment equipment to limit contamination discharges that could affect the community. • Delivery of nonconventional/oversized equipment could pose safety hazards to the public, including long-reach hydraulic excavators and portable barges. • Community impacts would likely include restricted use of Wappinger Creek (e.g., restricting recreational use and fishing) during implementation of this alternative. Access controls could be used to limit access to	• Potential impacts to the community due to increased truck traffic required for off-site disposal of dredged sediments and import of backfill layer materials. These community impacts could be reduced with careful selection of haul routes and the time windows that are used to minimize traffic safety hazards to the surrounding community. In addition, safety measures, such as signage and flaggers, could be used in areas where truck traffic could pose increased safety hazards. • Remedial activities associated with streambank soils may involve disturbance of contaminated media on residential, industrial, or recreational properties. Protective measures, such as dust suppression (water- or chemical-based), would be used to address risks to residents, workers, or recreational users. • Potential impacts to the community due to increased noise and odors associated with remedial activities. The Site is located near residential, industrial, and public recreation areas. Careful selection of the location of the sediment processing area and implementing appropriate work hour restrictions could reduce potential noise impacts to the community. Standard operating procedures and BMPs could be used to minimize odor generation, if necessary, such as use of foams or covering stockpiles. • Potential risks to trespassers who may enter the Site during remedial activities. These impacts could be mitigated through safety protocols such as signage, work zones, and security. However, it is possible that trespassers would ignore these methods. • Potential risks to the community resulting from dredging and processing contaminated sediment, which may liberate contaminated media and dust. Safety measures, such as dust suppression or containment during dewatering would protect the community during implementation. • This alternative could also include treatment and discharge of liquids generated from dewatering. Adequate controls would be placed on the treatment equipment to limit contamination discharges that could affect the community. • Delivery of nonconventional/oversized equipment could pose safety hazards to the public, including long-reach hydraulic excavators and portable barges. • Community impacts would likely include restricted use of Wappinger Creek (e.g., restricting recreational use and fishing) during implementation of this alternative. Access controls could be used to limit access to

Evaluation Factors for Short-Term Effectiveness	Remedial Alternative 1	Remedial Alternative 2	Remedial Alternative 3	Remedial Alternative 4
	No Action	Dredge to Depth of 1 Foot; Capping of Underlying Contamination	Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	Dredge to Remove Any Interim Performance Metric Exceedance; Backfill to Grade in the Dredge Footprint
		Wappinger Creek to protect potential recreational users. • Implementation of this alternative includes truck traffic for the transport of approximately 45,500 LCY (approximately 2,500 truckloads) of contaminated sediment for off-site disposal and approximately 27,000 LCY (1,500 truckloads) of placed materials for capping, backfill, or residuals control layer..	Wappinger Creek to protect potential recreational users. • Implementation of this alternative includes truck traffic for the transport of approximately 56,000 LCY (approximately 3,100 truckloads) of contaminated sediment for off-site disposal and approximately 39,300 LCY (2,200 truckloads) of placed materials for capping, backfill, or residuals control layer.	Wappinger Creek to protect potential recreational users. • Implementation of this alternative includes truck traffic for the transport of approximately 74,900 LCY (approximately 4,200 truckloads) of contaminated sediment for off-site disposal and approximately 71,200 LCY (4,000 truckloads) of placed materials for capping, backfill, or residuals control layer.
Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures	• No remedial action would be undertaken; thus, there would be no short-term risks posed to workers resulting from implementation of the alternative.	• Exposure to chemical amendments, dewatering reagents, or treatment media from the dewatering process could present short-term risk of adverse effects to workers. • Dredging and handling of contaminated sediment may pose short-term risks to workers. Specifically, the presence of highly contaminated media, which may be classified as hazardous waste, may pose short-term risks to workers handling these materials. Safety measures such as dust suppression, use of personal protective equipment (PPE), and establishment of work zones would protect workers during remedy implementation. • Handling, mixing, and placement of reactive media and treatment reagents may pose short-term risks to workers. Specifically, the presence of highly contaminated media, which may be classified as hazardous waste, may pose short-term risks to workers handling these materials. Safety measures such as dust suppression, use of personal protective equipment (PPE), and establishment of work zones would protect workers during remedy implementation. • Potential safety risks associated with mobilizing and working with large equipment, which could include long-reach excavators for excavating and large equipment for installing sheet piles or other shoring measures. Specialized operators would be required to ensure safety. • Work activities conducted near heavy equipment and large trucks pose short-term risks to workers. Adherence to appropriate health and safety plans and Site management protocols would be required to mitigate risks. • Other potential impacts to workers could be from safety hazards during implementation, such as noise, vapors, falls, utility lines, electrical hazards, and mechanical hazards. These other potential impacts would be mitigated through adherence to safety requirements, use of PPE, and standard operating procedures. • Potential risk to workers from working in areas with wet conditions. This would be mitigated through adherence to safety requirements, use of PPE, design for safe work conducted for in-water work, and standard operating procedures.	• Exposure to chemical amendments, dewatering reagents, or treatment media from the dewatering process could present short-term risk of adverse effects to workers. • Dredging and handling of contaminated sediment may pose short-term risks to workers. Specifically, the presence of highly contaminated media, which may be classified as hazardous waste, may pose short-term risks to workers handling these materials. Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers during remedy implementation. • Handling, mixing, and placement of reactive media and treatment reagents may pose short-term risks to workers. Specifically, the presence of highly contaminated media, which may be classified as hazardous waste, may pose short-term risks to workers handling these materials. Safety measures such as dust suppression, use of personal protective equipment (PPE), and establishment of work zones would protect workers during remedy implementation. • Potential safety risks associated with mobilizing and working with large equipment, which could include long-reach excavators for excavating and large equipment for installing sheet piles or other shoring measures. Specialized operators would be required to ensure safety. • Work activities conducted near heavy equipment and large trucks pose short-term risks to workers. Adherence to appropriate health and safety plans and Site management protocols would be required to mitigate risks. • Other potential impacts to workers could be from safety hazards during implementation, such as noise, vapors, falls, utility lines, electrical hazards, and mechanical hazards. These other potential impacts would be mitigated through adherence to safety requirements, use of PPE, and standard operating procedures. • Potential risk to workers from working in areas with wet conditions. This would be mitigated through adherence to safety requirements, use of PPE, design for safe work conducted for in-water work, and standard operating procedures.	• Exposure to chemical amendments, dewatering reagents, or treatment media from the dewatering process could present short-term risk of adverse effects to workers. • Dredging and handling of contaminated sediment may pose short-term risks to workers. Specifically, the presence of highly contaminated media, which may be classified as hazardous waste, may pose short-term risks to workers handling these materials. Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers during remedy implementation. • Handling, mixing, and placement of treatment reagents may pose short-term risks to workers. Specifically, the presence of highly contaminated media, which may be classified as hazardous waste, may pose short-term risks to workers handling these materials. Safety measures such as dust suppression, use of personal protective equipment (PPE), and establishment of work zones would protect workers during remedy implementation. • Potential safety risks associated with mobilizing and working with large equipment, which could include long-reach excavators for excavating and large equipment for installing sheet piles or other shoring measures. Specialized operators would be required to ensure safety. • Work activities conducted near heavy equipment and large trucks pose short-term risks to workers. Adherence to appropriate health and safety plans and Site management protocols would be required to mitigate risks. • Other potential impacts to workers could be from safety hazards during implementation, such as noise, mercury vapors, falls, utility lines, and electrical and mechanical hazards. These other potential impacts would be mitigated through adherence to safety requirements, use of PPE, and standard operating procedures. • Potential risk to workers from working in areas with wet conditions. This would be mitigated through adherence to safety requirements, use of PPE, design for safe work conducted for in-water work, and standard operating procedures. • Delivery of nonconventional/oversized equipment could pose safety hazards to the

Evaluation Factors for Short-Term Effectiveness	Remedial Alternative 1	Remedial Alternative 2	Remedial Alternative 3	Remedial Alternative 4
	No Action	Dredge to Depth of 1 Foot; Capping of Underlying Contamination	Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	Dredge to Remove Any Interim Performance Metric Exceedance; Backfill to Grade in the Dredge Footprint
		• Delivery of nonconventional/oversized equipment could pose safety hazards to the workers, including long-reach hydraulic excavators and portable barges. • Potential safety risks are associated with operation of the temporary mobile treatment system for dewatering. Adherence to safety protocols during operations of the treatment plant should lessen worker risks. • Activities in constrained areas, such as around bridges, or activities near obstructions or unstable slopes or shorelines could result in additional safety risks. Establishment of proper work procedures would be implemented to protect workers.	• Delivery of nonconventional/oversized equipment could pose safety hazards to the workers, including long-reach hydraulic excavators and portable barges. • Potential safety risks are associated with operation of the temporary mobile treatment system for dewatering. Adherence to safety protocols during operations of the treatment plant should lessen worker risks. • Activities in constrained areas, such as around bridges, or activities near obstructions or unstable slopes or shorelines could result in additional safety risks. Establishment of proper work procedures would be implemented to protect workers.	workers, including long-reach hydraulic excavators and portable barges. • Potential safety risks are associated with operation of the temporary mobile treatment system for dewatering. Adherence to safety protocols during operations of the treatment plant should lessen worker risks. • Activities in constrained areas, such as around bridges, or activities near obstructions or unstable slopes or shorelines could result in additional safety risks. Establishment of proper work procedures would be implemented to protect workers.
Potential adverse environmental impacts resulting from construction and implementation of an alternative and the reliability of the available mitigation measures during implementation in preventing or reducing the potential impacts	• No remedial action would be undertaken; thus, there would be no short-term risks posed to the environment resulting from implementation of the alternative.	• Sediment removal and capping may result in short-term adverse impacts to the Wappinger Creek, including exposure of fish and other biota to suspended and dissolved contaminants or material in the water column, temporary loss of benthos and habitat for the ecological community in dredged areas, and increased emissions from construction and transportation equipment. Measures and BMPs that would be used to minimize these impacts include engineering controls to minimize resuspension/release during cap placement, sequencing of dredging and placement activities to minimize recontamination potential, conducting work within the in-water work window, if applicable, to minimize impacts to fish, and silt curtains, sheet pile walls, or other physical barriers would be used as appropriate to minimize releases. • Precautions and controls will be taken to prevent incidental discharges of contaminated media from entering the water column from in-water work. These precautions and controls could include using spill plates and aprons to prevent dropping dredge material into the water, reducing cycle times, restricting lateral movement of the dredge bucket while under water, using closed dredge buckets whenever Site conditions allow, reducing or stopping dredging activities during periods of peak current. • High winds, disturbance and processing of contaminated sediment and streambank soils, and other Site activities may pose potential adverse impacts to the environment through dispersion of dust. Dust suppression would be used to control any dust during construction. Perimeter air monitoring would be implemented. • Additional adverse impacts to the environment may be incurred as a result of the use of heavy construction and hauling equipment. Hauling contributes to local air emissions due to increased truck traffic. Use of fuel-efficient and	• Sediment removal and capping may result in short-term adverse impacts to the Wappinger Creek, including exposure of fish and other biota to suspended and dissolved contaminants or material in the water column, temporary loss of benthos and habitat for the ecological community in dredged areas, and increased emissions from construction and transportation equipment. Measures and BMPs that would be used to minimize these impacts include engineering controls to minimize resuspension/release during cap placement, sequencing of dredging and placement activities to minimize recontamination potential, conducting work within the in-water work window, if applicable, to minimize impacts to fish, and silt curtains, sheet pile walls, or other physical barriers would be used as appropriate to minimize releases. • Precautions and controls will be taken to prevent incidental discharges of contaminated media from entering the water column from in-water work. These precautions and controls could include using spill plates and aprons to prevent dropping dredge material into the water, reducing cycle times, restricting lateral movement of the dredge bucket while under water, using closed dredge buckets whenever Site conditions allow, reducing or stopping dredging activities during periods of peak current. • High winds, disturbance and processing of contaminated sediment and streambank soils, and other Site activities may pose potential adverse impacts to the environment through dispersion of dust. Dust suppression would be used for controlling any dust during construction. Perimeter air monitoring would be implemented. • Additional adverse impacts to the environment may be incurred as a result of the use of heavy construction and hauling equipment. Hauling contributes to local air emissions due to increased truck traffic. Use of fuel-efficient and	• Sediment removal and backfilling may result in short-term adverse impacts to the Wappinger Creek, including exposure of fish and other biota to suspended and dissolved contaminants or material in the water column, temporary loss of benthos and habitat for the ecological community in dredged areas, and increased emissions from construction and transportation equipment. Measures and BMPs that would be used to minimize these impacts include engineering controls to minimize resuspension/release during cap placement, sequencing of dredging and placement activities to minimize recontamination potential, conducting work within the in-water work window, if applicable, to minimize impacts to fish, and silt curtains, sheet pile walls, or other physical barriers would be used as appropriate to minimize releases. • Precautions and controls will be taken to prevent incidental discharges of contaminated media from entering the water column from in-water work. These precautions and controls could include using spill plates and aprons to prevent dropping dredge material into the water, reducing cycle times, restricting lateral movement of the dredge bucket while under water, using closed dredge buckets whenever Site conditions allow, reducing or stopping dredging activities during periods of peak current. • High winds, disturbance of contaminated sediment and streambank soils, and other Site activities may pose potential adverse impacts to the environment through dispersion of dust. Dust suppression would be used for controlling any dust during construction. Perimeter air monitoring would be implemented. • Additional adverse impacts to the environment may be incurred as a result of the use of heavy construction and hauling equipment. Hauling contributes to local air emissions due to increased truck traffic. Use of fuel-efficient and

Evaluation Factors for Short-Term Effectiveness	Remedial Alternative 1	Remedial Alternative 2	Remedial Alternative 3	Remedial Alternative 4
	No Action	Dredge to Depth of 1 Foot; Capping of Underlying Contamination	Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	Dredge to Remove Any Interim Performance Metric Exceedance; Backfill to Grade in the Dredge Footprint
		low-emission equipment and vehicles could reduce environmental impacts. • Noise emissions from construction and hauling activities could lead to adverse environmental conditions primarily limited to near the Site. • Protective measures such as silt fencing and other erosion prevention measures would be used to minimize the environmental impacts during construction in streambank soils areas. • High winds have the potential to liberate contaminated media impacting the environment. Perimeter air monitoring and dust suppression measures would be implemented. • Treated dewater would need to be managed and handled to not impact the environment at the Site. • Use of resources (i.e., borrow) would result in short-term environmental impacts (i.e., generating borrow material would result in a short-term increase of air emissions from transport and construction equipment as well as dust during transport and placement of borrow material). Impacts could be reduced through segregation of unimpacted coarser fraction for beneficial reuse.	low-emission equipment and vehicles could reduce environmental impacts. • Noise emissions from construction and hauling activities could lead to adverse environmental conditions primarily limited to near the Site. • Protective measures such as silt fencing and other erosion prevention measures would be used to minimize the environmental impacts during construction in streambank soils areas. • Treated dewater would need to be managed and handled to not impact the environment at the site. • Use of resources (i.e., borrow) would result in short-term environmental impacts (i.e., generating borrow material would result in a short-term increase of air emissions from transport and construction equipment as well as dust during transport and placement of borrow material). Impacts could be reduced through segregation of unimpacted coarser fraction for beneficial reuse.	low-emission equipment and vehicles could reduce environmental impacts. • Noise emissions from construction and hauling activities could lead to adverse environmental conditions primarily limited to near the Site. • Protective measures such as silt fencing and other erosion prevention measures would be used to minimize the environmental impacts during construction in streambank soils areas. • Treated dewater would need to be managed and handled to not impact the environment at the site. • Use of resources (i.e., borrow) would result in short-term environmental impacts (i.e., generating borrow material would result in a short-term increase of air emissions from transport and construction equipment as well as dust during transport and placement of borrow material). Impacts could be reduced through segregation of unimpacted coarser fraction for beneficial reuse.
Time until protection is achieved	• No remedial action would be undertaken. Thus, protection would not be achieved under this alternative.	• The proposed remedial activities associated with this alternative could be implemented in approximately 2 construction seasons.	• The proposed remedial activities associated with this alternative could be implemented in approximately 2 construction seasons.	• The proposed remedial activities associated with this alternative could be implemented in approximately 3 construction seasons.
Overall Rating:	**None**	**Moderate**	**Moderate**	**Low to Moderate**

Table C-6. Evaluation for Implementability

Evaluation Factors for Implementability		Remedial Alternative 1	Remedial Alternative 2	Remedial Alternative 3	Remedial Alternative 4
		No Action	Dredge to Depth of 1 Foot; Capping of Underlying Contamination	Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	Dredge to Remove Any Interim Performance Metric Exceedance; Backfill to Grade in the Dredge Footprint
Technical feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	• No remedial action would be undertaken. Thus, no technical difficulties would be encountered.	• Construction of a reactive cap is relatively straightforward. Appropriate capping technologies are readily available and implementable, and construction procedures are well established. • Dredging of sediment is relatively straightforward; however, certain site-specific conditions add some complexities for dredging in certain areas of the site. • Shallow areas of the creek, or areas where tidal conditions exist, can restrict or reduce accessibility for dredging equipment, including the embayment area. Dredging in these areas may require dredging in access channels to allow for dredge equipment to access or alternative removal methods (such as use of amphibious excavators) would be considered. • Areas of the creek with additional access constraints, such as areas under or adjacent to bridges with low clearance or areas along the shoreline with overhead utilities, may add difficulties in conducting dredging and capping activities. • General access to and from the creek for capping and dredging is a potential increased difficulty since there is not access for water vessels from the Hudson River because of the fixed bridge at the confluence of the Wappinger Creek and Hudson River, as well as several other bridges with limited clearance throughout the creek. All in-water equipment likely would be mobilized by truck and gain access to the creek from the existing boat ramp or through another access point along the shoreline of Wappinger Creek. • Dredged sediments would require dewatering and stabilization prior to disposal off-site for which technologies are available and construction procedures are well established. • Staging/processing area(s) would be required to facilitate dewatering and loading for off-site transportation and disposal. Finding suitable staging areas would be challenging given the limited space available on-site. Establishing access routes to these areas and for cap, amendment, and	• Construction of a reactive cap is relatively straightforward. Appropriate capping technologies are readily available and implementable, and construction procedures are well established. • Dredging of sediment is relatively straightforward; however, certain site-specific conditions add some complexities for dredging in certain areas of the site. • Shallow areas of the creek or areas where tidal conditions exist can restrict or reduce accessibility for dredging equipment, including the embayment area. Dredging in these areas may require dredging in access channels to allow for dredge equipment to access or alternative removal methods (such as use of amphibious excavators) would be considered. • Areas of the creek with additional access constraints, such as areas under or adjacent to bridges with low clearance or areas along the shoreline with overhead utilities, may add difficulties in conducting dredging and capping activities. • General access to and from the creek for capping and dredging is a potential increased difficulty since there is not access for water vessels from the Hudson River because of the fixed bridge at the confluence of the Wappinger Creek and Hudson River, as well as several other bridges with limited clearance throughout the creek. All in-water equipment likely would be mobilized by truck and gain access to the creek from the existing boat ramp or through another access point along the shoreline of Wappinger Creek. • Dredged sediments would require dewatering and stabilization prior to disposal off-site for which technologies are available and construction procedures are well established. • Staging/processing area(s) would be required to facilitate dewatering and loading for off-site transportation and disposal. Finding suitable staging areas would be challenging given the limited space available on-site. Establishing access routes to these areas and for cap, amendment, and other material deliveries also could be challenging. • It is assumed that a temporary water treatment system may be required for treatment and discharge of water collected from dewatering processes, which would add complexity. • Erosion of contaminated soil from streambank soils areas during storms could be more difficult to control. Silt fences and other erosion control measures can be constructed and operated. • It could be difficult to control sediment transport during storm events, but it can be reduced through BMPs.	• Construction of a backfill layer is relatively straightforward. Appropriate backfilling technologies are readily available and implementable, and construction procedures are well established. • Dredging of sediment is relatively straightforward; however, certain site-specific conditions add some complexities for dredging in certain areas of the site. • Shallow areas of the creek or areas where tidal conditions exist can restrict or reduce accessibility for dredging equipment, including the embayment area. Dredging in these areas may require dredging in access channels to allow for dredge equipment to access or alternative removal methods (such as use of amphibious excavators) would be considered. • Areas of the creek with additional access constraints, such as areas under or adjacent to bridges with low clearance or areas along the shoreline with overhead utilities, may add difficulties in conducting dredging and backfilling activities. • General access to and from the creek for dredging is a potential increased difficulty since there is not access for water vessels from the Hudson River because of the fixed bridge at the confluence of the Wappinger Creek and Hudson River as well as several other bridges with limited clearance throughout the creek. All in-water equipment likely would be mobilized by truck and gain access to the creek from the existing boat ramp or through another access point along the shoreline of Wappinger Creek. • Dredged sediments would require dewatering and stabilization prior to disposal off-site for which technologies are available and construction procedures are well established. • Staging/processing area(s) would be required to facilitate dewatering and loading for off-site transportation and disposal. Finding suitable staging areas would be challenging given the limited space available on-site. Establishing access routes to these areas and for backfill, amendment,

Evaluation Factors for Implementability		Remedial Alternative 1	Remedial Alternative 2	Remedial Alternative 3	Remedial Alternative 4
		No Action	Dredge to Depth of 1 Foot; Capping of Underlying Contamination	Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	Dredge to Remove Any Interim Performance Metric Exceedance; Backfill to Grade in the Dredge Footprint
			other material deliveries also could be challenging. • It is assumed that a temporary water treatment system may be required for treatment and discharge of water collected from dewatering processes, which would add complexity. • Erosion of contaminated soil from streambank soils areas during storms could be more difficult to control. Silt fences and other erosion control measures can be constructed and operated. • It could be difficult to control sediment transport during storm events, but it could be reduced using BMPs. • It is anticipated that wetlands would be reestablished after placement of the cap.	• It is anticipated that wetlands would be reestablished after placement of the cap.	and other material deliveries also could be challenging. • It is assumed that a temporary water treatment system may be required for treatment and discharge of water collected from dewatering processes, which would add complexity. • Erosion of contaminated soil from streambank soils areas during storms could be more difficult to control. Silt fences and other erosion control measures can be constructed and operated. • It could be difficult to control sediment transport during storm events but can be reduced through BMPs. • It is anticipated that wetlands would be reestablished after completion of the dredging and placement of the residuals control layer.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	• No remedial action would be undertaken; thus, no technical difficulties would be encountered.	• In-place containment (capping) of contaminated sediment is generally a reliable technology and would be relatively straightforward to implement. However, seasonal conditions such as significant rainfall and high flow conditions as well as tidal conditions could negatively affect construction progress. • Dredging and off-site disposal are relatively straightforward and typically can be implemented using available equipment and construction resources. • Dredging and off-site disposal are reliable process options. However, acceptance of contaminated media would be determined by the individual facilities. • Timely delivery of construction materials including capping and amendment materials would be required.	• In-place containment (capping) of contaminated sediment is generally a reliable technology and would be relatively straightforward to implement. However, seasonal conditions such as significant rainfall and high flow conditions as well as tidal conditions could negatively affect construction progress. • Dredging and off-site disposal are relatively straightforward and typically can be implemented using available equipment and construction resources. • Dredging and off-site disposal are reliable process options. However, acceptance of contaminated media would be determined by the individual facilities. • Timely delivery of construction materials including capping and amendment materials would be required.	• Backfilling is generally a reliable technology and would be relatively straightforward to implement. However, seasonal conditions such as significant rainfall and high flow conditions as well as tidal conditions could negatively affect construction progress. • Dredging and off-site disposal are relatively straightforward and typically can be implemented using available equipment and construction resources. • Dredging and off-site disposal are reliable process options. However, acceptance of contaminated media would be determined by the individual facilities. • Timely delivery of construction materials including backfill materials would be required.
	Ease of undertaking additional remedial actions including what, if any, future remedial actions would be needed and the difficulty to implement additional remedial actions	• No remedial action would be undertaken; thus, the ability to undertake future remedial actions would be unchanged from current conditions.	• Placement of additional material to capped areas could be implemented. However, care would need to be taken to maintain the flood storage capacity of the creek. • If additional dredging is required to remove contaminated sediments in previously capped areas, then the capping materials would need to be removed prior to additional dredging in those areas.	• Placement of additional material to capped areas could be implemented. However, care would need to be taken to maintain the flood storage capacity of the creek. • If additional dredging is required to remove contaminated sediments in previously capped areas, then the capping materials would need to be removed prior to additional dredging in those areas. • Implementation of remedial activities in other areas of the creek not part of this IRA (e.g., areas	• If additional dredging is required to remove contaminated sediments, , then a backfill layer would need to be applied in those dredged areas. • Backfill placed in dredged areas would not preclude the addition of other remedial activities, such as caps or in situ treatment if needed. • Implementation of remedial activities in other areas of the creek not part of this IRA (e.g., areas

Evaluation Factors for Implementability		Remedial Alternative 1	Remedial Alternative 2	Remedial Alternative 3	Remedial Alternative 4
		No Action	Dredge to Depth of 1 Foot; Capping of Underlying Contamination	Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	Dredge to Remove Any Interim Performance Metric Exceedance; Backfill to Grade in the Dredge Footprint
			• Implementation of remedial activities in other areas of the creek not part of this IRA (e.g., areas downgradient of the Hudson River Line [HRL]) could be implemented, though care may be needed to avoid disturbing capped areas from this IRA.	downgradient of the HRL) could be implemented, though care may be needed to avoid disturbing capped areas from this IRA.	downgradient of the HRL) could be implemented,
	Ability to monitor the effectiveness of the remedy, including an evaluation of risks of exposure, should monitoring be insufficient to detect a system failure	• No remedial action would be undertaken; thus, there would be no systems to fail.	• Confirmation sampling would be conducted in dredged areas prior to placement of the cap to verify effectiveness of the remedy and measure contaminant concentrations left in place. • Long-term inspection and monitoring of the cap would be performed on a routine and event-triggered basis. Maintenance would be performed as needed. • Environmental monitoring of surface water and newly deposited sediment would be conducted to monitor effectiveness of the remedy and to confirm remediated area surfaces have not become recontaminated. • Risk of exposure and contaminant migration from contaminated sediment within the capped areas would be possible if monitoring of the cap is insufficient or fails to detect failure.	• Confirmation sampling would be conducted in dredged areas prior to placement of the cap to verify effectiveness of the remedy and measure contaminant concentrations left in place. • Long-term inspection and monitoring of the cap would be performed on a routine and event-triggered basis. Maintenance would be performed as needed. • Environmental monitoring of surface water and newly deposited sediment would be conducted to monitor effectiveness of the remedy and to confirm remediated area surfaces have not become recontaminated. • Risk of exposure and contaminant migration from contaminated sediment within the capped areas would be possible if monitoring of the cap is insufficient or fails to detect failure.	• Confirmation sampling would be conducted in dredged areas prior to placement of the backfill layer to verify effectiveness of the remedy. • Environmental monitoring would be conducted to confirm remediated area surfaces have not become recontaminated. • Risk of exposure and contaminant migration from contaminated sediment within the backfilled areas would be minimized, since removal of contaminated sediment down to the RAL would be completed.
Administrative feasibility	Activities needed to coordinate with other offices and agencies	• No remedial action would be undertaken; thus, there would be no need to coordinate with other agencies and offices.	• Coordination with regulatory agencies for in-place containment of contaminated sediment would be required. • Regulatory and facility approval for off-site disposal of dredged material would be required. • Off-site transportation of contaminated media would require coordination with New York State Department of Transportation (NYSDOT) and potentially other state transportation departments. • Coordination with regulatory agencies would be required for the implementation of ICs. • Coordination with NYSDEC would be needed to dredge material in Federal Emergency Management Agency (FEMA) regulatory floodway and disturbance of wetlands. • Coordination with State Historic Preservation Office (SHPO) for any cultural resource surveys and USFWS	• Coordination with regulatory agencies for in-place containment of contaminated sediment would be required. • Regulatory and facility approval for off-site disposal of dredged material would be required. • Off-site transportation of contaminated media would require coordination with NYSDOT and potentially other state transportation departments. • Coordination with regulatory agencies would be required for the implementation of ICs. • Coordination with NYSDEC would be needed to dredge material in FEMA regulatory floodway and disturbance of wetlands. • Coordination with SHPO for any cultural resource surveys and USFWS or state agency for T&E species would be required.	• Coordination with regulatory agencies would be required for dredging contaminated media. • Regulatory and facility approval for off-site disposal of dredged material would be required. • Off-site transportation of contaminated media would require coordination with NYSDOT and potentially other state transportation departments. • Coordination with regulatory agencies would be required for the implementation of ICs. • Coordination with NYSDEC would be needed to dredge material in FEMA regulatory floodway and disturbance of wetlands. • Coordination with SHPO for any cultural resource surveys and USFWS or state agency for T&E species would be required.

Evaluation Factors for Implementability		Remedial Alternative 1	Remedial Alternative 2	Remedial Alternative 3	Remedial Alternative 4
		No Action	Dredge to Depth of 1 Foot; Capping of Underlying Contamination	Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	Dredge to Remove Any Interim Performance Metric Exceedance; Backfill to Grade in the Dredge Footprint
			or state agency for T&E species would be required.		
	Ability and time required to obtain any necessary approvals and permits from other agencies (for off-site actions)	• No off-site remedial action would be undertaken; thus, there would be no need to obtain approvals from regulatory agencies.	• Regulatory and facility approval for off-site disposal of contaminated sediment and treatment residuals at an existing permitted facility meeting EPA's Off-Site Rule should be attainable. • Permits from NYSDOT and potentially other state transportation departments would be required.	• Regulatory and facility approval for off-site disposal of contaminated sediment and treatment residuals at an existing permitted facility meeting EPA's Off-Site Rule should be attainable. • Permits from NYSDOT and potentially other state transportation departments would be required.	• Regulatory and facility approval for off-site disposal of contaminated sediment and treatment residuals at an existing permitted facility meeting EPA's Off-Site Rule should be attainable. • Permits from NYSDOT and potentially other state transportation departments would be required.
Availability of services and materials	Availability of adequate off-site treatment, storage capacity, and disposal capacity and services	• No remedial action would be undertaken; thus, this criterion is not applicable.	• Off-site licensed disposal facilities for both nonhazardous and hazardous waste are available and are expected to have the capacity to accept the total volume of contaminated material requiring disposal. Off-site licensed disposal facilities may include facilities outside the state of New York. • Off-site licensed treatment and disposal facilities are available and have the capacity to accept spent GAC for regeneration and any liquids collected for treatment and disposal that cannot be treated on-site.	• Off-site licensed disposal facilities for both nonhazardous waste and hazardous waste are available and are expected to have the capacity to accept the total volume of contaminated material requiring disposal. Off-site licensed disposal facilities may include facilities outside the state of New York. • Off-site licensed treatment and disposal facilities are available and have the capacity to accept spent GAC for regeneration and any liquids collected for treatment and disposal that cannot be treated on-site.	• Off-site licensed disposal facilities for nonhazardous waste are available and are expected to have the capacity to accept the total volume of contaminated material requiring disposal. Off-site licensed disposal facilities may include facilities outside the state of New York. • Off-site licensed treatment and disposal facilities are available and have the capacity to accept spent GAC for regeneration and any liquids collected for treatment and disposal that cannot be treated on-Site.
	Availability of necessary equipment and specialists and provisions to ensure any necessary additional resources	• No remedial action would be undertaken; thus, this criterion is not applicable.	• The technology, equipment, subcontractors, personnel, and facilities for dredging and off-site disposal generally would be available. • Construction specialists familiar with dredging and capping using a long-reach excavator and/or other specialized equipment in constrained creek areas are available. • Treatment specialists familiar with handling, mixing, and placement of reactive media caps would be required and are available. • Specialized equipment and construction specialists for dewatering processes including on-site treatment would be required and are available. • Specialists for implementation of ICs would be required and are available.	• The technology, equipment, subcontractors, personnel, and facilities for dredging and off-site disposal generally would be available. • Construction specialists familiar with dredging and capping using a long-reach excavator and/or other specialized equipment in creek areas are available. • Treatment specialists familiar with handling, mixing, and placement of reactive media caps would be required and are available. • Specialized equipment and construction specialists for dewatering processes including on-site treatment would be required and are available. • Specialists for implementation of ICs would be required and are available.	• The technology, equipment, subcontractors, personnel, and facilities for dredging and off-site disposal generally would be available. • Construction specialists familiar with dredging and backfilling using a long-reach excavator and/or in shallow creek areas are available. • Specialized equipment and construction specialists for dewatering processes including on-site treatment would be required and are available. • Specialists for implementation of ICs would be required and are available.
	Availability of services and materials plus the potential for obtaining competitive bids,		• Appropriate excavation equipment and services are available and well	• Appropriate excavation equipment and services are available and well established. Specialized	• Appropriate excavation equipment and services are available and well

Evaluation Factors for Implementability		Remedial Alternative 1	Remedial Alternative 2	Remedial Alternative 3	Remedial Alternative 4
		No Action	Dredge to Depth of 1 Foot; Capping of Underlying Contamination	Dredge to Depth of 2 Feet Maximum; Capping of Underlying Contamination	Dredge to Remove Any Interim Performance Metric Exceedance; Backfill to Grade in the Dredge Footprint
	which is particularly important for innovative technologies	• No remedial action would be undertaken; thus, this criterion is not applicable.	established. Specialized equipment and services may be necessary for the dredging and capping in more complex areas of the creek; however, these services are also available and well established. • Certain amendments are proprietary, but generic amendments are also available. Both generic and proprietary amendments are generally available in the environmental marketplace. • Dewatering technology and dewater treatment technology would be required and are readily available.	equipment and services may be necessary for the dredging and capping in more complex areas of the creek; however, these services are also available and well established. • Certain amendments are proprietary but generic amendments are also available. Both generic and proprietary amendments are generally available in the environmental marketplace. • Dewatering technology and dewater treatment technology would be required and are readily available.	established. Specialized equipment and services may be necessary for the dredging and backfilling in more complex areas of the creek; however, these services are also available and well established. • Dewatering technology and dewater treatment technology would be required and are readily available.
	Availability of prospective technologies				
Overall Rating:		**None**	**Moderate**	**Moderate**	**Moderate to High**

Appendix D
Capping Evaluation

1 Purpose and Limitations

This memorandum documents the CapSim modeling assumptions, evaluations, uncertainties, and conclusions related to estimating a representative cap amendment dosage for the Wappinger Creek Superfund Site (Site) focused feasibility study (FFS). The goal of this modeling effort was to select a representative amendment dosage that would be mixed with a specified sand thickness to create a sediment cap chemical isolation layer (CIL) for FFS Alternatives 2 and 3. This CIL amendment dosage should inhibit any undredged mercury-contaminated sediment within the alternative footprint from recontaminating the top 6 inches of the remedy surface (i.e., the assumed biologically active zone) via dissolved-phase transport to concentrations at or above 0.11 milligrams per kilogram (mg/kg) of total mercury (THg) (i.e., the project interim performance metric [IPM]) within 100 years. The IPM was used as a conservative value owing to the complex behavior, distribution, bioavailability, and toxicity of THg. These CapSim modeling efforts focused on an evaluation of the CIL and did not evaluate physical stabilization (erosion protection layer, filter layer, etc.) or determine site-specific habitat considerations (habitat layer/substrate).

This evaluation was a focused effort to develop a representative CIL amendment dosage based on available information. The representative dosage will be used to support the evaluation of alternatives in the FFS and should not be considered a design-level modeling effort. In this vein, direct site-specific empirical information (e.g., sediment bed THg concentrations) from the Site was prioritized for model input. In the absence of available site-specific information, other model input assumptions were based on either (1) other indirect available lines of site-specific evidence (e.g., inferring seepage velocities based on geology and measured potentiometric heads from the Site) or (2) literature values and best professional judgment (e.g., relevant partition coefficients).

If capping is included in the selected remedy, additional site-specific data collection, as described in Section 9, is recommended to further refine the CapSim model. Furthermore, as mercury is a unique environmental contaminant with complex contaminant fate and transport properties, a site-specific treatability study is strongly recommended for quantifying any amendment's effectiveness in addressing mercury-contaminated sediments.

2 Focused Feasibility Study Alternative Summary

This FFS identified four alternatives for evaluation. These alternatives are presented in the main FFS report, Section 6.3, and are summarized in Table 2-1, with information pertinent to CapSim modeling formatted in bold and underlined for emphasis.

Table 2-1: Alternative Descriptions

Alternative	Description
Alternative 1	Under this alternative, **no action will be taken**. This alternative is required by the National Oil and Hazardous Substances Pollution Contingency Plan.
Alternative 2	Under this alternative, any Thiessen polygon with a RAL sediment exceedance, regardless of sample depth, will be **dredged to 1 foot below the mudline** (**Figure 6-1**of the FFS report). All dredged polygons will be **capped with a CIL** to isolate any contamination remaining in the underlying sediment bed. NOTE: An estimated over-dredge allowance of 6 inches is included in this alternative because of constructability considerations and the precision of mechanical dredging operations. This over-dredge estimate is not specifically targeting mass removal of contaminants or included in the CIL evaluation. The allowable over-dredge is subject to refinement during design.
Alternative 3	Under this alternative, any Thiessen polygon with a RAL sediment exceedance, regardless of sample depth, will be **dredged to a minimum of 1 foot below the mudline**. **Any Thiessen polygon with a RAL exceedance in the 1- to 2-foot depth interval below the mudline will be dredged an additional foot** to remove those exceedances. Those polygons with a 2-foot total dredge depth are shown in **Figure 6-2**of the FFS report to differentiate them from those polygons with a 1-foot dredge depth. All dredged polygons will be **capped with a CIL** to isolate any contamination remaining in the underlying sediment bed.
Alternative 4	Under this alternative, any Thiessen polygon with a RAL sediment exceedance, regardless of sample depth, will be **dredged to remove any RAL concentration or exceedance**. **Figure 6-3**of the FFS report present the estimated dredge depth of each remediation polygon under this alternative. All dredged polygons will be **backfilled** to ensure slope stabilities of dredge cuts. **Backfill will be used instead of a cap using a reactive amendment** as all THg RAL exceedances will be removed from a given polygon under this alternative, greatly minimizing any potential for significant dissolved contaminant concentrations to be transported upward through the backfill layer.

The configuration of the alternatives results in a CIL only being required for Alternative 2 (i.e., a 1-foot cap) and Alternative 3 (i.e., a 1- or 2-foot cap, depending on location). As the “no action” alternative,

Alternative 1 has no active remediation; therefore, the alternative does not include construction of a cap. Lastly, Alternative 4 removes any known THg RAL exceedance; therefore, under this alternative, there would no remaining THg above the RAL that would require chemical isolation.

3 Overarching Model Effort Guidelines

Overarching guidelines were developed to focus the scope of this CapSim modeling effort while still ensuring it sufficiently informs the FFS evaluations. The CIL modeling effort can grow exponentially as model scenarios examine various site heterogeneities (e.g., seepage velocity and contaminant concentration) and as more broad sensitivity analyses are performed around key input variables. However, these types of evaluations are typically more applicable as a part of a remedial design. The objective of this FFS evaluation is to select a representative amendment dosage for use in the alternative evaluation. Therefore, the following overarching guidelines were established:

- **The modeling effort will examine one type of amendment, activated carbon (AC).**
    - Given the mixture of contaminants at the Site, multiple amendments may be effective at chemically isolating the contaminants. AC was selected as the representative amendment for these modeling efforts. If capping is a component of the selected remedy, the most optimal amendment should be determined through a site-specific treatability study, which would consider the complexities associated with addressing mercury.
    - AC is a well-understood and commonly used amendment in sediment remediation. However, despite its widespread use in sediment remedies, model uncertainties can still persist around AC. For example, both the AC source material (carbon, coconut shells, etc.) and physical form (granulated, powdered, etc.) can impact its effectiveness.
- **Mercury will be the primary CapSim-modeled contaminant.**
    - The FFS IPM is for THg only.
    - Other representative site-related contaminants were also modeled using the representative AC dosage selected to address the dissolved-phase THg transport. These efforts were done to determine how effective that CIL would be for addressing certain other contaminants.
    - These other site-elated contaminants were selected based on their presence in site sediments (based on RI sampling results), the fact that they have environmental fate and transport characteristics that vary from THg, and may also pose risks to human health or environmental receptors at the site.

- **The modeling effort will examine two seepage velocities—one considered probable and one considered conservative.**
- **The modeling effort will determine one representative cap AC dosage for Alternative 2 (i.e., one dosage for a 1-foot-thick cap) and up to two representative cap AC dosages for Alternative 3 (i.e., one dosage for a 1-foot-thick cap and one dosage for a 2-foot-thick cap).**

Sections 5 through 7 of this appendix discuss these guidelines.

4 Model and Model Version

CapSim Model Version 4.2.6 was used for this modeling effort (Shen et al. 2025).

5 Modeled Contaminants

Mercury (herein represented by THg concentrations) is the primary contaminant evaluated in this FFS and in these associated modeling efforts. Once a representative AC dosage was selected for the CIL to address THg, other site-related contaminants were modeled to estimate how effectively that same CIL would chemically isolate them. The evaluation of these other site-related contaminants was done for informational purposes and includes the following:

- Polycyclic aromatic hydrocarbons: **Benzo(a)pyrene (BAP)**
- Polychlorinated biphenyls (PCBs): **Aroclor 1254**
    - Aroclors are a mixture of PCB congeners, and CapSim is currently better configured to model PCB congener transport. Consequently, PCB-110 was modeled in place of Aroclor 1254 (i.e., PCB-110 chemical properties were substituted for Aroclor 1254 properties). PCB-110 is a primary component of Aroclor 1254 (ATSDR 2000).
- Pesticides: **4,4'-Dichlorodiphenyldichloroethylene (DDE)**

6 Modeled Amendment

Multiple amendments and amendment mixtures are available to address mercury (and other inorganic and organic contaminants) sediment bed contamination. Additionally, as previously stated, multiple varieties and physical forms of AC exist. However, in alignment with the scope of these modeling efforts, a coal-based activated AC with a partition coefficient (Kd) of 3.55E+06 (i.e., log Kd = 6.55; Gomez-Eyles et al. 2013) was selected as the representative amendment.

Because professional experience and a review of literature-based mercury partitioning indicate a range of possible mercury Kd values, this modeling effort also analyzed dissolved-phase mercury transport in scenarios where the log Kd value for AC was set to 4 to better understand a range of potential contaminant fate and transport outcomes.

The site-specific partitioning of mercury and its various species is a vital model input that should be developed via treatability studies if a reactive capping alternative is included as a part of the selected remedy.

7 Primary Model Inputs and Assumptions Summary

The subsections that follow describe the primary CIL modeling inputs.

7.1 Layer Configuration and Properties

The cap model was configured, from top to bottom, as follows:

- Habitat layer
    - Assumed to be 15 centimeters (cm) of sediment with the same physical properties (i.e., porosity, bulk density, particle size, permeability, and organic carbon fraction) as the native sediment at the Site.
        - Organic carbon fraction was based on site-specific total organic carbon data.
        - Other physical properties were determined to be (1) the mathematical average of all available sediment geotechnical data from the site (if site-specific empirical information was available) or (2) the general properties of a common silt material (if site-specific empirical information was not available). Silt was chosen because it approximates a fine-grained material that would likely be depositional in these areas.
- CIL
    - Assumed to be 23 cm (approximately 9 inches) of a homogenous sand and coal-based AC mixture.
    - While Alternative 2 stipulates a 1-foot-thick cap, the initial model assumption was that 3 inches of the CIL would intermix with the underlying sediment bed upon placement. While this amendment mass would still be present to inhibit contaminant migration, the model configuration assumed that this AC was lost, forcing only the remaining 9 inches of CIL to chemically isolate the mercury.

  - CapSim default values were used as the physical properties for sand (i.e., porosity, bulk density, particle size, and permeability).
  - Physical properties for AC were selected from commercially available AC product data.
- Native sediment layer
  - Assumed to be 30 cm of sediment material with the same physical properties as described for the preceding habitat layer.

7.2 Partition Coefficients and Physiochemical Properties

The partition coefficients to understand sorption between AC and mercury was selected as previously discussed. Partition coefficients between other contaminants (BAP, Aroclor 1254, and DDE) and AC were selected as the Freundlich isotherm coefficient (Kf) available in the CapSim database as of June 2025.

A partition coefficient of 1,000 (log Kd = 3) was selected for sorption between sediment and mercury. This value was based on a partition coefficient of 6,300 derived from an ongoing mercury treatability study at another site, which was then adjusted to conservatively encourage additional desorption of the mercury from the sediment bed into the pore water. Partition coefficients between other contaminants and sediment were selected as the organic carbon-water partition coefficient (Koc)values available in the CapSim database.

All chemical partition coefficients for sand were set to zero. This results in no adsorption to sand, and as such, the sand does not act to inhibit contaminant transport. Therefore, the AC dosages developed using the model are conservative since all adsorption/contaminant isolation would be the result of the AC present in the CIL.

7.3 Sediment Processes

Sediment deposition, consolidation, and hyporheic exchange were not modeled, as not enough site-specific information was available to develop these parameters. Bioturbation was assumed to occur throughout the habitat layer, and dispersion was set as 10 percent (%) of the layer thickness, which is the default assumption recommended for CapSim (Shen et al. 2025).

7.4 Bottom Boundary Conditions

Contaminant concentrations for the native sediment layer were set as the maximum observed THg concentration in sediment within the remedial footprint that would remain after dredging. This maximum THg concentration is 210 mg/kg. This concentration was observed in Sample T905-C-SE-D, a duplicate sample of T16-C-SE-D, which was collected from a depth interval of 2 to 4 feet below the mudline. The boundary condition was set as a fixed concentration, forcing the model to treat the underlying sediment bed as an infinite source of mercury with no contaminant mass depletion over time.

Designing the amendment dosage based on the assumption that the maximum concentration represents an infinite source is a conservative approach. This is particularly true considering the next highest observed THg concentration remaining in any other FFS remedial polygon is 39 mg/kg THg for Alternative 2 and 10 mg/kg for Alternative 3. However, owing to the lack of site-specific data and the resulting uncertainties with some other modeling inputs, this conservative assumption is considered appropriate to select a representative amendment dosage for FFS purposes.

Concentrations for the other modeled contaminants in the native sediment layer were conservatively set to their respective maximum observed values based on remedial investigation sample data.

7.5 Seepage Velocities

Neither empirical nor groundwater flow model-generated seepage velocities were available at the time of this CapSim modeling effort. However, based on secondary lines of evidence—such as Site geology and observed potentiometric heads—an order of magnitude estimate Darcy velocity of 10 centimeters per year (cm/year) was identified for this modeling effort. To understand cap functionality under a range of conditions, the Darcy velocity was also increased to 100 cm/year as a sensitivity test. Based on available information, a velocity of 100 cm/year is unlikely to be encountered at the Site. Therefore, this represents another conservative assumption.

7.6 Additional Inputs and Assumptions

The following additional inputs and assumptions provide additional context for understanding the CapSim modeling results:

- The FFS IPM is solids-based, so CapSim results for the solids-phase concentrations just below the habitat layer were evaluated.
- Six inches was selected as a representative depth for the biologically active zone.
- The typical design life for a contaminated sediment cap is 100 years or more. Therefore, CapSim model runs were set to 100 years.

8 Primary Model Outputs Summary

Under the aforementioned conditions and assuming AC partition coefficients and Darcy velocities as presented in Table 8-1, the model estimates that the AC dosages presented in Table 8-1 will result in a solids-phase THg concentration at a point 6 inches below the cap-surface water interface, below the IPM of 0.11 mg/kg.

Table 8-1: Primary Model Outputs Summary

Model Run Scenario	AC Log Kd	Darcy Velocity (cm/year)	Estimated AC Dosage (% by weight)
1	6.55	10	0.5
2	6.55	100	2
3	4.00	10	12

The resultant estimated AC dosages in Model Run Scenarios 1 and 2 are somewhat similar, especially when considering the order of magnitude difference in seepage velocities between the two scenarios. However, the resultant estimated AC dosage in Model Run Scenario 3 is significantly different from those of Model Run Scenarios 1 and 2. The Model Run Scenario 3 estimated AC dosage highlights the importance of understanding the site-specific mercury partitioning behavior and the need for a treatability study to inform amendment selection and CapSim design model runs. Understanding that any amendment dosage is highly dependent on yet-to-be-determined amendment and site characteristics, 2% by weight AC is identified as a likely effective AC dosage.

Table 8-2 presents additional model outputs for the other modeled contaminants as a percentage reduction in solid-phase concentration at the same point 6 inches below cap-surface water interface in the cap. For these model runs, Darcy velocity was set to 10 cm/year and the AC dosage was set to 2%.

Table 8-2: Secondary Model Outputs

Contaminant	Sediment Bed Concentration (mg/kg)	Solid-Phase Concentration 6 Inches Below Cap-Surface Water Interface (mg/kg)	Estimated Percent Reduction Through CIL (%)
BAP	250	~0	>99
Aroclor 1254 (modeled as PCB-110)	0.36	~0	>99
DDE	0.016	~0	>99

Notes: > – greater than

9 Recommended Future Data Collection

If a cap is included in the selected remedy for the Site, it is recommended that cap modeling and cap design teams be consulted during development of the pre-design investigation (PDI) scope. These teams could identify data needs necessary for footprint refinement, model development and calibration, and overall cap design. Future modeling and cap design efforts should also be developed in consultation with the implementing party(ies) and regulators to ensure that cap designs meet project technical, regulatory, and/or other needs.

The following site-specific information should be considered for further investigation/refinement/development via PDI and/or treatability study(ies):

- Refined horizontal and vertical extents of contamination through increased sediment core spatial density and decreased sample depth intervals
- Seepage velocities
- Site factors affecting metals speciation and mercury methylation
- Partitioning coefficients
- Amendment(s) selection based on site-specific needs
- Habitat layer necessity, thickness, and composition
- Flood rise impacts for any selected cap design
- Armor stone requirements (e.g., where needed, armor stone sizing)
- Geotechnical stability considerations for any cap placement

Additionally, the following modeling approaches are recommended for further investigation/refinement:

- Potential for multiple caps of varying thickness, amendment(s), and amendment(s) dosage(s) based on subarea Site characteristics (e.g., two or three different cap designs may be more cost-effective than a single cap design)
- Designing to contaminant concentrations less than the single absolute maximum (e.g., evaluating the additional PDI data to determine if localized areas of significantly elevated contaminant concentrations exist and can be addressed separately from other portions of the Site)
- Modeling the CIL considering constructability (e.g., fully homogenized sand/AC mixture versus a cap with distinct layers of sand and AC resulting from particle density-induced settling differences during cap material placement)

10 Focused Feasibility Study Recommendations

Based on the preceding assumptions, available Site information, existing uncertainties, and presented CapSim model inputs, it is recommended that a 3% AC dosage (by weight) be assumed for the 1-foot cap proposed in Alternative 2, and the same 3% AC dosage be assumed for both the 1-and 2-foot caps proposed in Alternative 3. The 3% AC dosage is greater than the 2% by weight AC identified as a likely effective AC dosage in Section 8 of this appendix. Understanding that any amendment dosage is highly dependent on yet-to-be-determined amendment and site characteristics, this increased AC dosage is recommended for considering the potential loss of AC to downstream transport during placement through the water column and in further recognition of model input and data uncertainties.

11 References

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Appendix E
Detailed Cost Estimate

Contract No: 68HE0318D0003
Task Order No: 68HE0220F0064

Appendix E
Detailed Cost Estimate

U.S. Environmental Protection Agency
Region 2

Wappinger Creek Superfund Site
Wappinger Falls, NY

CDM Smith

May 2026

The cost spreadsheets included in this appendix were developed in accordance with EPA 540-R-00-002 (OSWER 9355.0-75) July 2000.

These costs should be used to compare alternative relative costs. Costs for project management, remedial design, and construction management were determined as percentages of capital cost per the guidance. Costs for these work items may not reflect costs for implementation. These costs are determined based on specific client requirements during implementation.

Cost Estimate Summary

TABLE CS-ALT

ALTERNATIVE COST SUMMARY

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Alternative		Total Capital Cost	Total Annual O&M Cost	Total Periodic Cost	Total Non-Discounted Cost	Present Value Cost
1	No Action	$0	$0	$0	$0	$0
2	Dredge to Depth of 1 foot; Backfill/Capping of Underlying Contamination	$68,281,000	$16,560,000	$532,000	$85,373,000	$77,298,000
3	Dredge to Depth of 2 Feet; Backfill/Capping of Underlying Contamination	$89,568,000	$16,320,000	$564,000	$106,452,000	$98,472,000
4	Dredge to Remove RAL Exceedance; Backfill with Residuals Control Layer in the Dredge Footprint	$83,072,000	$9,280,000	$240,000	$92,592,000	$88,098,000

Notes:

1 - Capital costs, annual costs, and periodic costs are presented on Table CS-2, CS-3, and CS-4.

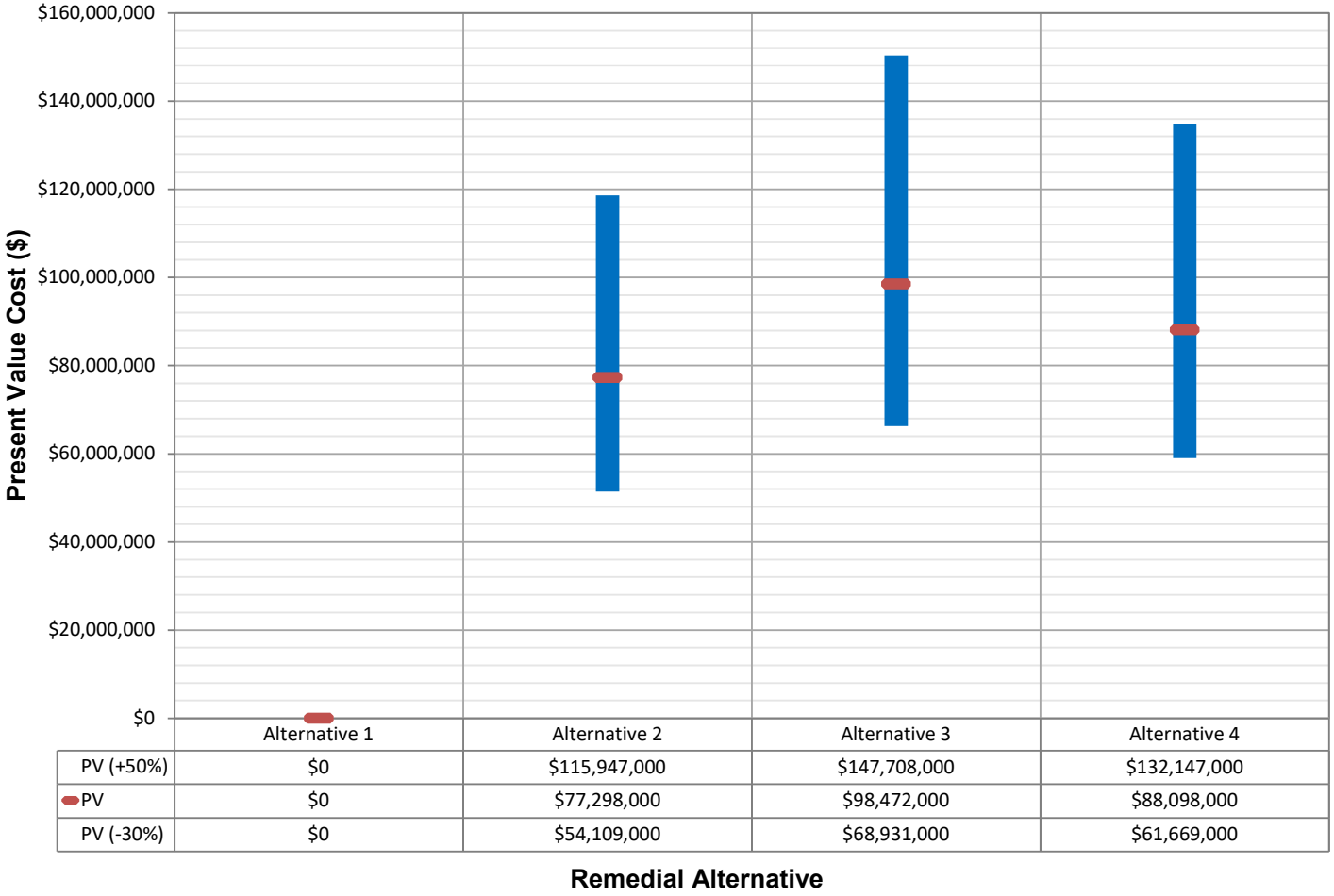
2 - Estimated remedial timeframes and associated present value analysis for remedial alternatives 2, 3, and 4 are provided on Tables PV-2, PV-3, and PV-4.

3 - The non-discounted total cost demonstrates the impact of a discount rate on the total present value cost and the relative amount of future annual expenditures. Non-discounted time cost does not include escalation. Non-discounted costs are presented for comparison purposes only and should not be used in place of present value costs in the CERCLA remedy selection process.

4 - Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for feasibility study level evaluation purposes.

5 - Total present value is rounded to the nearest $1,000. Inflation and depreciation are excluded from the present value cost.

Exhibit 1
Alternative Cost Estimate Accuracy Ranges



	Alternative 1	Alternative 2	Alternative 3	Alternative 4
PV (+50%)	$0	$115,947,000	$147,708,000	$132,147,000
PV	$0	$77,298,000	$98,472,000	$88,098,000
PV (-30%)	$0	$54,109,000	$68,931,000	$61,669,000

Remedial Alternative

Note:

Alternative 1: No Action

Alternative 2: Dredge to Depth of 1 foot; Backfill/Capping of Underlying Contamination

Alternative 3: Dredge to Depth of 2 Feet; Backfill/Capping of Underlying Contamination

Alternative 4: Dredge to Remove Any RAL Exceedance; Backfill with Residuals Control Layer in the Dredge Footprint

Cost Estimate Summary and Present Value

Alternative 2
Dredge to Depth of 1 foot; Backfill/Capping of Underlying Contamination

TABLE CS-2

Alternative **2**
Dredge to Depth of 1 foot; Backfill/Capping of Underlying Contamination

COST ESTIMATE SUMMARY

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025
Date: May 2026

Description: Alternative 2 consists of dredging sediments through targeted removal of one foot of contaminated sediments above the RAL and placement of an amended cap. Alternative 2 focuses on limited removal and in-place containment of contaminated sediments in conjunction with ICs, access controls and monitoring. Under this alternative, the entire footprint with RAL exceedance regardless of depth will be dredged to 1 foot below the mudline, plus required over dredge. Excavated contaminated sediment will be loaded onto hopper barges and transported to a central processing area for dewatering/treatment before being transported for offsite disposal. Evaluation monitoring would be implemented to evaluate remedy performance. Periodic maintenance for this alternative would include physical inspections of the reactive cap, periodic updates of ICs and maintenance of access controls. Institutional controls measures will be implemented and could include a fish advisory, educational programs, or notification programs such as environmental and health advisories. Access controls would consist of physical measures, such as informational signage or waterway access controls.

CAPITAL COSTS: (Assumed to be Incurred During Year 0)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	CW2-1	1	LS	$117,794	$117,794	Includes institutional control costs- buoys, fish advisories, signage.
General Conditions	--	1	LS	$2,171,944	$2,171,944	Assumes 10% of mobilization, demobilization, and construction costs
Mobilization and Demobilization	--	1	LS	$1,020,473	$1,020,473	Assumes 5% of construction costs
Site Surveying	CW2-2	1	LS	$239,538	$239,538	Includes costs for site bathymetric surveying.
Site Preparation	CW2-3	1	LS	$319,292	$319,292	Includes costs for clearing, laydown area, temporary road, and sheetpiling.
Erosion Control Measures	CW2-4	1	LS	$256,705	$256,705	Includes costs for various erosion controls.
Dredging for Off-Site Disposal	CW2-5	37,734	BCY	$69	$2,586,314	Includes dredging and transfer of waste to stockpile area.
Confirmation Sampling	CW2-6	66	EA	$1,908	$125,951	Includes confirmation sampling of dredged areas.
Containment- Reactive/Engineered Cap	CW2-7	13.20	ACR	$941,206	$12,423,887	Includes capping costs of dredged areas.
Backfill Conformance Sampling	CW2-8	43	EA	$3,015	$129,640	Includes sampling of backfill materials.
Temporary Water Treatment Set Up	CW2-9	1	LS	$124,534	$124,534	Includes setup of the water treatment system.
Temporary Water Treatment System Operation	CW2-10	8	MO	$153,677	$1,229,417	Includes costs for operation of the water treatment system.
Waste Characterization Sampling	CW2-11	47	EA	$1,681	$79,015	Includes waste characterization sampling of dredged waste.
Off-Site Transportation and Disposal	CW2-12	63,090	TON	$377	$23,778,087	Includes disposal costs for dredged waste.
Restoration of Laydown Area	CW2-13	1	LS	$289,516	$289,516	Includes removal of pavement and gravel, and restoration of disturbed areas.
SUBTOTAL					$44,892,107	
Contingency (Scope)		20%			$8,978,421	Middle of the recommended ranges in EPA 540-R-00-002 Exhibit 5-6.
Contingency (Bid)		10%			$4,489,211	Lower end of the recommended range in EPA 540-R-00-002.
SUBTOTAL					$58,359,739	
Project Management		5%			$2,917,987	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		6%			$3,501,584	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used. This markup also accounts for any costs associated with pre-design investigation.
Construction Management		6%			$3,501,584	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
TOTAL					$68,280,894	
TOTAL CAPITAL COST					**$68,281,000**	Total capital cost is rounded to the nearest $1,000.

ANNUAL COSTS (Years 1 through 20)

	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Environmental Monitoring	--	1	LS	$538,706	$538,706	Equal to 1.2% of total construction cost based on similar projects. Accounts for monitoring costs including sampling, inspections, and bathymetric surveys.
Containment System Monitoring	CW2-14	1	LS	$55,989	$55,989	
SUBTOTAL					$594,695	
Contingency (Scope)		10%			$59,470	Lower end of the recommended ranges in EPA 540-R-00-002 Exhibit 5-6.
Contingency (Bid)		10%			$59,470	Lower end of the recommended range in EPA 540-R-00-002.
SUBTOTAL					$713,635	
Project Management		6%			$42,818	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		10%			$71,364	Lower value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$827,817	
TOTAL ANNUAL COST					**$828,000**	Total annual cost is rounded to the nearest $1,000.

TABLE CS-2

Alternative **2**
Dredge to Depth of 1 foot; Backfill/Capping of Underlying Contamination

COST ESTIMATE SUMMARY

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025
Date: May 2026

Description: Alternative 2 consists of dredging sediments through targeted removal of one foot of contaminated sediments above the RAL and placement of an amended cap. Alternative 2 focuses on limited removal and in-place containment of contaminated sediments in conjunction with ICs, access controls and monitoring. Under this alternative, the entire footprint with RAL exceedance regardless of depth will be dredged to 1 foot below the mudline, plus required over dredge. Excavated contaminated sediment will be loaded onto hopper barges and transported to a central processing area for dewatering/treatment before being transported for offsite disposal. Evaluation monitoring would be implemented to evaluate remedy performance. Periodic maintenance for this alternative would include physical inspections of the reactive cap, periodic updates of ICs and maintenance of access controls. Institutional controls measures will be implemented and could include a fish advisory, educational programs, or notification programs such as environmental and health advisories. Access controls would consist of physical measures, such as informational signage or waterway access controls.

PERIODIC COSTS (Years 5, 10, 15 and 20 years)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Control Maintenance	CW2-15	1	LS	$94,233	$94,233	Assumes each maintenance event will include replacement of buoys and signage.
Five-Year Reviews	NA	1	LS	$0	$0	Assumes no cost for five-year reviews in this cost estimate
SUBTOTAL					$94,233	
Contingency (Scope)		10%			$9,423	Lower end of the recommended ranges in EPA 540-R-00-002 Exhibit 5-6.
Contingency (Bid)		10%			$9,423	Lower end of the recommended range in EPA 540-R-00-002.
SUBTOTAL					$113,079	
Project Management		8%			$9,046	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		10%			$11,308	Lower value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$133,433	
TOTAL PERIODIC COST					**$133,000**	Total periodic cost is rounded to the nearest $1,000.

Notes:
1 - Additional assumptions related to Alternative 2 are detailed in the Alternative 2 cost worksheets and calculations
Percentages used for contingency and professional/technical services costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Abbreviations:

EA	Each
LS	Lump Sum
QTY	Quantity
BCY	Bank Cubic Yard
ACR	Acre
MO	Month
TON	Tons

TABLE PV-2

PRESENT VALUE ANALYSIS

Alternative 2

Dredge to Depth of 1 foot; Backfill/Capping of Underlying Contamination

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Year[1]	Capital Costs[2]	Annual Costs	Periodic Costs	Total Annual Expenditure[3]	Discount Factor (7%)	Present Value[4]
0	$68,281,000	$0	$0	$68,281,000	1.0000	$68,281,000
1	$0	$828,000	$0	$828,000	0.9346	$773,849
2	$0	$828,000	$0	$828,000	0.8734	$723,175
3	$0	$828,000	$0	$828,000	0.8163	$675,896
4	$0	$828,000	$0	$828,000	0.7629	$631,681
5	$0	$828,000	$133,000	$961,000	0.7130	$685,193
6	$0	$828,000	$0	$828,000	0.6663	$551,696
7	$0	$828,000	$0	$828,000	0.6227	$515,596
8	$0	$828,000	$0	$828,000	0.5820	$481,896
9	$0	$828,000	$0	$828,000	0.5439	$450,349
10	$0	$828,000	$133,000	$961,000	0.5083	$488,476
11	$0	$828,000	$0	$828,000	0.4751	$393,383
12	$0	$828,000	$0	$828,000	0.4440	$367,632
13	$0	$828,000	$0	$828,000	0.4150	$343,620
14	$0	$828,000	$0	$828,000	0.3878	$321,098
15	$0	$828,000	$133,000	$961,000	0.3624	$348,266
16	$0	$828,000	$0	$828,000	0.3387	$280,444
17	$0	$828,000	$0	$828,000	0.3166	$262,145
18	$0	$828,000	$0	$828,000	0.2959	$245,005
19	$0	$828,000	$0	$828,000	0.2765	$228,942
20	$0	$828,000	$133,000	$961,000	0.2584	$248,322
TOTALS:	$68,281,000	$16,560,000	$532,000	$85,373,000		$77,297,664
TOTAL PRESENT VALUE OF ALTERNATIVE 2						**$77,298,000**

Notes:

[1] The estimated remedial timeframe is assumed to be 20 years.

[2] Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table CS-2.

[3] Total annual expenditure is the total cost per year with no discounting.

[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table PV-ADRFT for details.

[5] Total present value is rounded to the nearest $1,000. Inflation and depreciation are excluded from the present value cost.
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented.
They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Cost Estimate Summary and Present Value

Alternative 3
Dredge to Depth of 2 Feet; Backfill/Capping of Underlying Contamination

TABLE CS-3

Alternative 3
Dredge to Depth of 2 Feet; Backfill/Capping of Underlying Contamination

COST ESTIMATE SUMMARY

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025
Date: May 2026

Description: Alternative 3 consists of dredging of sediments through targeted removal of up to two feet of contaminated sediments above the RAL and placement of an amended cap. Alternative 3 focuses on removal and in-place containment of contaminated sediments in conjunction with ICs, access controls and monitoring. Under this alternative, the entire footprint will be dredged to at least 1 foot below the mudline, and dredge polygons with THg concentrations at or greater than the RAL in the 1- to 2 foot depth interval below the mudline will also be dredged to the RAL. Excavated contaminated sediment will be loaded onto hopper barges and transported to a central processing area for dewatering/treatment before being transported for offsite disposal. Evaluation monitoring would be implemented to evaluate remedy performance. Periodic maintenance for this alternative would include physical inspections of the reactive cap, periodic updates of ICs and maintenance of access controls. Institutional controls measures will be implemented and could include a fish advisory, educational programs, or notification programs such as environmental and health advisories. Access controls would consist of physical measures, such as informational signage or waterway access controls.

CAPITAL COSTS: (Assumed to be Incurred During Year 0)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	CW3-1	1	LS	$122,896	$122,896	Includes institutional control costs- buoys, fish advisories, signage.
General Conditions	--	1	LS	$2,943,985	$2,943,985	Assumes 10% of mobilization, demobilization, and construction costs
Mobilization and Demobilization	--	1	LS	$1,388,111	$1,388,111	Assumes 5% of construction costs
Site Surveying	CW3-2	1	LS	$275,528	$275,528	Includes costs for site bathymetric surveying.
Site Preparation	CW3-3	1	LS	$319,292	$319,292	Includes costs for clearing, laydown area, temporary road, and sheetpiling.
Erosion Control Measures	CW3-4	1	LS	$275,448	$275,448	Includes costs for various erosion controls.
Dredging for Off-Site Disposal	CW3-5	46,448	BCY	$72	$3,347,940	Includes dredging and transfer of waste to stockpile area.
Confirmation Sampling	CW3-6	78	EA	$1,902	$148,340	Includes confirmation sampling of dredged areas.
Containment- Reactive/Engineered Cap	CW3-7	15.44	ACR	$1,203,951	$18,594,283	Includes capping costs of dredged areas.
Backfill Conformance Sampling	CW3-8	65	EA	$2,988	$194,212	Includes sampling of backfill materials.
Temporary Water Treatment Set Up	CW3-9	1	LS	$127,271	$127,271	Includes setup of the water treatment system.
Temporary Water Treatment System Operation	CW3-10	9	MO	$165,462	$1,489,161	Includes costs for operation of the water treatment system.
Waste Characterization Sampling	CW3-11	57	EA	$1,677	$95,590	Includes waste characterization sampling of dredged waste.
Off-Site Transportation and Disposal	CW3-12	77,680	TON	$377	$29,276,040	Includes disposal costs for dredged waste.
Restoration of Laydown Area	CW3-13	1	LS	$289,516	$289,516	Includes removal of pavement and gravel, and restoration of disturbed areas.
SUBTOTAL					$58,887,613	
Contingency (Scope)		20%			$11,777,523	Middle of the recommended ranges in EPA 540-R-00-002 Exhibit 5-6.
Contingency (Bid)		10%			$5,888,761	Lower end of the recommended range in EPA 540-R-00-002.
SUBTOTAL					$76,553,897	
Project Management		5%			$3,827,695	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		6%			$4,593,234	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used. This markup also accounts for any costs associated with pre-design investigation.
Construction Management		6%			$4,593,234	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
TOTAL					$89,568,060	
TOTAL CAPITAL COST					**$89,568,000**	Total capital cost is rounded to the nearest $1,000.

TABLE CS-3

Alternative 3
Dredge to Depth of 2 Feet; Backfill/Capping of Underlying Contamination

COST ESTIMATE SUMMARY

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025
Date: May 2026

Description: Alternative 3 consists of dredging of sediments through targeted removal of up to two feet of contaminated sediments above the RAL and placement of an amended cap. Alternative 3 focuses on removal and in-place containment of contaminated sediments in conjunction with ICs, access controls and monitoring. Under this alternative, the entire footprint will be dredged to at least 1 foot below the mudline, and dredge polygons with THg concentrations at or greater than the RAL in the 1- to 2 foot depth interval below the mudline will also be dredged to the RAL. Excavated contaminated sediment will be loaded onto hopper barges and transported to a central processing area for dewatering/treatment before being transported for offsite disposal. Evaluation monitoring would be implemented to evaluate remedy performance. Periodic maintenance for this alternative would include physical inspections of the reactive cap, periodic updates of ICs and maintenance of access controls. Institutional controls measures will be implemented and could include a fish advisory, educational programs, or

ANNUAL COSTS (Years 1 through 20)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Environmental Monitoring	--	1	LS	$529,989	$529,989	Equal to 0.9% of total construction cost based on similar projects. Accounts for monitoring costs including sampling, inspections, and bathymetric surveys.
Containment System Monitoring	CW3-14	1	LS	$55,989	$55,989	
SUBTOTAL					$585,978	
Contingency (Scope)		10%			$58,598	Lower end of the recommended ranges in EPA 540-R-00-002 Exhibit 5-6.
Contingency (Bid)		10%			$58,598	Lower end of the recommended range in EPA 540-R-00-002.
SUBTOTAL					$703,174	
Project Management		6%			$42,190	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		10%			$70,317	Lower value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$815,681	
TOTAL ANNUAL COST					**$816,000**	Total annual cost is rounded to the nearest $1,000.

PERIODIC COSTS (Years 5, 10, 15, 20)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Control Maintenance	CW3-15	1	LS	$99,335	$99,335	Assumes each maintenance event will include replacement of buoys and signage.
Five-Year Reviews	NA	1	LS	$0	$0	Assumes no cost for five-year reviews in this cost estimate
SUBTOTAL					$99,335	
Contingency (Scope)		10%			$9,934	Lower end of the recommended ranges in EPA 540-R-00-002 Exhibit 5-6.
Contingency (Bid)		10%			$9,934	Lower end of the recommended range in EPA 540-R-00-002.
SUBTOTAL					$119,203	
Project Management		8%			$9,536	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		10%			$11,920	Lower value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$140,659	
TOTAL PERIODIC COST					**$141,000**	Total periodic cost is rounded to the nearest $1,000.

Notes:
1 - Additional assumptions related to Alternative 3 are detailed in the Alternative 3 cost worksheets and calculations

Percentages used for contingency and professional/technical services costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Abbreviations:

EA	Each
LS	Lump Sum
QTY	Quantity
BCY	Bank Cubic Yard
ACR	Acre
MO	Month
TON	Tons

TABLE PV-3

PRESENT VALUE ANALYSIS

Alternative 3

Dredge to Depth of 2 Feet; Backfill/Capping of Underlying Contamination

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Year[1]	Capital Costs[2]	Annual Costs	Periodic Costs	Total Annual Expenditure[3]	Discount Factor (7%)	Present Value[4]
0	$89,568,000	$0	$0	$89,568,000	1.0000	$89,568,000
1	$0	$816,000	$0	$816,000	0.9346	$762,634
2	$0	$816,000	$0	$816,000	0.8734	$712,694
3	$0	$816,000	$0	$816,000	0.8163	$666,101
4	$0	$816,000	$0	$816,000	0.7629	$622,526
5	$0	$816,000	$141,000	$957,000	0.7130	$682,341
6	$0	$816,000	$0	$816,000	0.6663	$543,701
7	$0	$816,000	$0	$816,000	0.6227	$508,123
8	$0	$816,000	$0	$816,000	0.5820	$474,912
9	$0	$816,000	$0	$816,000	0.5439	$443,822
10	$0	$816,000	$141,000	$957,000	0.5083	$486,443
11	$0	$816,000	$0	$816,000	0.4751	$387,682
12	$0	$816,000	$0	$816,000	0.4440	$362,304
13	$0	$816,000	$0	$816,000	0.4150	$338,640
14	$0	$816,000	$0	$816,000	0.3878	$316,445
15	$0	$816,000	$141,000	$957,000	0.3624	$346,817
16	$0	$816,000	$0	$816,000	0.3387	$276,379
17	$0	$816,000	$0	$816,000	0.3166	$258,346
18	$0	$816,000	$0	$816,000	0.2959	$241,454
19	$0	$816,000	$0	$816,000	0.2765	$225,624
20	$0	$816,000	$141,000	$957,000	0.2584	$247,289
TOTALS:	$89,568,000	$16,320,000	$564,000	$106,452,000		$98,472,277
TOTAL PRESENT VALUE OF ALTERNATIVE 3						**$98,472,000**

Notes:

[1] The estimated remedial timeframe is assumed to be 20 years.

[2] Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table CS-3.

[3] Total annual expenditure is the total cost per year with no discounting.

[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table PV-ADRFT for details.

[5] Total present value is rounded to the nearest $1,000. Inflation and depreciation are excluded from the present value cost.
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Cost Estimate Summary and Present Value

Alternative 4
Dredge to Remove any RAL Exceedance; Backfill with Residuals Control Layer in the Dredge Footprint

TABLE CS-4

Alternative 4

Dredge to Remove RAL Exceedance; Backfill with Residuals Control Layer in the Dredge Footprint

COST ESTIMATE SUMMARY

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025
Date: May 2026

Description: Alternative 4 would consist of dredging sediments through complete removal of contaminated sediments that exceed the RAL, and management of residual contamination in conjunction with ICs, access controls, and monitoring. Alternative 4 focuses primarily on removal of contaminated sediments.For this alternative the thickness of the residual controls layer will match the depth of dredge to ensure that the post-remediation surface does not exceed the pre-existing bathymetric surface. Excavated contaminated sediment will be loaded onto hopper barges and transported to a central processing area for dewatering/treatment before being transported for offsite disposal. Evaluation monitoring would be implemented to evaluate remedy performance. Periodic maintenance for this alternative would include physical inspections of the residual layer, periodic updates of ICs and maintenance of access controls. Institutional controls measures will be implemented and could include a fish advisory, educational programs, or notification programs such as environmental and health advisories. Access controls would consist of physical measures, such as informational signage or waterway access controls.

CAPITAL COSTS: (Assumed to be Incurred During Year 0)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	CW4-1	1	LS	$64,917	$64,917	Includes institutional control costs- fish advisories, signage.
General Conditions	--	1	LS	$1,663,561	$1,663,561	Assumes 10% of mobilization, demobilization, and construction costs
Mobilization and Demobilization	--	1	LS	$778,385	$778,385	Assumes 5% of construction costs
Site Surveying	CW4-2	1	LS	$290,524	$290,524	Includes costs for site bathymetric surveying.
Site Preparation	CW4-3	1	LS	$311,138	$311,138	Includes costs for clearing, laydown area, temporary road, and sheetpiling.
Erosion Control Measures	CW4-4	1	LS	$319,184	$319,184	Includes costs for various erosion controls.
Dredging for Off-Site Disposal	CW4-5	62,075	BCY	$80	$4,960,821	Includes dredging and transfer of waste to stockpile area.
Confirmation Sampling	CW4-6	82	EA	$1,910	$156,594	Includes confirmation sampling of dredged areas.
Residual Cover	CW4-7	16.28	ACR	$239,662	$3,902,311	Includes placement and materials for residual cover.
Backfill Conformance Sampling	CW4-8	134	EA	$2,957	$396,301	Includes sampling of backfill materials.
Temporary Water Treatment Set Up	CW4-9	1	LS	$138,216	$138,216	Includes setup of the water treatment system.
Temporary Water Treatment System Operation	CW4-10	13	MO	$159,089	$2,068,153	Includes costs for operation of the water treatment system.
Waste Characterization Sampling	CW4-11	77	EA	$1,679	$129,304	Includes waste characterization sampling of dredged waste.
Off-Site Transportation and Disposal	CW4-12	103,870	TON	$377	$39,147,855	Includes disposal costs for dredged waste.
Restoration of Laydown Area	CW4-13	1	LS	$289,516	$289,516	Includes removal of pavement and gravel, and restoration of disturbed areas.
SUBTOTAL					$54,616,780	
Contingency (Scope)		20%			$10,923,356	Middle of the recommended ranges in EPA 540-R-00-002 Exhibit 5-6.
Contingency (Bid)		10%			$5,461,678	Lower end of the recommended range in EPA 540-R-00-002.
SUBTOTAL					$71,001,814	
Project Management		5%			$3,550,091	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		6%			$4,260,109	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used. This markup also accounts for any costs associated with pre-design investigation.
Construction Management		6%			$4,260,109	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
TOTAL					$83,072,123	
TOTAL CAPITAL COST					**$83,072,000**	Total capital cost is rounded to the nearest $1,000.

TABLE CS-4

Alternative 4
Dredge to Remove RAL Exceedance; Backfill with Residuals Control Layer in the Dredge Footprint

COST ESTIMATE SUMMARY

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025
Date: May 2026

Description: Alternative 4 would consist of dredging sediments through complete removal of contaminated sediments that exceed the RAL, and management of residual contamination in conjunction with ICs, access controls, and monitoring. Alternative 4 focuses primarily on removal of contaminated sediments.For this alternative the thickness of the residual controls layer will match the depth of dredge to ensure that the post-remediation surface does not exceed the pre-existing bathymetric surface. Excavated contaminated sediment will be loaded onto hopper barges and transported to a central processing area for dewatering/treatment before being transported for offsite disposal. Evaluation monitoring would be implemented to evaluate remedy performance. Periodic maintenance for this alternative would include physical inspections of the residual layer, periodic updates of ICs and maintenance of access controls. Institutional controls measures will be implemented and could include a fish advisory, educational programs, or notification programs such as environmental and health advisories. Access controls would consist of physical measures, such as informational signage or waterway access controls.

ANNUAL COSTS (Years 1 through 20)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Environmental Monitoring	--	1	LS	$327,701	$327,701	Equal to 0.6% of total construction cost based on similar projects. Accounts for monitoring costs including sampling, inspections, and bathymetric surveys.
SUBTOTAL					$327,701	
Contingency (Scope)		10%			$32,770	Lower end of the recommended ranges in EPA 540-R-00-002 Exhibit 5-6.
Contingency (Bid)		10%			$32,770	Lower end of the recommended range in EPA 540-R-00-002.
SUBTOTAL					$393,241	
Project Management		8%			$31,459	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		10%			$39,324	Lower value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$464,024	
TOTAL ANNUAL COST					**$464,000**	Total annual cost is rounded to the nearest $1,000.

PERIODIC COSTS (Years 5, 10, 15, and 20)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Control Maintenance	CW4-14	1	LS	$41,356	$41,356	Assumes each maintenance event will include replacement of buoys and signage.
Five-Year Reviews	NA	1	LS	$0	$0	Assumes no cost for five-year reviews in this cost estimate
SUBTOTAL					$41,356	
Contingency (Scope)		10%			$4,136	Lower end of the recommended ranges in EPA 540-R-00-002 Exhibit 5-6.
Contingency (Bid)		10%			$4,136	Lower end of the recommended range in EPA 540-R-00-002.
SUBTOTAL					$49,628	
Project Management		10%			$4,963	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		10%			$4,963	Lower value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$59,554	
TOTAL PERIODIC COST					**$60,000**	Total periodic cost is rounded to the nearest $1,000.

Notes:
1 - Additional assumptions related to Alternative 4 are detailed in the Alternative 4 cost worksheets and calculations
Percentages used for contingency and professional/technical services costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Abbreviations:

EA	Each
LS	Lump Sum
QTY	Quantity
BCY	Bank Cubic Yard
ACR	Acre
MO	Month
TON	Tons

TABLE PV-4

PRESENT VALUE ANALYSIS

Alternative 4

Dredge to Remove Any IPM Exceedance; Backfill with Residuals Control Layer in the dredge footprint

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Year[1]	Capital Costs[2]	Annual Costs	Periodic Costs	Total Annual Expenditure[3]	Discount Factor (7%)	Present Value[4]
0	$83,072,000	$0	$0	$83,072,000	1.0000	$83,072,000
1	$0	$464,000	$0	$464,000	0.9346	$433,654
2	$0	$464,000	$0	$464,000	0.8734	$405,258
3	$0	$464,000	$0	$464,000	0.8163	$378,763
4	$0	$464,000	$0	$464,000	0.7629	$353,986
5	$0	$464,000	$60,000	$524,000	0.7130	$373,612
6	$0	$464,000	$0	$464,000	0.6663	$309,163
7	$0	$464,000	$0	$464,000	0.6227	$288,933
8	$0	$464,000	$0	$464,000	0.5820	$270,048
9	$0	$464,000	$0	$464,000	0.5439	$252,370
10	$0	$464,000	$60,000	$524,000	0.5083	$266,349
11	$0	$464,000	$0	$464,000	0.4751	$220,446
12	$0	$464,000	$0	$464,000	0.4440	$206,016
13	$0	$464,000	$0	$464,000	0.4150	$192,560
14	$0	$464,000	$0	$464,000	0.3878	$179,939
15	$0	$464,000	$60,000	$524,000	0.3624	$189,898
16	$0	$464,000	$0	$464,000	0.3387	$157,157
17	$0	$464,000	$0	$464,000	0.3166	$146,902
18	$0	$464,000	$0	$464,000	0.2959	$137,298
19	$0	$464,000	$0	$464,000	0.2765	$128,296
20	$0	$464,000	$60,000	$524,000	0.2584	$135,402
TOTALS:	$83,072,000	$9,280,000	$240,000	$92,592,000		$88,098,050
TOTAL PRESENT VALUE OF ALTERNATIVE 4						**$88,098,000**

Notes:

[1] The estimated remedial timeframe is assumed to be 20 years.

[2] Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table CS-4.

[3] Total annual expenditure is the total cost per year with no discounting.

[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table PV-ADRFT for details.

[5] Total present value is rounded to the nearest $1,000. Inflation and depreciation are excluded from the present value cost.
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Annual Discount Rate Factors Table

TABLE PV-ADRFT

PRESENT VALUE ANALYSIS

Annual Discount Rate Factors Table

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Discount Rate (Percent): 7.0

Year	Discount Factor[1,2]	Year	Discount Factor[1,2]
0	1.0000	26	0.1722
1	0.9346	27	0.1609
2	0.8734	28	0.1504
3	0.8163	29	0.1406
4	0.7629	30	0.1314
5	0.7130	31	0.1228
6	0.6663	32	0.1147
7	0.6227	33	0.1072
8	0.5820	34	0.1002
9	0.5439	35	0.0937
10	0.5083		
11	0.4751		
12	0.4440		
13	0.4150		
14	0.3878		
15	0.3624		
16	0.3387		
17	0.3166		
18	0.2959		
19	0.2765		
20	0.2584		
21	0.2415		
22	0.2257		
23	0.2109		
24	0.1971		
25	0.1842		

Notes:

[1] Annual discount factors were calculated using the formulas and guidance presented in Section 4.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

[2] The real discount rate of 7.0% was obtained from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000, Page 4-5.

Cost Worksheets and Calculations

PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY:	Shelby Kapperman
JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE:	11/15/2025	DATE CHECKED:	12/9/2025
CLIENT:	EPA Region 2			WRKSHT NO.:	GA-01

Description: General productivity assumptions for commonly used processes.

General Assumptions

Estimated Work Week and Work Day Duration

Days per work week:	**5**
Hours per workday for Office Staff:	**8**
Hours per workday for Field Staff:	**10**

Assumed Material Properties

Common Earth Bulking Factor:	1.2	*Conversion from BCY to LCY*
Common Earth Compaction Factor:	0.9	*Conversion from BCY to ECY*
Common Earth Compaction Factor:	0.75	*Conversion from LCY to ECY*
Density of common earth, LB/BCY:	3,200	*CAT Handbook*
Density of common earth, LB/LCY:	2,625	*CAT Handbook*
Riprap Bulking Factor:	1.50	*Conversion from BCY to LCY*
Riprap Compaction Factor:	1.30	*Conversion from BCY to ECY*
Riprap Compaction Factor:	0.87	*Conversion from LCY to ECY*
Density of riprap, LB/BCY:	4,400	*CAT Handbook*
Density of riprap, LB/LCY:	2,700	*CAT Handbook*
Sand Bulking Factor:	1.12	*Conversion from BCY to LCY*
Sand Compaction Factor:	0.95	*Conversion from BCY to ECY*
Sand Compaction Factor:	0.85	*Conversion from LCY to ECY*
Density of sand (dry), LB/BCY:	2,700	*CAT Handbook*
Density of sand (dry), LB/LCY:	2,400	*CAT Handbook*
Topsoil and compost bulking factor:	1.1	*Conversion from BCY to LCY*
Topsoil and compost compaction Factor:	0.95	*Conversion from BCY to ECY*
Topsoil and compost compaction Factor:	0.86	*Conversion from LCY to ECY*
Density of Topsoil, LB/BCY:	2,300	*CAT Handbook*
Density of Topsoil, LB/LCY:	1,600	*CAT Handbook*
Gravel Bulking Factor:	1.12	*Conversion from BCY to LCY*
Gravel Compaction Factor:	0.95	*Conversion from BCY to ECY*
Gravel Compaction Factor:	0.85	*Conversion from LCY to ECY*
Density of gravel (pitrun), LB/BCY:	3,650	*CAT Handbook*
Density of gravel (pitrun), LB/LCY:	3,250	*CAT Handbook*

Dredged Material

Bulking Factor BCY to LCY:	1.15	
Dredged Sediment Density (LB/CY):	3,100	*Source: Caterpillar Performance Handbook, edition 3.1 (Assumes Sand - Wet)*
Dredged Sediment Density (TON/CY):	1.55	
Density of GAC,TON/CY:	0.44	

PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY:	Shelby Kapperman
JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE:	11/15/2025	DATE CHECKED:	12/9/2025
CLIENT:	EPA Region 2			WRKSHT NO.:	GA-01

Description: General productivity assumptions for commonly used processes.

Concrete Demolition Debris Bulking Factor:	1.30	*Conversion from BCY to LCY*
Density of Concrete Debris, LB/LCY:	1,855	
Density of Concrete Debris, TON/LCY:	0.93	
Density of Asphalt Debris, LB/LCY:	2,970	
Density of Asphalt Debris, TON/LCY:	1.49	
Vegetative debris - hardwoods, TON/LCY:	0.25	*FEMA Debris Estimating Field Guide*
Vegetative debris - softwoods, TON/LCY:	0.17	*FEMA Debris Estimating Field Guide*

Frequently Used Conversions

Acres to Square Feet, AC/SF:	43,560

TABLE CW2-1

Alternative 2 **Cost Worksheet: CW2-1**
Capital Cost Sub-Element
Institutional Controls

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025
Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves implementation of institutional controls for the site. The following cost includes hours for legal document submission and recording. ICs are intended to prevent changes in landuse and prevent intrusive work on the site.

Cost Analysis:
Cost for Institutional Controls (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Legal Controls																
L5	Environmental Lawyer	40	HR	1.00	$242.72	$242.72	$0.00	$0.00	$0.00	$0.00	$242.72	$9,708.80	50%	9%	$15,874	FLC FLC Datacenter	
L14	Paralegal	80	HR	1.00	$91.35	$91.35	$0.00	$0.00	$0.00	$0.00	$91.35	$7,308.00	50%	9%	$11,949	FLC FLC Datacenter	
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$54.89	$54.89	$0.00	$0.00	$0.00	$0.00	$54.89	$2,195.60	50%	9%	$3,590	FLC FLC Datacenter	
M1	Institutional Controls Report Allowance	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	Per Estimator
	Regulated Navigation Area (RNA) Setup																
L12	Project Manager	40	HR	1.00	$216.33	$216.33	$0.00	$0.00	$0.00	$0.00	$216.33	$8,653.20	50%	9%	$14,148	FLC FLC Datacenter	
L4	Environmental Engineer	24	HR	1.00	$130.74	$130.74	$0.00	$0.00	$0.00	$0.00	$130.74	$3,137.76	50%	9%	$5,130	FLC FLC Datacenter	
L3	Clerks, Typist, Bookkeeper & Receptionist	8	HR	1.00	$54.89	$54.89	$0.00	$0.00	$0.00	$0.00	$54.89	$439.12	50%	9%	$718	FLC FLC Datacenter	
A69	Buoy Placement	28	HR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$274.69	$274.69	$7,691.32	15%	9%	$9,641	MII MII Assemblies	
L9	Field Technician	56	HR	1.00	$73.71	$73.71	$0.00	$0.00	$0.00	$0.00	$73.71	$4,127.76	50%	9%	$6,749	FLC FLC Datacenter	
M91	Regulatory Buoy	14	EA	1.00	$0.00	$0.00	$0.00	$0.00	$975.61	$0.00	$975.61	$13,658.54	15%	9%	$17,121	V Allowance	Go2Marine, 2025
	Informational Devices-Fish Consumption Advisory																
L12	Project Manager	40	HR	1.00	$216.33	$216.33	$0.00	$0.00	$0.00	$0.00	$216.33	$8,653.20	50%	9%	$14,148	FLC FLC Datacenter	
L4	Environmental Engineer	20	HR	1.00	$130.74	$130.74	$0.00	$0.00	$0.00	$0.00	$130.74	$2,614.80	50%	9%	$4,275	FLC FLC Datacenter	
L6	Environmental Scientist	20	HR	1.00	$110.55	$110.55	$0.00	$0.00	$0.00	$0.00	$110.55	$2,211.00	50%	9%	$3,615	FLC FLC Datacenter	
L3	Clerks, Typist, Bookkeeper & Receptionist	10	HR	1.00	$54.89	$54.89	$0.00	$0.00	$0.00	$0.00	$54.89	$548.90	50%	9%	$897	FLC FLC Datacenter	
L5	Environmental Lawyer	5	HR	1.00	$242.72	$242.72	$0.00	$0.00	$0.00	$0.00	$242.72	$1,213.60	50%	9%	$1,984	FLC FLC Datacenter	
L14	Paralegal	5	HR	1.00	$91.35	$91.35	$0.00	$0.00	$0.00	$0.00	$91.35	$456.75	50%	9%	$747	FLC FLC Datacenter	
M34	Aluminum Warning Signs (24" x 24")	7	EA	1.00	$0.00	$0.00	$0.00	$0.00	$59.34	$0.00	$59.34	$415.38	15%	9%	$521	V Vendor Quote	Source: Signs.com, 2025
L9	Field Technician	14	HR	1.00	$73.71	$73.71	$0.00	$0.00	$0.00	$0.00	$73.71	$1,031.94	50%	9%	$1,687	FLC FLC Datacenter	
												TOTAL UNIT COST:			$117,794		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$117,794	$117,794

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW2-2

Alternative 2 **Cost Worksheet:** **CW2-2**

Capital Cost Sub-Element
Site Surveying

COST WORKSHEET

Site:	Wappinger Creek Superfund Site	**Prepared By:** Jacob Hill	**Date:** 7/7/2025
Location:	Dutchess County, New York		
Phase:	Focused Feasibility Study	**Checked By:** Steve Clinch	**Date:** 7/10/2025
Base Year:	2025		

Work Statement:
This sub-element involves costs for site surveys. The following line items include costs for a Pre-Construction Survey and Post-Construction Survey of the site.

Cost Analysis:
Cost for Site Surveying (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Pre-Construction Bathymetric Survey																
A51	Bathymetric Surveying	7	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$11,963.09	$11,963.09	$87,330.56	15%	9%	$109,469	MII MII Assemblies	
M80	Bathymetric Survey Report	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$10,300.00	$10,300.00	$10,300.00	0%	0%	$10,300	A Allowance	Per Estimator
	Post-Construction Bathymetric Survey																
A51	Bathymetric Surveying	7	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$11,963.09	$11,963.09	$87,330.56	15%	9%	$109,469	MII MII Assemblies	
M80	Bathymetric Survey Report	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$10,300.00	$10,300.00	$10,300.00	0%	0%	$10,300	A Allowance	Per Estimator
												TOTAL UNIT COST:			$239,538		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$239,538	$239,538

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW2-3

Alternative 2 **Cost Worksheet: CW2-3**
Capital Cost Sub-Element
Site Preparation

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025
Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves site preparation including clearing and grubbing, prepping the laydown area, prepping the temporary road, and sheetpiling for the access ramp.

Cost Analysis:
Cost for Site Preparation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Clearing and Grubbing																
A1	Light Clearing (Open Areas)	2.00	AC	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,885.62	$2,885.62	$5,771.24	15%	9%	$7,234	MII MII Assemblies	
A2	Rough Site Grading	81,433	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.08	$0.08	$6,514.64	15%	9%	$8,166	MII MII Assemblies	
	Sediment Processing Area-Gravel																
A11	Gravel Placement	189	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.09	$8.09	$1,529.01	15%	9%	$1,917	MII MII Assemblies	
M26	Gravel - 1-1/2"	308	TON	1.00	$0.00	$0.00	$0.00	$0.00	$32.60	$0.00	$32.60	$10,040.80	15%	9%	$12,586	V Vendor Quote	
A33	Earth Stripping and Stockpiling	330	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.40	$2.40	$792.00	15%	9%	$993	MII MII Assemblies	
	Sediment Processing Area-Pavement																
A70	Asphalt Paving 4" Base Course	970	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.61	$2.61	$2,531.70	15%	9%	$3,173	MII MII Assemblies	
M92	Binder Course 4"	175	TON	1.00	$0.00	$0.00	$0.00	$0.00	$88.00	$0.00	$88.00	$15,412.22	15%	9%	$19,319	V CostWorks	
A71	Asphalt Paving 2" Surface Course	970	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.83	$1.83	$1,775.10	15%	9%	$2,225	MII MII Assemblies	
M93	Wearing Course 2"	80	TON	1.00	$0.00	$0.00	$0.00	$0.00	$87.00	$0.00	$87.00	$6,985.62	15%	9%	$8,756	V CostWorks	
A72	Aggregate Sub Base Placement	970	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5.39	$5.39	$5,228.30	15%	9%	$6,554	MII MII Assemblies	
M26	Gravel - 1-1/2"	309	TON	1.00	$0.00	$0.00	$0.00	$0.00	$32.60	$0.00	$32.60	$10,075.64	15%	9%	$12,630	V Vendor Quote	
	Sheet Piling																
A22	Sheet Piling Installation and Salvage	6,000	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$30.26	$30.26	$181,560.00	15%	9%	$227,585	MII MII Assemblies	
A11	Gravel Placement	107	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.09	$8.09	$861.78	15%	9%	$1,080	MII MII Assemblies	
M26	Gravel - 1-1/2"	173	TON	1.00	$0.00	$0.00	$0.00	$0.00	$32.60	$0.00	$32.60	$5,643.13	15%	9%	$7,074	V Vendor Quote	
												TOTAL UNIT COST:			$319,292		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$319,292	$319,292

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW2-4

Alternative 2 **Cost Worksheet: CW2-4**
Capital Cost Sub-Element
Erosion Control Measures

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025
Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves erosion control measures for the site. The following line items include costs for materials, installation, and maintenance of silt fencing and turbidity curtains are included.

Cost Analysis:
Cost for Erosion Control Measures (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Erosion Control Measures																
M22	Silt Fence	2,400	LF	1.00	$0.00	$0.00	$0.00	$0.00	$2.05	$0.00	$2.05	$4,920.00	15%	9%	$6,167	CW CostWorks	Source: 31 25 1416 1000
A3	Silt Fence Installation	2,400	LF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4.10	$4.10	$9,840.00	15%	9%	$12,334	MII MII Assemblies	
A24	Erosion Control Maintenance Crew	208	HR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$240.21	$240.21	$49,963.68	15%	9%	$62,629	MII MII Assemblies	
	Turbidity Curtains																
A48	Turbidity Curtain Install	2,000	LF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$18.69	$18.69	$37,380.00	15%	9%	$46,856	MII MII Assemblies	
M76	DOT Type 2 Turbidity Curtain	20	EA	1.00	$0.00	$0.00	$0.00	$0.00	$1,372.42	$0.00	$1,372.42	$27,448.40	15%	9%	$34,407	V Vendor Quote	Paramount Materials 2023
M77	Turbidity Curtain Anchor Kit	40	EA	1.00	$0.00	$0.00	$0.00	$0.00	$503.20	$0.00	$503.20	$20,128.00	15%	9%	$25,230	V Vendor Quote	Paramount Materials 2023
A49	Turbidity Curtain Maintenance	104	HR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$350.30	$350.30	$36,431.20	15%	9%	$45,667	MII MII Assemblies	
A50	Turbidity Curtain Removal	2,000	LF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$9.34	$9.34	$18,680.00	15%	9%	$23,415	MII MII Assemblies	
												TOTAL UNIT COST:			$256,705		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$256,705	$256,705

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist: **NOTES:**

FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW2-5

Alternative 2 **Cost Worksheet: CW2-5**
Capital Cost Sub-Element
Dredging for Off-Site Disposal

COST WORKSHEET

Site: Wappinger Creek Superfund Site **Prepared By:** Jacob Hill **Date:** 7/7/2025
Location: Dutchess County, New York
Phase: Focused Feasibility Study **Checked By:** Steve Clinch **Date:** 7/10/2025
Base Year: 2025

Work Statement:
This sub-element involves dredging and the transfer of waste to the soil stockpile areas for dewatering.

Cost Analysis:
Cost for Excavation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	In-Channel																
A52	Dredging	7,400	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$61.32	$61.32	$453,768.00	15%	9%	$568,798	MII MII Assemblies	
A55	Scow Transport	6	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$835.45	$835.45	$5,012.70	15%	9%	$6,283	MII MII Assemblies	
	Shore-Line																
A52	Dredging	8,100	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$61.32	$61.32	$496,692.00	15%	9%	$622,603	MII MII Assemblies	
A55	Scow Transport	7	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$835.45	$835.45	$5,848.15	15%	9%	$7,331	MII MII Assemblies	
	Embayment																
A67	Embayment Dredging	20,340	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$20.11	$20.11	$409,037.40	15%	9%	$512,728	MII MII Assemblies	
A55	Scow Transport	16	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$835.45	$835.45	$13,367.20	15%	9%	$16,756	MII MII Assemblies	
	Floodplain Soils																
A15	Excavation	1,894	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.09	$3.09	$5,853.83	15%	9%	$7,338	MII MII Assemblies	
A75	Loading Material	2,273	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.68	$0.68	$1,545.87	15%	9%	$1,938	MII MII Assemblies	
A76	Onsite Hauling	2,273	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4.65	$4.65	$10,571.00	15%	9%	$13,251	MII MII Assemblies	
	Offloading																
A56	Offloading- Barge	41,216	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7.14	$7.14	$294,282.24	15%	9%	$368,883	MII MII Assemblies	
	Barge Equipment																
S71	Spud Barge 1 to 90 days	90	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$933.00	$933.00	$83,970.00	15%	9%	$105,256	V Vendor Quote	FlexiFloat 2025
S72	Spud Barge 91 to 180 days	30	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$699.75	$699.75	$20,992.50	15%	9%	$26,314	V Vendor Quote	FlexiFloat 2025
S73	Spud Barge Mob/Demob	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$56,000.00	$56,000.00	$112,000.00	15%	9%	$140,392	V Vendor Quote	FlexiFloat 2025,Spud Barge Freight
S74	Material Barge Mob/Demob	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$36,000.00	$36,000.00	$72,000.00	15%	9%	$90,252	V Vendor Quote	FlexiFloat 2025 , Material Barge Freight
S75	Material Barge 1 to 90 days	90	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$592.00	$592.00	$53,280.00	15%	9%	$66,786	V Vendor Quote	FlexiFloat 2025
S76	Material Barge 91 to 180 days	30	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$444.00	$444.00	$13,320.00	15%	9%	$16,697	V Vendor Quote	FlexiFloat 2025
	Cultural Resources Oversight																
L22	Archeologist	80	HR	1.00	$85.25	$85.25	$0.00	$0.00	$0.00	$0.00	$85.25	$6,820.00	50%	9%	$11,151	FLC FLC Datacenter	
M21	Per Diem	8	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$115.00	$115.00	$920.00	0%	0%	$920	GSA gsa.gov	gsa.gov local per diem rates
M20	Pick up Truck	8	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$263.00	$263.00	$2,104.00	15%	9%	$2,637	CW CostWorks	Source: 01 54 3340 7200
														TOTAL UNIT COST:	$2,586,314		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	37,734	BCY	$2,586,314	$69

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist: **NOTES:**

FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW2-6

Alternative 2 **Cost Worksheet: CW2-6**
Capital Cost Sub-Element
Confirmation Sampling

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025
Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves confirmation sampling of dredged areas.

Cost Analysis:
Cost for Waste Characterization Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Confirmation Sampling																
S18	TAL Metals Analysis (soil media)	66	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$154.76	$154.76	$10,214.16	15%	9%	$12,803	V Vendor Quote	MSA Lab Pricing, 2025
S5	PCB Analysis (soil media)	66	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$173.33	$173.33	$11,439.78	15%	9%	$14,340	V Vendor Quote	MSA Lab Pricing, 2025
S16	Mercury Analysis (soil media)	66	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$27.24	$27.24	$1,797.84	15%	9%	$2,254	V Vendor Quote	MSA Lab Pricing, 2025
S12	Dioxins/Furans (soil media)	66	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$441.53	$441.53	$29,140.98	15%	9%	$36,528	V Vendor Quote	MSA Lab Pricing, 2025
S29	SVOCs	66	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$160.95	$160.95	$10,622.70	15%	9%	$13,316	V Vendor Quote	MSA Lab Pricing, 2025
S21	Pesticides	66	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$149.01	$149.01	$9,834.66	15%	9%	$12,328	V Vendor Quote	MSA Lab Pricing, 2025
L15	Senior Scientist	56	HR	1.00	$133.15	$133.15	$0.00	$0.00	$0.00	$0.00	$133.15	$7,456.40	50%	9%	$12,191	FLC FLC Datacenter	
L16	Staff Scientist	56	HR	1.00	$87.94	$87.94	$0.00	$0.00	$0.00	$0.00	$87.94	$4,924.64	50%	9%	$8,052	FLC FLC Datacenter	
M20	Pick up Truck	6	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$263.00	$263.00	$1,578.00	15%	9%	$1,978	CW CostWorks	Source: 01 54 3340 7200
M21	Per Diem	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$115.00	$115.00	$1,380.00	0%	0%	$1,380	GSA gsa.gov	gsa.gov local per diem rates
M35	Sample Shipping per Analysis	330	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.50	$13.50	$4,455.00	0%	0%	$4,455	A Allowance	Per Estimator
M36	Sample Supplies per Analysis	330	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.24	$3.24	$1,069.20	0%	0%	$1,069	A Allowance	Per Estimator
	IDW Handling																
S77	Rental Fee for Solid Waste Disposal Container	14	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$18.30	$18.30	$256.20	15%	9%	$321	A Allowance	Per Estimator
S78	Hauling for Disposal	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$566.95	$566.95	$1,133.90	15%	9%	$1,421	A Allowance	Per Estimator
S79	IDW Disposal	1	TON	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$209.62	$209.62	$146.73	15%	9%	$184	A Allowance	Per Estimator
S80	Water Disposal Fee	66	GAL	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.47	$1.47	$97.02	15%	9%	$122	A Allowance	Per Estimator
S81	55-gallon drum	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$178.00	$178.00	$356.00	15%	9%	$446	A Allowance	Per Estimator
S82	Water Testing for Waste Progiling- Standard Analyte List	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,102.24	$1,102.24	$2,204.48	15%	9%	$2,763	A Allowance	Per Estimator
												TOTAL UNIT COST:			$125,951		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	66	EA	$125,951	$1,908

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW2-7

Alternative 2 **Cost Worksheet: CW2-7**
Capital Cost Sub-Element
Containment- Reactive/Engineered Cap

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025
Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves placement of the reactive cap.

Cost Analysis:
Cost for Excavation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	In-Channel																
A54	Placement	5,646	CY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$24.45	$24.45	$138,037.69	15%	9%	$173,030	MII MII Assemblies	
M70	Sand	5,880	TON	1.00	$0.00	$0.00	$0.00	$0.00	$20.00	$0.00	$20.00	$117,600.00	0%	0%	$117,600	V Vendor Quote	Peckham 2025
M89	Carbon Amendment	453	TON	1.00	$0.00	$0.00	$0.00	$0.00	$4,409.00	$0.00	$4,409.00	$1,997,369.20	15%	9%	$2,503,702	V Vendor Quote	Sedimite.com 2025, Assumed sedimite amendment
A43	Amendment Mixing	5,646	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.40	$2.40	$13,549.71	15%	9%	$16,985	MII MII Assemblies	
	Shore																
A54	Placement	6,216	CY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$24.45	$24.45	$151,985.25	15%	9%	$190,514	MII MII Assemblies	
M70	Sand	6,480	TON	1.00	$0.00	$0.00	$0.00	$0.00	$20.00	$0.00	$20.00	$129,600.00	0%	0%	$129,600	V Vendor Quote	Peckham 2025
M89	Carbon Amendment	496	TON	1.00	$0.00	$0.00	$0.00	$0.00	$4,409.00	$0.00	$4,409.00	$2,186,072.78	15%	9%	$2,740,242	V Vendor Quote	Sedimite.com 2025, Assumed sedimite amendment
A43	Amendment Mixing	6,216	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.40	$2.40	$14,918.80	15%	9%	$18,701	MII MII Assemblies	
	Embayment																
A54	Placement	12,798	CY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$24.45	$24.45	$312,916.98	15%	9%	$392,241	MII MII Assemblies	
M70	Sand	13,320	TON	1.00	$0.00	$0.00	$0.00	$0.00	$20.00	$0.00	$20.00	$266,400.00	0%	0%	$266,400	V Vendor Quote	Peckham 2025
M89	Carbon Amendment	1,032	TON	1.00	$0.00	$0.00	$0.00	$0.00	$4,409.00	$0.00	$4,409.00	$4,548,681.68	15%	9%	$5,701,772	V Vendor Quote	Sedimite.com 2025, Assumed sedimite amendment
A43	Amendment Mixing	12,798	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.40	$2.40	$30,715.78	15%	9%	$38,502	MII MII Assemblies	
	Floodplains Soils																
A77	Backfill/Compaction	2,273	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5.06	$5.06	$11,503.07	15%	9%	$14,419	MII MII Assemblies	
M37	Common Borrow Fill	2,728	TON	1.00	$0.00	$0.00	$0.00	$0.00	$35.47	$0.00	$35.47	$96,762.16	15%	8%	$120,179	V Vendor Quote	Source: 31 05 1310 0200
												TOTAL UNIT COST:			$12,423,887		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	13.20	ACR	$12,423,887	$941,206

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist: **NOTES:**

FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW2-8

Alternative 2 **Cost Worksheet: CW2-8**

Capital Cost Sub-Element

Backfill Conformance Sampling

COST WORKSHEET

Site: Wappinger Creek Superfund Site **Prepared By:** Jacob Hill **Date:** 7/7/2025

Location: Dutchess County, New York

Phase: Focused Feasibility Study **Checked By:** Steve Clinch **Date:** 7/10/2025

Base Year: 2025

Work Statement:

This sub-element involves backfill conformance sampling of imported materials.

Cost Analysis:

Cost for Waste Characterization Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Backfill Conformance Sampling																
S12	Dioxins/Furans (soil media)	43	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$441.53	$441.53	$18,985.79	15%	9%	$23,799	V Vendor Quote	MSA Lab Pricing, 2025
S20	PAHs	43	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$93.82	$93.82	$4,034.26	15%	9%	$5,057	V Vendor Quote	MSA Lab Pricing, 2025
S21	Pesticides	43	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$149.01	$149.01	$6,407.43	15%	9%	$8,032	V Vendor Quote	MSA Lab Pricing, 2025
S26	TCLP Full Analytical Suite	43	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$866.64	$866.64	$37,265.52	15%	9%	$46,712	V Vendor Quote	MSA Lab Pricing, 2025
S16	Mercury Analysis (soil media)	43	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$27.24	$27.24	$1,171.32	15%	9%	$1,468	V Vendor Quote	MSA Lab Pricing, 2025
S5	PCB Analysis (soil media)	43	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$173.33	$173.33	$7,453.19	15%	9%	$9,343	V Vendor Quote	MSA Lab Pricing, 2025
S25	TPH-Diesel	43	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$74.28	$74.28	$3,194.04	15%	9%	$4,004	V Vendor Quote	MSA Lab Pricing, 2025
S18	TAL Metals Analysis (soil media)	43	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$154.76	$154.76	$6,654.68	15%	9%	$8,342	V Vendor Quote	MSA Lab Pricing, 2025
S27	Grain Size Distribution	43	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$173.33	$173.33	$7,453.19	15%	9%	$9,343	V Vendor Quote	MSA Lab Pricing, 2025
S28	Total Organic Carbon	43	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$55.71	$55.71	$2,395.53	15%	9%	$3,003	V Vendor Quote	MSA Lab Pricing, 2025
L7	Field Engineer	60	HR	1.00	$72.87	$72.87	$0.00	$0.00	$0.00	$0.00	$72.87	$4,372.20	50%	9%	$7,149	FLC FLC Datacenter	
M20	Pick up Truck	6	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$263.00	$263.00	$1,578.00	15%	9%	$1,978	CW CostWorks	Source: 01 54 3340 7200
M21	Per Diem	6	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$115.00	$115.00	$690.00	0%	0%	$690	GSA gsa.gov	gsa.gov local per diem rates
M35	Sample Shipping per Analysis	43	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.50	$13.50	$580.50	0%	0%	$581	A Allowance	Per Estimator
M36	Sample Supplies per Analysis	43	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.24	$3.24	$139.32	0%	0%	$139	A Allowance	Per Estimator
												TOTAL UNIT COST:			$129,640		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	43	EA	$129,640	$3,015

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001

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Source of Cost Data:

NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:

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Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

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ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
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EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW2-9

Alternative 2 **Cost Worksheet:** **CW2-9**

Capital Cost Sub-Element

Temporary Water Treatment Set Up

COST WORKSHEET

Site:	Wappinger Creek Superfund Site	**Prepared By:** Jacob Hill	**Date:** 7/7/2025
Location:	Dutchess County, New York		
Phase:	Focused Feasibility Study	**Checked By:** Steve Clinch	**Date:** 7/10/2025
Base Year:	2025		

Work Statement:

This sub-element involves set up of a temporary water treatment system. Water collected from dewatering operations will be piped to a temporary water treatment system onsite. The treatment system will operate on top of a gravel surface and within a containment barrier. Dewatered liquids from the soil stockpiles and excavations will be pumped to the water treatment system and treated. Effluent will be discharged into Wappinger Creek.

Cost Analysis:

Cost for Temporary Water Treatment Set Up (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION		COMMENTS
	Mob/Demob of Water Treatment System																	
S32	Mobilization Water Treatment System	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$37,510.00	$37,510.00	$37,510.00	15%	9%	$47,019	V	Vendor Quote	Ground Water Treatment & Technology, LLC, 2021. Includes start up testing.
S33	Demobilization Water Treatment System	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$19,965.00	$19,965.00	$19,965.00	15%	9%	$25,026	V	Vendor Quote	Ground Water Treatment & Technology, LLC, 2021
S35	Water Treatment System - Start up Testing	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,288.00	$2,288.00	$4,576.00	15%	9%	$5,736	V	Vendor Quote	Ground Water Treatment & Technology, LLC, 2017
M60	Sump Pump - 4" Dia	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$7,750.75	$0.00	$7,750.75	$15,501.50	15%	9%	$19,431	CW	CostWorks	Source: 22 14 2913 2060
S53	Water Storage Tank (10,000 GAL) Transportation	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$541.06	$541.06	$1,082.12	15%	9%	$1,356	V	Vendor Quote	Ironclad Environmental Solutions 2024
S37	Tank Cleaning	8	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,183.00	$2,183.00	$17,464.00	15%	9%	$21,891	V	Vendor Quote	Previous Work, 2015
	Startup Testing - Influent Sampling																	
S17	Mercury Analysis (aqueous media)	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$27.24	$27.24	$81.72	15%	9%	$102	V	Vendor Quote	MSA Lab Pricing, 2025
M35	Sample Shipping per Analysis	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.50	$13.50	$40.50	0%	0%	$41	A	Allowance	Per Estimator
M36	Sample Supplies per Analysis	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.24	$3.24	$9.72	0%	0%	$10	A	Allowance	Per Estimator
	Startup Testing - Effluent Sampling								$0.00		$0.00	$0.00			$0			
S17	Mercury Analysis (aqueous media)	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$27.24	$27.24	$81.72	15%	9%	$102	V	Vendor Quote	MSA Lab Pricing, 2025
M35	Sample Shipping per Analysis	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.50	$13.50	$40.50	0%	0%	$41	A	Allowance	Per Estimator
M36	Sample Supplies per Analysis	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.24	$3.24	$9.72	0%	0%	$10	A	Allowance	Per Estimator
	Treatment Area - Gravel																	
A70	Asphalt Paving 4" Base Course	69	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.61	$2.61	$181.25	15%	9%	$227	MII	MII Assemblies	
M92	Binder Course 4"	13	TON	1.00	$0.00	$0.00	$0.00	$0.00	$88.00	$0.00	$88.00	$1,103.40	15%	9%	$1,383	V	CostWorks	Source: 32 12 1613 0813
A71	Asphalt Paving 2" Surface Course	69	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.83	$1.83	$127.08	15%	9%	$159	MII	MII Assemblies	
M93	Wearing Course 2"	6	TON	1.00	$0.00	$0.00	$0.00	$0.00	$87.00	$0.00	$87.00	$500.12	15%	9%	$627	V	CostWorks	Source: 32 12 1613 0882
A72	Aggregate Sub Base Placement	69	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5.39	$5.39	$374.31	15%	9%	$469	MII	MII Assemblies	
M26	Gravel - 1-1/2"	22	TON	1.00	$0.00	$0.00	$0.00	$0.00	$32.60	$0.00	$32.60	$721.34	15%	9%	$904	V	Vendor Quote	Peckham 2025
												TOTAL UNIT COST:			$124,534			

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$124,534	$124,534

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001

The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:

NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:

MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "D" PPE.
Escalation to Base Year	MII assembly costs include HPF adjustments.
Area Cost Factor (AF)	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Subcontractor Overhead and Profit	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW2-10

Alternative 2 **Cost Worksheet: CW2-10**

Capital Cost Sub-Element

Temporary Water Treatment System Operation

COST WORKSHEET

Site:	Wappinger Creek Superfund Site	**Prepared By:** Jacob Hill	**Date:** 7/7/2025
Location:	Dutchess County, New York		
Phase:	Focused Feasibility Study	**Checked By:** Steve Clinch	**Date:** 7/10/2025
Base Year:	2025		

Work Statement:

This sub-element involves water treatment system operation. The treatment system will operate at full scale during excavation activities.

Cost Analysis:

Cost for Temporary Water Treatment System Operation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Full Scale Operation																
S34	Water Treatment System Rental	8	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,238.50	$2,238.50	$17,908.00	15%	9%	$22,448	V Vendor Quote	Ground Water Treatment & Technology, LLC, 2021
S36	Electricity Cost	47,728	KWH	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.14	$0.14	$6,726.78	15%	9%	$8,432	V Vendor Quote	US Energy Information Administration, 2022.
S11	Operator for Water Treatment System	96	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,287.00	$1,287.00	$123,552.00	15%	9%	$154,872	V Vendor Quote	Ground Water Treatment & Technology, LLC, 2017
S51	Bag Filter Replacement	96	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$6.05	$6.05	$580.80	15%	9%	$728	V Vendor Quote	Ground Water Treatment & Technology, LLC, 2022
S54	Water Treatment System - Activated Carbon Changeout	4	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$41,040.00	$41,040.00	$164,160.00	15%	9%	$205,775	V Vendor Quote	Ground Water Treatment & Technology, LLC, 2022. Includes onsite removal and refill of two - 4000lb vessels.
S52	Water Storage Tank (10,000 GAL) Rental	68	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$36.57	$36.57	$2,486.42	15%	9%	$3,117	V Vendor Quote	Ironclad Environmental Solutions 2024
	Effluent Sampling																
S17	Mercury Analysis (aqueous media)	15	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$27.24	$27.24	$408.60	15%	9%	$512	V Vendor Quote	MSA Lab Pricing, 2025
M35	Sample Shipping per Analysis	15	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.50	$13.50	$202.50	0%	0%	$203	A Allowance	Per Estimator
M36	Sample Supplies per Analysis	15	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.24	$3.24	$48.60	0%	0%	$49	A Allowance	Per Estimator
	Dewatering																
A66	Sump Pump Operation	68	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$300.38	$300.38	$20,425.84	15%	9%	$25,604	MII MII Assemblies	
A43	Amendment Mixing	43,277	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.40	$2.40	$103,864.32	15%	9%	$130,194	MII MII Assemblies	
M75	Portland Cement	2,705	TON	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$199.82	$199.82	$540,473.14	15%	9%	$677,483	V CostWorks	Cost Works 03 05 1330 0010
												TOTAL UNIT COST:			$1,229,417		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	8	MO	$1,229,417	$153,677

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001

The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:

NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:

MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW2-11

Alternative 2 **Cost Worksheet: CW2-11**

Capital Cost Sub-Element

Waste Characterization Sampling

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025

Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves waste characterization sampling for off-site disposal.

Cost Analysis:
Cost for Waste Characterization Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Waste Characterization Sampling																
S26	TCLP Full Analytical Suite	47	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$866.64	$866.64	$40,732.08	15%	9%	$51,058	V Vendor Quote	MSA Lab Pricing, 2025
S9	Paint Filter Test	47	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$27.24	$27.24	$1,280.28	15%	9%	$1,605	V Vendor Quote	MSA Lab Pricing, 2025
S2	Reactivity-Cyanide	47	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$30.95	$30.95	$1,454.65	15%	9%	$1,823	V Vendor Quote	MSA Lab Pricing, 2025
S3	Reactivity-Sulfide	47	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$49.52	$49.52	$2,327.44	15%	9%	$2,917	V Vendor Quote	MSA Lab Pricing, 2025
S1	Corrosivity	47	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$18.57	$18.57	$872.79	15%	9%	$1,094	V Vendor Quote	MSA Lab Pricing, 2025
S19	Ignitability	47	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$49.52	$49.52	$2,327.44	15%	9%	$2,917	V Vendor Quote	MSA Lab Pricing, 2025
S5	PCB Analysis (soil media)	47	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$173.33	$173.33	$8,146.51	15%	9%	$10,212	V Vendor Quote	MSA Lab Pricing, 2025
L7	Field Engineer	16	HR	1.00	$72.87	$72.87	$0.00	$0.00	$0.00	$0.00	$72.87	$1,165.92	50%	9%	$1,906	FLC FLC Datacenter	
M20	Pick up Truck	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$263.00	$263.00	$526.00	15%	9%	$659	CW CostWorks	Source: 01 54 3340 7200
M21	Per Diem	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$115.00	$115.00	$230.00	0%	0%	$230	GSA gsa.gov	gsa.gov local per diem rates
M35	Sample Shipping per Analysis	329	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.50	$13.50	$4,441.50	0%	0%	$4,442	A Allowance	Per Estimator
M36	Sample Supplies per Analysis	47	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.24	$3.24	$152.28	0%	0%	$152	A Allowance	Per Estimator
														TOTAL UNIT COST:	$79,015		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	47	EA	$79,015	$1,681

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW2-12

Alternative 2 **Cost Worksheet: CW2-12**
Capital Cost Sub-Element
Off-Site Transportation and Disposal

COST WORKSHEET

Site:	Wappinger Creek Superfund Site	**Prepared By:** Jacob Hill	**Date:** 7/7/2025
Location:	Dutchess County, New York		
Phase:	Focused Feasibility Study	**Checked By:** Steve Clinch	**Date:** 7/10/2025
Base Year:	2025		

Work Statement:
This sub-element involves costs for off-site disposal, including transportation.

Cost Analysis:
Cost for Off-Site Transportation and Disposal (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Off-Site Transportation and Disposal																
S23	Non-Hazardous Waste Disposal	28,390	TON	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$265.00	$265.00	$7,523,350.00	2%	0%	$7,673,817	V Vendor Quote	Republic Services 2025
S24	Hazardous Waste Disposal	34,700	TON	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$455.00	$455.00	$15,788,500.00	2%	0%	$16,104,270	V Vendor Quote	Republic Services 2025
												TOTAL UNIT COST:			$23,778,087		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	63,090	TON	$23,778,087	$377

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW2-13

Alternative 2 **Cost Worksheet: CW2-13**

Capital Cost Sub-Element

Restoration of Laydown Area

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025

Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves costs for restoration.

Cost Analysis:
Cost for Restoration (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Asphalt Removal																
A73	Power Washing of Surfaces	9,320	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.12	$0.12	$1,118.40	15%	9%	$1,402	MII MII Assemblies	
A74	Asphalt Demolition	1,036	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$11.81	$11.81	$12,229.91	15%	9%	$15,330	MII MII Assemblies	
S23	Non-Hazardous Waste Disposal	605	TON	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$265.00	$265.00	$160,302.71	2%	0%	$163,509	V Vendor Quote	Republic Services 2025
	Gravel Removal																
A15	Excavation	169	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.09	$3.09	$521.44	15%	9%	$654	MII MII Assemblies	
S23	Non-Hazardous Waste Disposal	308	TON	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$265.00	$265.00	$81,620.00	2%	0%	$83,252	V Vendor Quote	Republic Services 2025
	Topsoil and Seeding																
A2	Rough Site Grading	18,015	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.08	$0.08	$1,441.20	15%	9%	$1,807	MII MII Assemblies	
A19	Top Soil Placement	450	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.11	$2.11	$949.50	15%	9%	$1,190	MII MII Assemblies	
M31	Screened Topsoil	450	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$37.50	$0.00	$37.50	$16,875.00	15%	9%	$21,153	V CostWorks	Costworks 31 05 1310 0700
A9	Seeding	0.4	AC	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,227.67	$1,227.67	$507.72	15%	9%	$636	MII MII Assemblies	
M30	Lawn Seed	0.4	AC	1.00	$0.00	$0.00	$0.00	$0.00	$1,125.00	$0.00	$1,125.00	$465.26	15%	9%	$583	V CostWorks	Costworks 32 92 1913 1900
												TOTAL UNIT COST:			$289,516		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$289,516	$289,516

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW2-14

Alternative 2 **Cost Worksheet: CW2-14**
Capital Cost Sub-Element
Containment System Monitoring

COST WORKSHEET

Site:	Wappinger Creek Superfund Site	**Prepared By:** Jacob Hill	**Date:** 7/7/2025
Location:	Dutchess County, New York		
Phase:	Focused Feasibility Study	**Checked By:** Steve Clinch	**Date:** 7/10/2025
Base Year:	2025		

Work Statement:
This sub-element involves monitoring and maintenance of the containment system areas.

Cost Analysis:
Cost for Containment System Monitoring (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L19	Project Engineer	20	HR	1.00	$155.95	$155.95	$0.00	$0.00	$0.00	$0.00	$155.95	$3,119.00	50%	9%	$5,100	FLC FLC Datacenter	
M20	Pick up Truck	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$263.00	$263.00	$526.00	15%	9%	$659	CW CostWorks	Source: 01 54 3340 7200
M21	Per Diem	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$115.00	$115.00	$230.00	0%	0%	$230	GSA gsa.gov	gsa.gov local per diem rates
M78	Containment System Maintenance Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$50,000.00	$50,000.00	$50,000.00	0%	0%	$50,000	A Allowance	Per Estimator
												TOTAL UNIT COST:			$55,989		

	Representative Unit Quantity	Unit(s)	$111,978	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$55,989	$55,989

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
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Source of Cost Data:
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Cost Adjustment Checklist: **NOTES:**

FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW2-15

Alternative 2 **Cost Worksheet: CW2-15**

Periodic Cost Sub-Element

Institutional Control Maintenance

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025

Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves maintenance of institutional controls for the site.

Cost Analysis:
Cost for Institutional Controls (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Legal Controls																
L5	Environmental Lawyer	10	HR	1.00	$242.72	$242.72	$0.00	$0.00	$0.00	$0.00	$242.72	$2,427.20	50%	9%	$3,968	FLC FLC Datacenter	
L14	Paralegal	20	HR	1.00	$91.35	$91.35	$0.00	$0.00	$0.00	$0.00	$91.35	$1,827.00	50%	9%	$2,987	FLC FLC Datacenter	
L3	Clerks, Typist, Bookkeeper & Receptionist	10	HR	1.00	$54.89	$54.89	$0.00	$0.00	$0.00	$0.00	$54.89	$548.90	50%	9%	$897	FLC FLC Datacenter	
M1	Institutional Controls Report Allowance	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	Per Estimator
	Regulated Navigation Area(RNA) Setup																
L12	Project Manager	40	HR	1.00	$216.33	$216.33	$0.00	$0.00	$0.00	$0.00	$216.33	$8,653.20	50%	9%	$14,148	FLC FLC Datacenter	
L4	Environmental Engineer	24	HR	1.00	$130.74	$130.74	$0.00	$0.00	$0.00	$0.00	$130.74	$3,137.76	50%	9%	$5,130	FLC FLC Datacenter	
L3	Clerks, Typist, Bookkeeper & Receptionist	8	HR	1.00	$54.89	$54.89	$0.00	$0.00	$0.00	$0.00	$54.89	$439.12	50%	9%	$718	FLC FLC Datacenter	
A69	Buoy Placement	28	HR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$274.69	$274.69	$7,691.32	15%	9%	$9,641	MII MII Assemblies	
L9	Field Technician	56	HR	1.00	$73.71	$73.71	$0.00	$0.00	$0.00	$0.00	$73.71	$4,127.76	50%	9%	$6,749	FLC FLC Datacenter	
M91	Regulatory Buoy	14	EA	1.00	$0.00	$0.00	$0.00	$0.00	$975.61	$0.00	$975.61	$13,658.54	15%	9%	$17,121	V Allowance	Go2Marine, 2025
	Informational Devices-Fish Consumption Advisory																
L12	Project Manager	40	HR	1.00	$216.33	$216.33	$0.00	$0.00	$0.00	$0.00	$216.33	$8,653.20	50%	9%	$14,148	FLC FLC Datacenter	
L4	Environmental Engineer	20	HR	1.00	$130.74	$130.74	$0.00	$0.00	$0.00	$0.00	$130.74	$2,614.80	50%	9%	$4,275	FLC FLC Datacenter	
L6	Environmental Scientist	20	HR	1.00	$110.55	$110.55	$0.00	$0.00	$0.00	$0.00	$110.55	$2,211.00	50%	9%	$3,615	FLC FLC Datacenter	
L3	Clerks, Typist, Bookkeeper & Receptionist	10	HR	1.00	$54.89	$54.89	$0.00	$0.00	$0.00	$0.00	$54.89	$548.90	50%	9%	$897	FLC FLC Datacenter	
L5	Environmental Lawyer	5	HR	1.00	$242.72	$242.72	$0.00	$0.00	$0.00	$0.00	$242.72	$1,213.60	50%	9%	$1,984	FLC FLC Datacenter	
L14	Paralegal	5	HR	1.00	$91.35	$91.35	$0.00	$0.00	$0.00	$0.00	$91.35	$456.75	50%	9%	$747	FLC FLC Datacenter	
M34	Aluminum Warning Signs (24" x 24")	7	EA	1.00	$0.00	$0.00	$0.00	$0.00	$59.34	$0.00	$59.34	$415.38	15%	9%	$521	V Vendor Quote	Source: Signs.com, 2025
L9	Field Technician	14	HR	1.00	$73.71	$73.71	$0.00	$0.00	$0.00	$0.00	$73.71	$1,031.94	50%	9%	$1,687	FLC FLC Datacenter	
												TOTAL UNIT COST:			$94,233		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$94,233	$94,233

Notes:
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Cost Adjustment Checklist:

FACTOR:	NOTES:
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EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

CDM Smith	PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY: Steve Clinch
	JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE:	7/7/2025	DATE CHECKED: 7/10/2025
	CLIENT:	EPA Region 2			WRKSHT NO.: Alt 2

Description: Assumptions and calculations for Alternative 2.

Alternative 2

Capital Costs

Project Schedule

Number of Months for Project Duration, MO:	**14**	*Assumes 1 additional month before and after construction duration for prep/closeout.*
Estimated duration of Project, WK:	61	
Number of Months for Construction, MO:	**12**	
Estimated duration of construction project, WK:	52	
Calendar days, DY:	364	
Total Number of Work Days, DY:	260	*Work days (based on 5 days per week)*

Institutional Controls

Legal Controls

Environmental Lawyer, HR:	**40**	
Paralegal, HR:	**80**	
Admin Clerk, HR:	**40**	
Reproduction Costs for Institutional Controls, LS:	**1**	

Regulated Navigation Area (RNA) Setup

Project Manager,HR:	**40**	*Assumed*
Environmental Engineer,HR:	**24**	*Assumed*
Admin Clerk,HR:	**8**	*Assumed*
Buoy Placement EA:	**14**	*Assumes 1 an acre*
Buoy Placement ,HR:	**2**	*Assumed per buoy*
Field Technician,HR:	**56**	*Assumes 2 technicians*
Boat Operator,HR:	**28**	
Boat Mobilization Demob,EA:	**2**	
Boat, HR:	**28**	

Informational Devices- Fish Consumption Advisory

Project Manager,HR:	**40**	*Assumed*
Environmental Engineer,HR:	**20**	*Assumed*
Environmental Scientist,HR:	**20**	*Assumed*
Admin Clerk,HR:	**10**	*Assumed*
Environmental Lawyer,HR:	**5**	*Assumed*
Paralegal,HR:	**5**	*Assumed*
Signage, EA:	**7**	*Assumes 1 every 2 acres*
Sign Placement,HR:	**1**	*Assumed*
Field Technician,HR:	**14**	*Assumes 2 technicians*

CDM Smith	PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY: Steve Clinch
	JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE:	7/7/2025	DATE CHECKED: 7/10/2025
	CLIENT:	EPA Region 2			WRKSHT NO.: Alt 2

Description: Assumptions and calculations for Alternative 2.

Site Surveying

Pre-Construction Bathymetric Survey

Total Area of Disturbance, SF:	574,990	
Extra Survey Area, %:	10%	
Total Survey Area, SF:	632,489	
Site Area, AC:	14.6	
Acres Surveyed,DY	2	*assumed*
Bathymetric Survey, DY:	7	
Bathymetric Surveying Report, EA:	1	

Post-Construction Bathymetric Survey

Total Area of Disturbance, SF:	574,990	
Extra Survey Area, %:	10%	
Total Survey Area, SF:	632,489	
Site Area, AC:	14.6	
Acres Surveyed,DY	2	*assumed*
Bathymetric Survey, DY:	7	
Bathymetric Surveying Report, EA:	1	

Site Preparation

Clearing and Grubbing

Removal Area, SF:	81,433
Removal Area, AC:	1.9
Clearing and Grubbing in Open Areas, %:	100%
Clearing and Grubbing - Open, AC:	2
Clearing and Grubbing - Open, AC:	2
Length for equipment laydown area, FT:	125
Width of equipment laydown area, FT:	40
Area for equipment laydown area, SF:	5,000
Area for equipment laydown area, SY:	556
Length for temporary road, FT:	826
Width of temporary road, FT:	15
Area for road, SF:	12,390
Area for temporary road, SY:	1,377
Area for equipment laydown are and road, SY:	1,940
Area of stripping, AC:	0.40
Depth of stripping, IN:	6
Depth of stripping, FT:	0.5
Stripped volume, CF:	8,695
Stripped volume, BCY:	330
Stripped volume, LCY:	396
Gravel %:	50%
Pavement %:	50%

CDM Smith	PROJECT: Wappinger Creek Superfund Site	COMPUTED BY: Jacob Hill		CHECKED BY: Steve Clinch	
	JOB NO.: 253508.3501-F0064-4_2FS.FSRPT	DATE: 7/7/2025		DATE CHECKED: 7/10/2025	
	CLIENT: EPA Region 2			WRKSHT NO.: Alt 2	

Description: Assumptions and calculations for Alternative 2.

Thickness of gravel for equipment laydown area, IN:	6	
Volume of gravel needed, ECY:	46	
Volume of gravel needed, LCY:	54	
Thickness of gravel for road, IN:	6	
Volume of gravel needed, ECY:	115	
Volume of gravel needed, LCY:	135	
Gravel volume, LCY:	189	
Gravel volume, TON:	**308**	
Area for equipment laydown are and road(Pavement), SY:	**970**	
Depth of Sub Base Course, IN:	6	
Depth of Base Course, IN:	4	
Depth of Pavement, IN:	2	
Sub Base Course Required, ECY:	162	
Sub Base Course Required, LCY:	190	
Sub Base Course Required, TON:	**309**	
Base Course Required, CY:	108	
Base Course Required, TON:	**175**	
Pavement Required, CY:	54	
Pavement Required, TON:	**80**	

Sheetpiling

Length of Sheetpiling Wall,FT	**200**	
Depth of Sheet Pile,FT:	**30**	
Area of Sheetpile, SF:	**6,000**	
Area of gravel,SF:	**321**	
Depth of gravel,ft:	**8**	
Gravel Placement CF::	**2,568**	
Gravel Placement BCY:	**95**	
Gravel Placement LCY:	**107**	
Gravel Tons:	**173**	

Erosion Control Measures

Silt Fencing, LF:	2,104	*Estimated based on area of disturbance*
Assumed % Replaced during Construction, %:	10%	
Length of Silt Fence Required, LF:	**2,400**	*Rounded up to nearest Hundred*
Number of Straw Bales, EA:	170	*Rounded up to nearest ten*
Length of Each Straw Bale, FT:	3	
Total length of Straw Bales, FT:	**500**	*Assumed. Based on previous work*
Erosion Control Maintenance Crew, HR/WK:	4	*Assumed*
Erosion Control Maintenance Crew, HR:	**208**	

Turbidity Curtain

Installation of Turbidity Curtain

Assumed Length of Turbidity Curtain Required, LF:	2,000	*Assumed by estimator*
Assumed % of turbidity curtain to be reused, %:	50%	
Amount of turbidity curtain to be purchased, LF:	**1,000**	
Length per section, LF/EA:	50	
Number of sections, EA:	20	
Total length, FT:	1,000	
No. of anchor kits per section, EA/EA:	2	
No. of anchor kits, EA:	40	
Assumed installation productivity, LF/HR:	100	*Assumed by estimator*
Assumed Duration of Installation, HR:	20	

CDM Smith	PROJECT: Wappinger Creek Superfund Site	COMPUTED BY: Jacob Hill		CHECKED BY: Steve Clinch	
	JOB NO.: 253508.3501-F0064-4_2FS.FSRPT	DATE: 7/7/2025		DATE CHECKED: 7/10/2025	
	CLIENT: EPA Region 2			WRKSHT NO.: Alt 2	

Description: Assumptions and calculations for Alternative 2.

Inspection and Maintenance

Number of weeks turbidity curtain required, WK:	52	
Maintenance time of turbidity curtains per week, HR/WK:	2	
Turbidity Curtain Maintenance, HR:	104	*Assume 2 hr per week during construction*

Removal of Turbidity Curtain

Removal of turbidity curtains and anchors, LF:	2,000	

Dredging

In Channel

Total Dredging Volume BCY:	7,400	
Bulking Factor BCY to LCY:	1.15	*Dredged Sediment Bulking Factor*
Dredging,LCY:	8,510	
Dredging Area,SF:	131,522	
Dredging Area,AC:	3.0	
Dredged Sediment Density (LB/CY):	3,100	*Source: Caterpillar Performance Handbook, edition 3.1 (Assumes*
Dredged Sediment Density (TON/CY):	1.55	
Weight of Dredged Sediments, TONS:	13,191	
Scow Capacity,LCY:	1,500	
Scow Transport,EA:	6	

Shoreline

Total Dredging Volume BCY:	8,100	
Bulking Factor BCY to LCY:	1.15	*Dredged Sediment Bulking Factor*
Dredging,LCY:	9,315	
Dredging Area,SF:	143,948	
Dredging Area,AC:	3.3	
Dredged Sediment Density (LB/CY):	3,100	*Source: Caterpillar Performance Handbook, edition 3.1 (Assumes*
Dredged Sediment Density (TON/CY):	1.55	
Weight of Dredged Sediments, TONS:	14,438	
Scow Capacity,LCY:	1,500	
Scow Transport,EA:	7	

CDM Smith	PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY: Steve Clinch
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	CLIENT:	EPA Region 2			WRKSHT NO.: Alt 2

Description: Assumptions and calculations for Alternative 2.

Embayment Area

Additional Dredging for Access Area Channel AVG Depth ft:	1.5	*Assumes additional dredging depth to allow equipment access*
Additional Dredging for Access Area Channel sf:	65510	
Additional Dredging cf:	98265	
Additional Dredging BCY:	3640	
Total Dredging Volume BCY:	20,340	
Bulking Factor BCY to LCY:	1.15	*Dredged Sediment Bulking Factor*
Dredging,LCY:	**23,391**	
Dredging Area,SF:	299,520	
Dredging Area,AC:	6.9	
Dredged Sediment Density (LB/CY):	3,100	*Source: Caterpillar Performance Handbook, edition 3.1 (Assumes*
Dredged Sediment Density (TON/CY):	1.55	
Weight of Dredged Sediments, TONS:	36,256	
Scow Capacity,LCY:	1,500	
Scow Transport,EA:	**16**	

Floodplain Soils

Width of Area,ft:	**50**	*assumed*
Depth of Area,ft:	**0.5**	*assumed*
Length of Area,ft:	**2046**	*assumed*
Volume for excavation, cf:	**51150**	
Volume for excavation, BCY:	**1894**	
Volume for excavation, LCY:	**2273**	
Volume for Disposal,TONS:	**2984**	

Offloading

Offloading Volume,LCY:	**41,216**	

Barge Equipment

Mob/Demob Spud Barge,EA:	**2**	
Mob/Demob Material Barge,EA:	**2**	
Spud Barge Rental (1-90) Rate,DY:	**90**	
Spud Barge Rental (90-180) Rate,DY:	**30**	
Material Barge Rental (1-90) Rate,DY:	**90**	
Material Barge Rental (90-180) Rate,DY:	**30**	

Cultural Resources Oversight

Archeologist,HR:	**80**	*Assumed*
Per Diem,DY:	**8**	
Pickup Truck, DY:	**8**	

Confirmation Sampling

Dredge Area, SF:	574,990	
Dredge Area, AC:	13.20	
Total Samples, EA:	**66**	*Assumes 5 samples an acre*
Estimated Duration of Sampling DY:	**14**	*Assumed*
Total number of chemical sample sets, EA:	**66**	*Maximum number of samples for a specific analysis*
Total number of chemical samples, EA:	**198**	
Time for sediment sample locations, DY:	14	
Time for sediment sample locations, HR:	56	
Total time, DY:	**14**	
Total time, HR:	**56**	
Number of mobilizations, EA/EA:	**1**	
Number of crews, EA:	1	
Number of workers per crew, EA/EA:	2	
Number of scientists per boat, EA:	2	
Assumed IDW per surface sediment sample, CF/EA:	0.2	
IDW generated from sample locations, CF:	13	
Total IDW generated, CF:	13	
Total IDW generated, GAL:	97	
Number of 55-gallon drums needed, EA:	2	
Total IDW generated, TON:	0.7	
Number of days for container rental, DY:	14	
Assumed solid waste container capacity, TON:	8	
Number of times container will need to be emptied, EA:	2	
Decon water generated per sediment sample, GAL/EA:	1	

CDM Smith	PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY: Steve Clinch
	JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE:	7/7/2025	DATE CHECKED: 7/10/2025
	CLIENT:	EPA Region 2			WRKSHT NO.: Alt 2

Description: Assumptions and calculations for Alternative 2.

IDW generated from decontamination of equipment, GAL:	66	
Number of 55-gallon drums needed, EA:	2	
Staff Scientist, HR:	56	
Project Scientist, HR:	56	
Pickup Truck, DY:	6	
Per Diem, DY:	12	
PCBs, EA:	66	
Dioxin/Furans, EA:	66	
Pesticides, EA:	66	
Total Metals, EA:	66	
Mercury, EA:	66	
SVOCs,EA:	66	
Shipping, per Sample Analysis, EA:	330	*1 Set of Analyses per Sample*
Miscellaneous Sampling Supplies, per Sample, EA:	330	
Rental Fee for Solid Waste Disposal Container, DAY:	14	
Hauling for Disposal, EA:	2	
Waste Disposal (non-regulated solid waste),TONs:	0.7	
Lab Analysis - Soil Disposal TCLP Analyte List, EA:	2	
Water Disposal Fee, GAL:	66	
55-gallon Drum, EA:	2	
Water Testing for Waste Profiling - Standard Analyte List, EA:	2	

Containment - Reactive/Engineered Cap

Amendment Addition %:	6%	*Assumes % by weight*

In-Channel

Carbon amendment, TON:	453	
Carbon Density,lb/cf:	45	*Based on density of Sedimite*
Density of Carbon,TON/CY:	0.61	
Carbon Amendment Volume, CY:	746	
Sand, LCY:	4,900	
Density of Sand (dry), TON/LCY:	1.20	
Sand,TON:	5,880	
Mixing Volume,LCY:	5,646	
Reactive Layer Placement, LCY:	5,646	

CDM Smith	PROJECT: Wappinger Creek Superfund Site	COMPUTED BY: Jacob Hill		CHECKED BY: Steve Clinch	
	JOB NO.: 253508.3501-F0064-4_2FS.FSRPT	DATE: 7/7/2025		DATE CHECKED: 7/10/2025	
	CLIENT: EPA Region 2			WRKSHT NO.: Alt 2	

Description: Assumptions and calculations for Alternative 2.

Shoreline

Carbon amendment, TON:	496	
Carbon Density,lb/cf:	45	*Based on density of Sedimite*
Density of Carbon,TON/CY:	0.61	
Carbon Amendment Volume, CY:	816	
Sand, LCY:	5,400	
Density of Sand (dry), TON/LCY:	1.20	
Sand,TON:	6,480	
Mixing Volume,LCY:	6,216	
Reactive Layer Placement, LCY:	6,216	

Embayment

Carbon amendment, TON:	1032	
Carbon Density,lb/cf:	45	*Based on density of Sedimite*
Density of Carbon,TON/CY:	0.61	
Carbon Amendment Volume, CY:	1698	
Sand, LCY:	11,100	
Density of Sand (dry), TON/LCY:	1.20	
Sand,TON:	13,320	
Mixing Volume,LCY:	12,798	
Reactive Layer Placement, LCY:	12,798	

Floodplains

		Assumes floodplains cap is not reactive
Sand, LCY:	2,273	
Density of Sand (dry), TON/LCY:	1.20	
Sand,TON:	2,728	
Sand Placement, LCY:	2,273	

Backfill Conformance Sampling

Total Fill Volume,LCY:	21,400
Dioxin/Furans, EA:	43
PAHs, EA:	43
Pesticides, EA:	43
TCLP Metals and mercury, EA:	43
PCBs, EA:	43
RCRA Metals, EA:	43
TPH Diesel, EA:	43
Grain Size Distribution,EA:	43
Total Organic Carbon (TOC),EA:	43
Shipping Allowance,EA:	43
Miscellaneus Supplies, EA:	43
Total Samples, EA:	43
Assumed Sample Location Productivity, EA/DY:	20
Estimated Duration of Sampling DY:	3
Crew Size,EA:	2
Field Engineer DY:	6
Field Engineer, HRs:	60
Pickup Truck,DY:	6

Temporary Water Treatment System Set up

Mob/Demob of Water Treatment System

Mob/Demob of Water Treatment System, LS:	1	
Startup Testing, DAY:	2	*Assumes 2 operators for 10 days*

Startup Testing - Influent Sampling

Influent Sampling Frequency, EA/DY:	1	*Assumed*
Influent Samples, EA:	2	*Assumes daily sampling for 10 days during startup*
Field Duplicates, EA:	1	*Assume 5% of total samples*
Total Influent Samples, EA:	3	*Assumes PCB analysis only*
Shipping, per Sample Analysis, EA:	3	
Miscellaneous Sampling Supplies, per Sample, EA:	3	

CDM Smith	PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY: Steve Clinch
	JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE:	7/7/2025	DATE CHECKED: 7/10/2025
	CLIENT:	EPA Region 2			WRKSHT NO.: Alt 2

Description: Assumptions and calculations for Alternative 2.

Startup Testing - Effluent Sampling

Effluent Sampling Frequency, EA/DY:	1	*Assumed*
Effluent Samples, EA:	2	*Assumes daily sampling for 10 days during startup*
Field Duplicates, EA:	1	*Assume 5% of total samples*
Total Effluent Samples, EA:	**3**	*Assumes PCB analysis only*
Shipping, per Sample Analysis, EA:	**3**	
Miscellaneous Sampling Supplies, per Sample, EA:	**3**	

Water Treatment Area - Pavement

Total Surface Area - Water Treatment Area, SF:	625	*Assumed*
Water Treatment Area, SY:	**69**	*Rounded up to the nearest tens*
Depth of Sub Base Course, IN:	6	*Dense graded aggregate sub base course*
Depth of Base Course, IN:	4	*Bituminous base course*
Depth of Pavement, IN:	2	*Pavement surface course*
Sub Base Course Required, ECY:	12	
Sub Base Course Required, LCY:	14	
Sub Base Course Required, TON:	**22**	
Base Course Required, CY:	8	
Base Course Required, TON:	**13**	
Pavement Required, CY:	4	
Pavement Required, TON:	**6**	

Dewatering of Stockpiles

Sump Pump, EA:	2	
Sump Pump Operating Days, DY:	**68**	
Total Sump Pumps, EA:	**2**	
Sump Pump Operating Days, DY:	**68**	
Volume of Material For Mixing, LCY:	**41,216**	
Percent by Volume of Cement,%:	**5%**	
Addition of Portland Cement, LCY:	**2,061**	
Addition of Portland Cement, Tons:	**2,705**	
amendment Mixing, LCY:	**43,277**	

Temporary Water Treatment System Operation

Full-Scale Operation of Water Treatment System

Duration of Dredging, MO:	8	
Duration of Dredging, WK:	14	
Duration of Dredging, DYs:	68	
Water Treatment System Operation/Rental, MO:	**8**	
Electrical Power Requirements, HP:	200	*Per Engineer*
Required Operation Duration per Week, HR/WK:	10	*Assumed*
Required Operation Duration per Month, HR/MO:	40	*Per Engineer*
Electricity Requirements per Month, KWH/MO:	5,966	
Total Electricity Requirements, KWH:	**47,728**	*For duration of full-scale operation*
Operator Frequency, DY/MO:	12	*Assumed*
Total Operator, DY:	**96**	
Total Operator, HR/DY:	10	
Total Operator, HR:	960	
Bag Filter Replacement, EA/DY:	1	*Assumed*
Total Bag Filter Replacement, EA:	**96**	
Activated Carbon Vessels, EA:	2	
Activated Carbon Vessel Loading, LB/EA:	4,000	
Total Activated Carbon, LB:	8,000	

CDM Smith	PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY: Steve Clinch
	JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE:	7/7/2025	DATE CHECKED: 7/10/2025
	CLIENT:	EPA Region 2			WRKSHT NO.: Alt 2

Description: Assumptions and calculations for Alternative 2.

Number of Activated Carbon Changeout, EA:	4	*Assumes changeout every other month*
Water Storage Tank, GAL:	10,000	
Water Storage Tank Rental, DY:	68	
Water Storage Tank Transportation, EA:	2	*Includes delivery and pickup*
Tank Cleaning/Decontamination, EA:	8	*Assumes 1 cleaning per month*

Effluent Sampling

Effluent Sampling Frequency, EA/WK:	1	*Assumed*
Total Effluent Samples, EA:	14	
Field Duplicates, EA:	1	*Assume 5% of total samples*
Total Effluent Samples, EA:	15	*Assumes PCB analysis only*
Shipping, per Sample Analysis, EA:	15	
Miscellaneous Sampling Supplies, per Sample, EA:	15	

Waste Characterization Sampling

Waste Characterization Sampling Frequency, LCY/EA:	1,000	*Assumed*
Total Waste Material, LCY:	43,277	*Off-Site Disposal Volume*
Waste Characterization Samples, EA:	44	
Field Duplicates, EA:	3	*Assume 5% of total samples*
TCLP Analysis, EA:	47	
Paint Filter Test,EA:	47	
Reactive Cyanide,EA:	47	
Reactive Sulfide,EA:	47	
Corrosivity,EA:	47	
Ignitability,EA:	47	
PCBs,EA:	47	
Field Engineer, HR:	16	*Assumes 20 minutes per sample.*
Pickup Truck, DY:	2	
Per Diem, DY:	2	
Shipping, per Sample Analysis, EA:	329	*7 Set of Analyses per Sample*
Miscellaneous Sampling Supplies, per Sample, EA:	47	

CDM Smith

PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY:	Steve Clinch
JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE:	7/7/2025	DATE CHECKED:	7/10/2025
CLIENT:	EPA Region 2			WRKSHT NO.:	Alt 2

Description: Assumptions and calculations for Alternative 2.

Transportation and Disposal

TSCA Waste Disposal Volume

Disposal Volume Classified as TSCA Waste, %: 0% *Assumed percentage of overall disposal volume*

	BCY	LCY	TON	
TSCA Volume :	0	0	0	
Total Mixed Cement:	-	-	0	
Total Volume:	0	0	**0**	*Rounded up to nearest ten*

Subtitle C (Hazardous) Waste Disposal Volume

Disposal Volume Classified as Subtitle C (Hazardous) Waste, %: 55% *Assumed percentage of overall disposal volume*

	BCY	LCY	TON	
Haz Waste Volume :	20,754	23,867	33,210	
Total Mixed Cement:	-	1133	1,488	
Total Volume:	20,760	25,010	**34,700**	*Rounded up to nearest ten*

Subtitle D (Non-Haz) Waste Disposal Volume

Disposal Volume Classified as Subtitle D (Non-Hazardous) Waste, %: 45% *Assumed percentage of overall disposal volume*

	BCY	LCY	TON	
Non-Haz Waste Volume (Upper Creek):	16,981	19,528	27,170	
Total Mixed Cement:	-	927	1,217	
Total Volume:	16,990	20,460	**28,390**	*Rounded up to nearest ten*

Restoration

Removal of Asphalt

Power Washing of Asphalt

Power Washing of Asphalt, SF: **9,320** *Power washing of asphalt prior to demolition*

Pavement Demolition

Pavement for Demolition, SY: **1,036**

Pavement/Aggregate for Off-Site Recycling, LCY: **377**
Pavement/Aggregate for Off-Site Recycling, TON: **605**

Removal of Gravel

Aggregate for Disposal, BCY: **169**
Aggregate for Disposal, TON: **308**

Topsoil and Seeding

Disturbed Areas,SF: **18,015**
Topsoil Depth,FT: **0.5**
Estimated area for Restoration, SF: 18,015 *Assumes half an acre*

Rough Grading, SF: **18,015**

Assumed Thickness of Topsoil, IN: 6
Placement of Topsoil, ECY: 334
Placement of Topsoil, LCY: **450** *Rounded up to nearest ten*
Placement of Topsoil, TON: 600 *Rounded up to nearest ten*

Restoration Area, SF: 18,015
Restoration Area, AC: 0.4

Seed Mix, AC: **0.4**

CDM Smith	PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY: Steve Clinch
	JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE:	7/7/2025	DATE CHECKED: 7/10/2025
	CLIENT:	EPA Region 2			WRKSHT NO.: Alt 2

Description: Assumptions and calculations for Alternative 2.

Annual O&M

Containment System Monitoring

Inspection Event Frequency, EA/YR:	2	*Assumed*
Inspection Duration, DY/EA:	1	*Assumed*
Project Engineer, DY:	2	
Project Engineer, HR:	20	
Pickup Truck, DY:	2	
Per Diem, DY:	2	
Maintenance Allowance, LS:	1	

Periodic O&M

Institutional Control Maintenance

Legal Controls

Environmental Lawyer, HR:	10	
Paralegal, HR:	20	
Admin Clerk, HR:	10	
Reproduction Costs for Institutional Controls, LS:	1	

Regulated Navigation Area (RNA) Setup

Project Manager,HR:	40	*Assumed*
Environmental Engineer,HR:	24	*Assumed*
Admin Clerk,HR:	8	*Assumed*
Buoy Replacement EA:	14	*Assumes 1 an acre*
Buoy Relacement ,HR:	2	*Assumed*
Field Technician,HR:	56	*Assumes 2 technicians*
Boat Operator,HR:	28	
Boat Mobilization Demob,EA:	2	
Boat, HR:	28	

Informational Devices- Fish Consumption Advisory

Project Manager,HR:	40	*Assumed*
Environmental Engineer,HR:	20	*Assumed*
Environmental Scientist,HR:	20	*Assumed*
Admin Clerk,HR:	10	*Assumed*
Environmental Lawyer,HR:	5	*Assumed*
Paralegal,HR:	5	*Assumed*
Signage, EA:	7	*Assumes 1 every 2 acres*
Sign Replacement,HR:	1	*Assumed*
Field Technician,HR:	14	*Assumes 2 technicians*

CDM Smith

PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY:	Steve Clinch
JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE:	7/7/2025	DATE CHECKED:	7/10/2025
CLIENT:	EPA Region 2			WRKSHT NO.:	Quantities

Description: Quantities for Alternative SED2.

Area of Disturbance

	Area (SF)
In-Channel	131,522
Shoreline	143,948
Embayment	299,520
Bridge Area	0
Floodplains	
TOTAL	574,990

Remediation Zone Total Quantities

	Remedial Technology	Area (SF)	Depth (LF)	Volume Excavated (BCY)	Overdredge (LF)	Volume Excavated (BCY)	Total Dredge Volume (BCY)
In-Channel	Dredging	131,522	1.0	4,900	0.5	2,500	7,400
Shoreline	Dredging	143,948	1.0	5,400	0.5	2,700	8,100
Embayment	Dredging	299,520	1.0	11,100	0.5	5,600	16,700
Bridge Area	Dredging	0	1.0	0	0.5	0	0
Floodplains							
TOTAL		**574,990**		**21,400**		**10,800**	**32,200**

Dredging Quantities

Wappinger Creek				
Section	Area (SF)	Depth (FT)	Volume (BCY)	Volume (LCY)
In-Channel	131,522	1.5	7,400	8,510
Shoreline	143,948	1.5	8,100	9,315
Embayment	299,520	1.5	16,700	19,205
Bridge	0	1.5	0	0
Floodplains				

Waste Quantities

	In-Channel	Shoreline	Embayment	Bridge
Volume of TSCA Waste (BCY)	0	0	0	0
Volume of TSCA Waste (LCY)	0	0	0	0
Volume of Hazardous Waste (Subtitle C) (BCY)	4,070	4,455	9,185	0
Volume of Hazardous Waste (Subtitle C) (LCY)	4,681	5,123	10,563	0
Volume of Non-Hazardous Waste (Subtitle D) (BCY)	3,330	3,645	7,515	0
Volume of Non-Hazardous Waste (Subtitle D) (LCY)	3,830	4,192	8,642	0

Disposal Volume Classified as TSCA (Hazardous) Waste, %:	0%	*Assumed percentage of overall disposal volume*
Disposal Volume Classified as Subtitle C (Hazardous) Waste, %:	55%	*Assumed percentage of overall disposal volume*
Disposal Volume Classified as Subtitle D (Non-Hazardous) Waste, %:	45%	*Assumed percentage of overall disposal volume*

Containment System Quantities

	In-Channel	Shoreline	Embayment	Bridge	TOTAL	ACRES
Area for In-Place Containment in Creek, SF:	131,522	143,948	299,520	0	574,990	13.20

	Layer	Depth (IN)	In-Channel (BCY)	Shoreline (BCY)	Embayment(BCY)	Bridge	
Sand and Sedimite	Chemical Isolation Layer (sand mixed with 2% sedimite by volume)	12	4,871	5,331	11,093	0	
	Total	**12**	**4,900**	**5,400**	**11,100**	**0**	*Rounded up to nearest hundred*

CDM Smith

PROJECT: Wappinger Creek Superfund Site
JOB NO.: 253508.3501-F0064-4_2FS.FSRPT
CLIENT: EPA Region 2
COMPUTED BY: Jacob Hill
DATE: 7/7/2025
CHECKED BY: Steve Clinch
DATE CHECKED: 7/10/2025
WRKSHT NO.: Quantities

Description: Quantities for Alternative SED2.

Quantity Summary

Alternative SED2					
	In-Channel	Shoreline	Embayment	Bridge	TOTAL
Areas					
Remediation Area (SF)	131,522	143,948	299,520	0	574,990
Area of Containment System (SF)	131,522	143,948	299,520	0	574,990
Area of Residual Cover	0	0	0	0	0
Depths					
Depth of Remediation Zone	1	1	1	1	1
Excavation					
Volume for Disposal (BCY)	7,400	8,100	16,700	0	32,200
Disposal					
TSCA Waste (BCY)	0	0	0	0	0
Subtitle C Hazardous Waste (BCY)	4,070	4,455	9,185	0	17,710
Subtitle D Non-Hazardous Waste(BCY)	3,330	3,645	7,515	0	14,490
Containment					
Volume of Material Placed for Containment System (BCY)	4,900	5,400	11,100	0	21,400

Estimated Project Duration

Major Construction Activity	Total Volume		Productivity		Estimated Duration		
					DY	WK	MO
Dredging (Shoreline and Channel)	15,500	BCY	228	BCY/DY	68	14	4
Dredging (Embayment and Bridge)	16,700	BCY	153	BCY/DY	110	14	4
Containment System Construction	21,400	ECY	467	ECY/DY	46	6	2
Site Preparation	[redacted]						1
Site Restoration							1
						Estimated Project Duration	**12**
						Construction Season, MO/YR:	**8**
						Construction Seasons, EA:	**2**

TABLE CW3-1

Alternative 3 **Cost Worksheet: CW3-1**
Capital Cost Sub-Element
Institutional Controls

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025
Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves implementation of institutional controls for the site. The following cost includes hours for legal document submission and recording. ICs are intended to prevent changes in landuse and prevent intrusive work on the site.

Cost Analysis:
Cost for Institutional Controls (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Legal Controls																
L5	Environmental Lawyer	40	HR	1.00	$242.72	$242.72	$0.00	$0.00	$0.00	$0.00	$242.72	$9,708.80	50%	9%	$15,874	FLC FLC Datacenter	
L14	Paralegal	80	HR	1.00	$91.35	$91.35	$0.00	$0.00	$0.00	$0.00	$91.35	$7,308.00	50%	9%	$11,949	FLC FLC Datacenter	
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$54.89	$54.89	$0.00	$0.00	$0.00	$0.00	$54.89	$2,195.60	50%	9%	$3,590	FLC FLC Datacenter	
M1	Institutional Controls Report Allowance	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	Per Estimator
	Regulated Navigation Area(RNA) Setup																
L12	Project Manager	40	HR	1.00	$216.33	$216.33	$0.00	$0.00	$0.00	$0.00	$216.33	$8,653.20	50%	9%	$14,148	FLC FLC Datacenter	
L4	Environmental Engineer	24	HR	1.00	$130.74	$130.74	$0.00	$0.00	$0.00	$0.00	$130.74	$3,137.76	50%	9%	$5,130	FLC FLC Datacenter	
L3	Clerks, Typist, Bookkeeper & Receptionist	8	HR	1.00	$54.89	$54.89	$0.00	$0.00	$0.00	$0.00	$54.89	$439.12	50%	9%	$718	FLC FLC Datacenter	
A69	Buoy Placement	32	HR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$274.69	$274.69	$8,790.08	15%	9%	$11,018	MII MII Assemblies	
L9	Field Technician	64	HR	1.00	$73.71	$73.71	$0.00	$0.00	$0.00	$0.00	$73.71	$4,717.44	50%	9%	$7,713	FLC FLC Datacenter	
M91	Regulatory Buoy	16	EA	1.00	$0.00	$0.00	$0.00	$0.00	$975.61	$0.00	$975.61	$15,609.76	15%	9%	$19,567	V Allowance	Go2Marine, 2025
	Informational Devices- Fish Consumption Advisory																
L12	Project Manager	40	HR	1.00	$216.33	$216.33	$0.00	$0.00	$0.00	$0.00	$216.33	$8,653.20	50%	9%	$14,148	FLC FLC Datacenter	
L4	Environmental Engineer	20	HR	1.00	$130.74	$130.74	$0.00	$0.00	$0.00	$0.00	$130.74	$2,614.80	50%	9%	$4,275	FLC FLC Datacenter	
L6	Environmental Scientist	20	HR	1.00	$110.55	$110.55	$0.00	$0.00	$0.00	$0.00	$110.55	$2,211.00	50%	9%	$3,615	FLC FLC Datacenter	
L3	Clerks, Typist, Bookkeeper & Receptionist	10	HR	1.00	$54.89	$54.89	$0.00	$0.00	$0.00	$0.00	$54.89	$548.90	50%	9%	$897	FLC FLC Datacenter	
L5	Environmental Lawyer	5	HR	1.00	$242.72	$242.72	$0.00	$0.00	$0.00	$0.00	$242.72	$1,213.60	50%	9%	$1,984	FLC FLC Datacenter	
L14	Paralegal	5	HR	1.00	$91.35	$91.35	$0.00	$0.00	$0.00	$0.00	$91.35	$456.75	50%	9%	$747	FLC FLC Datacenter	
L9	Field Technician	16	HR	1.00	$73.71	$73.71	$0.00	$0.00	$0.00	$0.00	$73.71	$1,179.36	50%	9%	$1,928	FLC FLC Datacenter	
												TOTAL UNIT COST:			$122,896		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 500%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW3-2

Alternative 3 **Cost Worksheet: CW3-2**
Capital Cost Sub-Element
Site Surveying

COST WORKSHEET

Site: Wappinger Creek Superfund Site **Prepared By:** Jacob Hill **Date:** 7/7/2025
Location: Dutchess County, New York
Phase: Focused Feasibility Study **Checked By:** Steve Clinch **Date:** 7/10/2025
Base Year: 2025

Work Statement:
This sub-element involves costs for site surveys. The following line items include costs for a Pre-Construction Survey and Post-Construction Survey of the site.

Cost Analysis:
Cost for Site Surveying (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Pre-Construction Bathymetric Survey																
A51	Bathymetric Surveying	9	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$11,963.09	$11,963.09	$101,686.27	15%	9%	$127,464	MII MII Assemblies	
M80	Bathymetric Survey Report	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$10,300.00	$10,300.00	$10,300.00	0%	0%	$10,300	A Allowance	Per Estimator
	Post-Construction Bathymetric Survey																
A51	Bathymetric Surveying	9	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$11,963.09	$11,963.09	$101,686.27	15%	9%	$127,464	MII MII Assemblies	
M80	Bathymetric Survey Report	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$10,300.00	$10,300.00	$10,300.00	0%	0%	$10,300	A Allowance	Per Estimator
												TOTAL UNIT COST:			$275,528		

	Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$275,528	$275,528

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:
FACTOR:
H&S Productivity (labor and equipment only)
Subcontractor Overhead and Profit
Prime Contractor Overhead and Profit

NOTES:
Field work will be in Level "D" PPE.
MII assembly costs include HPF adjustments.
It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 500%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll

TABLE CW3-3

Alternative 3 **Cost Worksheet:** **CW3-3**
Capital Cost Sub-Element
Site Preparation

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025
Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves site preparation including clearing and grubbing, prepping the laydown area, prepping the temporary road, and sheetpiling for the access ramp.

Cost Analysis:
Cost for Site Preparation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Clearing and Grubbing																
A1	Light Clearing (Open Areas)	2.00	AC	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,885.62	$2,885.62	$5,771.24	15%	9%	$7,234	MII MII Assemblies	
A2	Rough Site Grading	81,433	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.08	$0.08	$6,514.64	15%	9%	$8,166	MII MII Assemblies	
	Sediment Processing Area-Gravel																
A11	Gravel Placement	189	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.09	$8.09	$1,529.01	15%	9%	$1,917	MII MII Assemblies	
M26	Gravel - 1-1/2"	308	TON	1.00	$0.00	$0.00	$0.00	$0.00	$32.60	$0.00	$32.60	$10,040.80	15%	9%	$12,586	V Vendor Quote	
A33	Earth Stripping and Stockpiling	330	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.40	$2.40	$792.00	15%	9%	$993	MII MII Assemblies	
	Sediment Processing Area-Pavement																
A70	Asphalt Paving 4" Base Course	970	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.61	$2.61	$2,531.70	15%	9%	$3,173	MII MII Assemblies	
M92	Binder Course 4"	175	TON	1.00	$0.00	$0.00	$0.00	$0.00	$88.00	$0.00	$88.00	$15,412.22	15%	9%	$19,319	V CostWorks	
A71	Asphalt Paving 2" Surface Course	970	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.83	$1.83	$1,775.10	15%	9%	$2,225	MII MII Assemblies	
M93	Wearing Course 2"	80	TON	1.00	$0.00	$0.00	$0.00	$0.00	$87.00	$0.00	$87.00	$6,985.62	15%	9%	$8,756	V CostWorks	
A72	Aggregate Sub Base Placement	970	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5.39	$5.39	$5,228.30	15%	9%	$6,554	MII MII Assemblies	
M26	Gravel - 1-1/2"	309	TON	1.00	$0.00	$0.00	$0.00	$0.00	$32.60	$0.00	$32.60	$10,075.64	15%	9%	$12,630	V Vendor Quote	
	Sheet Piling																
A22	Sheet Piling Installation and Salvage	6,000	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$30.26	$30.26	$181,560.00	15%	9%	$227,585	MII MII Assemblies	
A11	Gravel Placement	107	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.09	$8.09	$861.78	15%	9%	$1,080	MII MII Assemblies	
M26	Gravel - 1-1/2"	173	TON	1.00	$0.00	$0.00	$0.00	$0.00	$32.60	$0.00	$32.60	$5,643.13	15%	9%	$7,074	V Vendor Quote	
												TOTAL UNIT COST:			$319,292		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$319,292	$319,292

The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist: **NOTES:**

FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 500%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW3-4

Alternative 3 **Cost Worksheet: CW3-4**
Capital Cost Sub-Element
Erosion Control Measures

COST WORKSHEET

Site: Wappinger Creek Superfund Site **Prepared By:** Jacob Hill **Date:** 7/7/2025
Location: Dutchess County, New York
Phase: Focused Feasibility Study **Checked By:** Steve Clinch **Date:** 7/10/2025
Base Year: 2025

Work Statement:
This sub-element involves erosion control measures for the site. The following line items include costs for materials, installation, and maintenance of silt fencing and turbidity curtains are included.

Cost Analysis:
Cost for Erosion Control Measures (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Erosion Control Measures																
M22	Silt Fence	2,400	LF	1.00	$0.00	$0.00	$0.00	$0.00	$2.05	$0.00	$2.05	$4,920.00	15%	9%	$6,167	CW CostWorks	Source: 31 25 1416 1000
A3	Silt Fence Installatior	2,400	LF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4.10	$4.10	$9,840.00	15%	9%	$12,334	MII MII Assemblies	
A24	Erosion Control Maintenance Crew	244	HR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$240.21	$240.21	$58,611.24	15%	9%	$73,469	MII MII Assemblies	
	Turbidity Curtains																
A48	Turbidity Curtain Instal	2,000	LF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$18.69	$18.69	$37,380.00	15%	9%	$46,856	MII MII Assemblies	
M76	DOT Type 2 Turbidity Curtain	20	EA	1.00	$0.00	$0.00	$0.00	$0.00	$1,372.42	$0.00	$1,372.42	$27,448.40	15%	9%	$34,407	V Vendor Quote	Paramount Materials 2023
M77	Turbidity Curtain Anchor Ki	40	EA	1.00	$0.00	$0.00	$0.00	$0.00	$503.20	$0.00	$503.20	$20,128.00	15%	9%	$25,230	V Vendor Quote	Paramount Materials 2023
A49	Turbidity Curtain Maintenance	122	HR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$350.30	$350.30	$42,736.60	15%	9%	$53,570	MII MII Assemblies	
A50	Turbidity Curtain Remova	2,000	LF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$9.34	$9.34	$18,680.00	15%	9%	$23,415	MII MII Assemblies	
												TOTAL UNIT COST:			$275,448		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$275,448	$275,448

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 500%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW3-5

Alternative 3 **Cost Worksheet:** **CW3-5**

Capital Cost Sub-Element

Dredging for Off-Site Disposal

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025

Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves dredging and the transfer of waste to the soil stockpile areas for dewatering. Contaminated materials will be excavated and consolidated onsite.

Cost Analysis:
Cost for Excavation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	In-Channel																
A52	Dredging	9,306	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$61.32	$61.32	$570,643.92	15%	9%	$715,302	MII MII Assemblies	
A55	Scow Transport	8	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$835.45	$835.45	$6,683.60	15%	9%	$8,378	MII MII Assemblies	
	Shore-Line																
A52	Dredging	13,535	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$61.32	$61.32	$829,966.20	15%	9%	$1,040,363	MII MII Assemblies	
A55	Scow Transport	11	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$835.45	$835.45	$9,189.95	15%	9%	$11,520	MII MII Assemblies	
	Embayment																
A67	Embayment Dredging	20,716	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$20.11	$20.11	$416,598.76	15%	9%	$522,207	MII MII Assemblies	
A55	Scow Transport	16	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$835.45	$835.45	$13,367.20	15%	9%	$16,756	MII MII Assemblies	
	Other Confined Dredging Areas																
A68	Other Dredging	997	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$30.08	$30.08	$29,989.76	15%	9%	$37,592	MII MII Assemblies	
A56	Offloading- Barge	1,147	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7.14	$7.14	$8,188.86	15%	9%	$10,265	MII MII Assemblies	
A55	Scow Transport	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$835.45	$835.45	$835.45	15%	9%	$1,047	MII MII Assemblies	
	Floodplain Soils																
A15	Excavation	1,894	BCY	3.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.09	$3.09	$5,853.83	15%	9%	$7,338	MII MII Assemblies	
A75	Loading Material	2,273	LCY	4.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.68	$0.68	$1,545.87	15%	9%	$1,938	MII MII Assemblies	
A76	Onsite Hauling	2,273	LCY	5.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4.65	$4.65	$10,571.00	15%	9%	$13,251	MII MII Assemblies	
	Offloading																
A56	Offloading- Barge	51,237	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7.14	$7.14	$365,830.39	15%	9%	$458,568	MII MII Assemblies	
S71	Spud Barge 1 to 90 days	90	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$933.00	$933.00	$83,970.00	15%	9%	$105,256	V Vendor Quote	FlexiFloat 2025
S72	Spud Barge 91 to 180 days	60	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$699.75	$699.75	$41,985.00	15%	9%	$52,628	V Vendor Quote	FlexiFloat 2025
S73	Spud Barge Mob/Demob	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$56,000.00	$56,000.00	$112,000.00	15%	9%	$140,392	V Vendor Quote	FlexiFloat 2025,Spud Barge Freight
S76	Material Barge 91 to 180 days	60	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$444.00	$444.00	$26,640.00	15%	9%	$33,393	V Vendor Quote	FlexiFloat 2025
	Cultural Resources Oversight																
L22	Archeologist	80	HR	1.00	$85.25	$85.25	$0.00	$0.00	$0.00	$0.00	$85.25	$6,820.00	50%	9%	$11,151	FLC FLC Datacenter	
M21	Per Diem	8	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$115.00	$115.00	$920.00	0%	0%	$920	GSA gsa.gov	gsa.gov local per diem rates
M20	Pick up Truck	8	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$263.00	$263.00	$2,104.00	15%	9%	$2,637	CW CostWorks	Source: 01 54 3340 7200
												TOTAL UNIT COST:			$3,347,940		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	46,448	BCY	$3,347,940	$72

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "D" PPE.
Escalation to Base Year	MII assembly costs include HPF adjustments.
Area Cost Factor (AF)	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Subcontractor Overhead and Profit	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 500%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW3-6

Alternative 3 **Cost Worksheet:** **CW3-6**

Capital Cost Sub-Element

Confirmation Sampling

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025

Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves confirmation sampling of dredged areas.

Cost Analysis:
Cost for Waste Characterization Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Confirmation Sampling																
S18	TAL Metals Analysis (soil media)	78	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$154.76	$154.76	$12,071.28	15%	9%	$15,131	V Vendor Quote	MSA Lab Pricing, 2025
S5	PCB Analysis (soil media)	78	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$173.33	$173.33	$13,519.74	15%	9%	$16,947	V Vendor Quote	MSA Lab Pricing, 2025
S16	Mercury Analysis (soil media)	78	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$27.24	$27.24	$2,124.72	15%	9%	$2,663	V Vendor Quote	MSA Lab Pricing, 2025
S12	Dioxins/Furans (soil media)	78	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$441.53	$441.53	$34,439.34	15%	9%	$43,170	V Vendor Quote	MSA Lab Pricing, 2025
S29	SVOCs	78	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$160.95	$160.95	$12,554.10	15%	9%	$15,737	V Vendor Quote	MSA Lab Pricing, 2025
S21	Pesticides	78	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$149.01	$149.01	$11,622.78	15%	9%	$14,569	V Vendor Quote	MSA Lab Pricing, 2025
L15	Senior Scientist	64	HR	1.00	$133.15	$133.15	$0.00	$0.00	$0.00	$0.00	$133.15	$8,521.60	50%	9%	$13,933	FLC FLC Datacenter	
L16	Staff Scientist	64	HR	1.00	$87.94	$87.94	$0.00	$0.00	$0.00	$0.00	$87.94	$5,628.16	50%	9%	$9,202	FLC FLC Datacenter	
M20	Pick up Truck	7	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$263.00	$263.00	$1,841.00	15%	9%	$2,308	CW CostWorks	Source: 01 54 3340 7200
M21	Per Diem	13	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$115.00	$115.00	$1,495.00	0%	0%	$1,495	GSA gsa.gov	gsa.gov local per diem rates
M35	Sample Shipping per Analysis	468	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.50	$13.50	$6,318.00	0%	0%	$6,318	A Allowance	Per Estimator
M36	Sample Supplies per Analysis	468	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.24	$3.24	$1,516.32	0%	0%	$1,516	A Allowance	Per Estimator
	IDW Handling																
S77	Rental Fee for Solid Waste Disposal Container	16	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$18.30	$18.30	$292.80	15%	9%	$367	A Allowance	Per Estimator
S78	Hauling for Disposal	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$566.95	$566.95	$1,133.90	15%	9%	$1,421	A Allowance	Per Estimator
S79	IDW Disposal	1	TON	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$209.62	$209.62	$167.70	15%	9%	$210	A Allowance	Per Estimator
S80	Water Disposal Fee	78	GAL	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.47	$1.47	$114.66	15%	9%	$144	A Allowance	Per Estimator
S81	55-gallon drum	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$178.00	$178.00	$356.00	15%	9%	$446	A Allowance	Per Estimator
												TOTAL UNIT COST:			$148,340		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	78	EA	$148,340	$1,902

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 500%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW3-7

Alternative 3 **Cost Worksheet:** **CW3-7**
Capital Cost Sub-Element
Containment- Reactive/Engineered Cap

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025
Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves placement of the reactive cap.

Cost Analysis:
Cost for Excavation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	In-Channel																
A54	Placement	9,218	CY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$24.45	$24.45	$225,375.64	15%	9%	$282,508	MII MII Assemblies	
M70	Sand	9,600	TON	1.00	$0.00	$0.00	$0.00	$0.00	$20.00	$0.00	$20.00	$192,000.00	0%	0%	$192,000	V Vendor Quote	Peckham 2025
M89	Carbon Amendment	740	TON	1.00	$0.00	$0.00	$0.00	$0.00	$4,409.00	$0.00	$4,409.00	$3,261,885.34	15%	9%	$4,088,773	V Vendor Quote	Sedimite.com 2025, Assumed sedimite amendment
A43	Amendment Mixing	9,218	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.40	$2.40	$22,122.76	15%	9%	$27,731	MII MII Assemblies	
	Shore																
A54	Placement	12,796	CY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$24.45	$24.45	$312,851.07	15%	9%	$392,159	MII MII Assemblies	
M70	Sand	13,320	TON	1.00	$0.00	$0.00	$0.00	$0.00	$20.00	$0.00	$20.00	$266,400.00	0%	0%	$266,400	V Vendor Quote	Peckham 2025
M89	Carbon Amendment	1,030	TON	1.00	$0.00	$0.00	$0.00	$0.00	$4,409.00	$0.00	$4,409.00	$4,541,461.99	15%	9%	$5,692,723	V Vendor Quote	Sedimite.com 2025, Assumed sedimite amendment
A43	Amendment Mixing	12,796	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.40	$2.40	$30,709.31	15%	9%	$38,494	MII MII Assemblies	
	Embayment																
A54	Placement	13,832	CY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$24.45	$24.45	$338,185.95	15%	9%	$423,916	MII MII Assemblies	
M70	Sand	14,400	TON	1.00	$0.00	$0.00	$0.00	$0.00	$20.00	$0.00	$20.00	$288,000.00	0%	0%	$288,000	V Vendor Quote	Peckham 2025
M89	Carbon Amendment	1,113	TON	1.00	$0.00	$0.00	$0.00	$0.00	$4,409.00	$0.00	$4,409.00	$4,906,246.09	15%	9%	$6,149,979	V Vendor Quote	Sedimite.com 2025, Assumed sedimite amendment
A43	Amendment Mixing	13,832	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.40	$2.40	$33,196.17	15%	9%	$41,611	MII MII Assemblies	
	Bridge Area																
A54	Placement	1,153	CY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$24.45	$24.45	$28,182.87	15%	9%	$35,327	MII MII Assemblies	
M70	Sand	1,200	TON	1.00	$0.00	$0.00	$0.00	$0.00	$20.00	$0.00	$20.00	$24,000.00	0%	0%	$24,000	V Vendor Quote	Peckham 2025
M89	Carbon Amendment	93	TON	1.00	$0.00	$0.00	$0.00	$0.00	$4,409.00	$0.00	$4,409.00	$408,931.42	15%	9%	$512,596	V Vendor Quote	Sedimite.com 2025, Assumed sedimite amendment
	Floodplain Soils																
A77	Backfill/Compaction	2,273	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5.06	$5.06	$11,503.07	15%	9%	$14,419	MII MII Assemblies	
M37	Common Borrow Fill	2,728	TON	1.00	$0.00	$0.00	$0.00	$0.00	$35.47	$0.00	$35.47	$96,762.16	15%	8%	$120,179	V Vendor Quote	Source: 31 05 1310 0200

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	15.44	ACR	$18,594,283	$1,203,951

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist: **NOTES:**

FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 500%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW3-8

Alternative 3 **Cost Worksheet: CW3-8**
Capital Cost Sub-Element
Backfill Conformance Sampling

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025
Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves backfill conformance sampling of imported materials.

Cost Analysis:
Cost for Waste Characterization Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Waste Characterization Sampling																
S12	Dioxins/Furans (soil media)	65	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$441.53	$441.53	$28,699.45	15%	9%	$35,975	V Vendor Quote	MSA Lab Pricing, 2025
S20	PAHs	65	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$93.82	$93.82	$6,098.30	15%	9%	$7,644	V Vendor Quote	MSA Lab Pricing, 2025
S21	Pesticides	65	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$149.01	$149.01	$9,685.65	15%	9%	$12,141	V Vendor Quote	MSA Lab Pricing, 2025
S26	TCLP Full Analytical Suite	65	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$866.64	$866.64	$56,331.60	15%	9%	$70,612	V Vendor Quote	MSA Lab Pricing, 2025
S16	Mercury Analysis (soil media)	65	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$27.24	$27.24	$1,770.60	15%	9%	$2,219	V Vendor Quote	MSA Lab Pricing, 2025
S5	PCB Analysis (soil media)	65	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$173.33	$173.33	$11,266.45	15%	9%	$14,122	V Vendor Quote	MSA Lab Pricing, 2025
S25	TPH-Diesel	65	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$74.28	$74.28	$4,828.20	15%	9%	$6,052	V Vendor Quote	MSA Lab Pricing, 2025
S18	TAL Metals Analysis (soil media)	65	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$154.76	$154.76	$10,059.40	15%	9%	$12,609	V Vendor Quote	MSA Lab Pricing, 2025
S27	Grain Size Distribution	65	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$173.33	$173.33	$11,266.45	15%	9%	$14,122	V Vendor Quote	MSA Lab Pricing, 2025
S28	Total Organic Carbon	65	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$55.71	$55.71	$3,621.15	15%	9%	$4,539	V Vendor Quote	MSA Lab Pricing, 2025
L7	Field Engineer	80	HR	1.00	$72.87	$72.87	$0.00	$0.00	$0.00	$0.00	$72.87	$5,829.60	50%	9%	$9,531	FLC FLC Datacenter	
M20	Pick up Truck	8	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$263.00	$263.00	$2,104.00	15%	9%	$2,637	CW CostWorks	Source: 01 54 3340 7200
M21	Per Diem	8	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$115.00	$115.00	$920.00	0%	0%	$920	GSA gsa.gov	gsa.gov local per diem rates
M35	Sample Shipping per Analysis	65	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.50	$13.50	$877.50	0%	0%	$878	A Allowance	Per Estimator
M36	Sample Supplies per Analysis	65	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.24	$3.24	$210.60	0%	0%	$211	A Allowance	Per Estimator
												TOTAL UNIT COST:			$194,212		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	65	EA	$194,212	$2,988

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist: **NOTES:**

FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 500%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW3-9

Alternative 3 **Cost Worksheet: CW3-9**

Capital Cost Sub-Element

Temporary Water Treatment Set Up

COST WORKSHEET

Site:	Wappinger Creek Superfund Site
Location:	Dutchess County, New York
Phase:	Focused Feasibility Study
Base Year:	2025

Prepared By: Jacob Hill **Date:** 7/7/2025

Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:

This sub-element involves set up of a temporary water treatment system. Water collected from dewatering operations will be piped to a temporary water treatment system onsite. The treatment system will operate on top of a gravel surface and within a containment barrier. Dewatered liquids from the soil stockpiles and excavations will be pumped to the water treatment system and treated. Effluent will be discharged into Wappinger Creek.

Cost Analysis:

Cost for Temporary Water Treatment Set Up (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION		COMMENTS
	Mob/Demob of Water Treatment System																	
S32	Mobilization Water Treatment System	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$37,510.00	$37,510.00	$37,510.00	15%	9%	$47,019	V	Vendor Quote	Ground Water Treatment & Technology, LLC, 2021. Includes start up testing.
S33	Demobilization Water Treatment System	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$19,965.00	$19,965.00	$19,965.00	15%	9%	$25,026	V	Vendor Quote	Ground Water Treatment & Technology, LLC, 2021
S35	Water Treatment System - Start up Testing	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,288.00	$2,288.00	$4,576.00	15%	9%	$5,736	V	Vendor Quote	Ground Water Treatment & Technology, LLC, 2017
M60	Sump Pump - 4" Dia	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$7,750.75	$0.00	$7,750.75	$15,501.50	15%	9%	$19,431	CW	CostWorks	Source: 22 14 2913 2060
S53	Water Storage Tank (10,000 GAL) Transportation	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$541.06	$541.06	$1,082.12	15%	9%	$1,356	V	Vendor Quote	Ironclad Environmental Solutions 2024
S37	Tank Cleaning	9	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,183.00	$2,183.00	$19,647.00	15%	9%	$24,628	V	Vendor Quote	Previous Work, 2015
	Startup Testing - Influent Sampling																	
S17	Mercury Analysis (aqueous media)	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$27.24	$27.24	$81.72	15%	9%	$102	V	Vendor Quote	MSA Lab Pricing, 2025
M35	Sample Shipping per Analysis	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.50	$13.50	$40.50	0%	0%	$41	A	Allowance	Per Estimator
M36	Sample Supplies per Analysis	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.24	$3.24	$9.72	0%	0%	$10	A	Allowance	Per Estimator
	Startup Testing - Effluent Sampling																	
S17	Mercury Analysis (aqueous media)	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$27.24	$27.24	$81.72	15%	9%	$102	V	Vendor Quote	MSA Lab Pricing, 2025
M35	Sample Shipping per Analysis	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.50	$13.50	$40.50	0%	0%	$41	A	Allowance	Per Estimator
M36	Sample Supplies per Analysis	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.24	$3.24	$9.72	0%	0%	$10	A	Allowance	Per Estimator
	Treatment Area - Pavement																	
A70	Asphalt Paving 4" Base Course	69	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.61	$2.61	$181.25	15%	9%	$227	MII	MII Assemblies	
M92	Binder Course 4"	13	TON	1.00	$0.00	$0.00	$0.00	$0.00	$88.00	$0.00	$88.00	$1,103.40	15%	9%	$1,383	V	CostWorks	Source: 32 12 1613 0813
A71	Asphalt Paving 2" Surface Course	69	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.83	$1.83	$127.08	15%	9%	$159	MII	MII Assemblies	
A72	Aggregate Sub Base Placement	69	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5.39	$5.39	$374.31	15%	9%	$469	MII	MII Assemblies	
M26	Gravel - 1-1/2"	22	TON	1.00	$0.00	$0.00	$0.00	$0.00	$32.60	$0.00	$32.60	$721.34	15%	9%	$904	V	Vendor Quote	Peckham 2025
												TOTAL UNIT COST:			$127,271			
									COST WORKSHEET SUMMARY			1	LS		$127,271		$127,271	

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001

The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:

NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:

MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 500%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW3-11

Alternative 3 **Cost Worksheet: CW3-11**
Capital Cost Sub-Element
Waste Characterization Sampling

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025
Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves waste characterization sampling for off-site disposal.

Cost Analysis:
Cost for Waste Characterization Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Waste Characterization Sampling																
S26	TCLP Full Analytical Suite	57	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$866.64	$866.64	$49,398.48	15%	9%	$61,921	V Vendor Quote	MSA Lab Pricing, 2025
S9	Paint Filter Test	57	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$27.24	$27.24	$1,552.68	15%	9%	$1,946	V Vendor Quote	MSA Lab Pricing, 2025
S2	Reactivity-Cyanide	57	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$30.95	$30.95	$1,764.15	15%	9%	$2,211	V Vendor Quote	MSA Lab Pricing, 2025
S3	Reactivity-Sulfide	57	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$49.52	$49.52	$2,822.64	15%	9%	$3,538	V Vendor Quote	MSA Lab Pricing, 2025
S1	Corrosivity	57	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$18.57	$18.57	$1,058.49	15%	9%	$1,327	V Vendor Quote	MSA Lab Pricing, 2025
S19	Ignitability	57	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$49.52	$49.52	$2,822.64	15%	9%	$3,538	V Vendor Quote	MSA Lab Pricing, 2025
S5	PCB Analysis (soil media)	57	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$173.33	$173.33	$9,879.81	15%	9%	$12,384	V Vendor Quote	MSA Lab Pricing, 2025
L7	Field Engineer	19	HR	1.00	$72.87	$72.87	$0.00	$0.00	$0.00	$0.00	$72.87	$1,384.53	50%	9%	$2,264	FLC FLC Datacenter	
M20	Pick up Truck	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$263.00	$263.00	$526.00	15%	9%	$659	CW CostWorks	Source: 01 54 3340 7200
M21	Per Diem	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$115.00	$115.00	$230.00	0%	0%	$230	GSA gsa.gov	gsa.gov local per diem rates
M35	Sample Shipping per Analysis	399	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.50	$13.50	$5,386.50	0%	0%	$5,387	A Allowance	Per Estimator
M36	Sample Supplies per Analysis	57	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.24	$3.24	$184.68	0%	0%	$185	A Allowance	Per Estimator
												TOTAL UNIT COST:			$95,590		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	57	EA	$95,590	$1,677

Notes:
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 500%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW3-10

Alternative 3 **Cost Worksheet:** **CW3-10**

Capital Cost Sub-Element

Temporary Water Treatment System Operation

COST WORKSHEET

Site:	Wappinger Creek Superfund Site	**Prepared By:** Jacob Hill	**Date:** 7/7/2025
Location:	Dutchess County, New York		
Phase:	Focused Feasibility Study	**Checked By:** Steve Clinch	**Date:** 7/10/2025
Base Year:	2025		

Work Statement:

This sub-element involves water treatment system operation. The treatment system will operate at full scale during excavation activities.

Cost Analysis:

Cost for Temporary Water Treatment System Operation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Full Scale Operation																
S34	Water Treatment System Rental	9	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,238.50	$2,238.50	$20,146.50	15%	9%	$25,254	V Vendor Quote	Ground Water Treatment & Technology, LLC, 2021
S36	Electricity Cost	53,694	KWH	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.14	$0.14	$7,567.63	15%	9%	$9,486	V Vendor Quote	US Energy Information Administration, 2022.
S11	Operator for Water Treatment System	108	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,287.00	$1,287.00	$138,996.00	15%	9%	$174,231	V Vendor Quote	Ground Water Treatment & Technology, LLC, 2017
S51	Bag Filter Replacement	108	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$6.05	$6.05	$653.40	15%	9%	$819	V Vendor Quote	Ground Water Treatment & Technology, LLC, 2022
S54	Water Treatment System - Activated Carbon Changeout	5	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$41,040.00	$41,040.00	$184,680.00	15%	9%	$231,496	V Vendor Quote	Ground Water Treatment & Technology, LLC, 2022. Includes onsite removal and refill of two - 4000lb vessels.
S52	Water Storage Tank (10,000 GAL) Rental	101	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$36.57	$36.57	$3,693.07	15%	9%	$4,629	V Vendor Quote	Ironclad Environmental Solutions 2024
	Effluent Sampling																
S17	Mercury Analysis (aqueous media)	23	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$27.24	$27.24	$626.52	15%	9%	$785	V Vendor Quote	MSA Lab Pricing, 2025
M35	Sample Shipping per Analysis	23	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.50	$13.50	$310.50	0%	0%	$311	A Allowance	Per Estimator
M36	Sample Supplies per Analysis	23	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.24	$3.24	$74.52	0%	0%	$75	A Allowance	Per Estimator
	Dewatering																
A66	Sump Pump Operation	101	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$300.38	$300.38	$30,338.38	15%	9%	$38,029	MII MII Assemblies	
A43	Amendment Mixing	53,799	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.40	$2.40	$129,116.61	15%	9%	$161,848	MII MII Assemblies	
M75	Portland Cement	3,362	TON	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$199.82	$199.82	$671,877.09	15%	9%	$842,198	V CostWorks	Cost Works 03 05 1330 0010
												TOTAL UNIT COST:			$1,489,161		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	9	MO	$1,489,161	$165,462

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001

The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:

NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:

MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 500%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW3-12

Alternative 3 **Cost Worksheet: CW3-12**

Capital Cost Sub-Element

Off-Site Transportation and Disposal

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025

Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves costs for off-site disposal, including transportation.

Cost Analysis:
Cost for Off-Site Transportation and Disposal (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Off-Site Transportation and Disposal																
S23	Non-Hazardous Waste Disposal	34,960	TON	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$265.00	$265.00	$9,264,400.00	2%	0%	$9,449,688	V Vendor Quote	Republic Services 2025
S24	Hazardous Waste Disposal	42,720	TON	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$455.00	$455.00	$19,437,600.00	2%	0%	$19,826,352	V Vendor Quote	Republic Services 2025
												TOTAL UNIT COST:			$29,276,040		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	77,680	TON	$29,276,040	$377

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist: **NOTES:**

FACTOR:	Field work will be in Level "D" PPE.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW3-13

Alternative 3 **Cost Worksheet:** **CW3-13**

Capital Cost Sub-Element

Restoration of Laydown Area

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025

Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves costs for restoration.

Cost Analysis:
Cost for Restoration (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Asphalt Removal																
A73	Power Washing of Surfaces	9,320	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.12	$0.12	$1,118.40	15%	9%	$1,402	MII MII Assemblies	
A74	Asphalt Demolition	1,036	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$11.81	$11.81	$12,229.91	15%	9%	$15,330	MII MII Assemblies	
S23	Non-Hazardous Waste Disposal	605	TON	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$265.00	$265.00	$160,302.71	2%	0%	$163,509	V Vendor Quote	Republic Services 2025
	Gravel Removal																
A15	Excavation	169	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.09	$3.09	$521.44	15%	9%	$654	MII MII Assemblies	
S23	Non-Hazardous Waste Disposal	308	TON	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$265.00	$265.00	$81,620.00	2%	0%	$83,252	V Vendor Quote	Republic Services 2025
	Topsoil and Seeding																
A2	Rough Site Grading	18,015	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.08	$0.08	$1,441.20	15%	9%	$1,807	MII MII Assemblies	
A19	Top Soil Placement	450	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.11	$2.11	$949.50	15%	9%	$1,190	MII MII Assemblies	
M31	Screened Topsoil	450	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$37.50	$0.00	$37.50	$16,875.00	15%	9%	$21,153	V CostWorks	Costworks 31 05 1310 0700
A9	Seeding	0.4	AC	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,227.67	$1,227.67	$507.72	15%	9%	$636	MII MII Assemblies	
M30	Lawn Seed	0.4	AC	1.00	$0.00	$0.00	$0.00	$0.00	$1,125.00	$0.00	$1,125.00	$465.26	15%	9%	$583	V CostWorks	Costworks 32 92 1913 1900
												TOTAL UNIT COST:			$289,516		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$289,516	$289,516

Notes:
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 500%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW3-14

Alternative 3 **Cost Worksheet:** **CW3-14**

Capital Cost Sub-Element

Containment System Monitoring

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025

Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves monitoring and maintenance of the containment system areas.

Cost Analysis:
Cost for Containment System Monitoring (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L19	Project Engineer	20	HR	1.00	$155.95	$155.95	$0.00	$0.00	$0.00	$0.00	$155.95	$3,119.00	50%	9%	$5,100	FLC FLC Datacenter	
M20	Pick up Truck	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$263.00	$263.00	$526.00	15%	9%	$659	CW CostWorks	Source: 01 54 3340 7200
M21	Per Diem	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$115.00	$115.00	$230.00	0%	0%	$230	GSA gsa.gov	gsa.gov local per diem rates
M78	Containment System Maintenance Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$50,000.00	$50,000.00	$50,000.00	0%	0%	$50,000	A Allowance	Per Estimator
														TOTAL UNIT COST:		$55,989	

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$55,989	$55,989

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:
H&S Productivity (labor and equipment only)
Escalation to Base Year
Area Cost Factor (AF)

NOTES:
MII assembly costs include HPF adjustments.
2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW3-15

Alternative 3 **Cost Worksheet: CW3-15**
Periodic Cost Sub-Element
Institutional Control Maintenance

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025
Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves maintenance of institutional controls for the site.

Cost Analysis:
Cost for Institutional Controls (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Legal Controls																
L5	Environmental Lawyer	10	HR	1.00	$242.72	$242.72	$0.00	$0.00	$0.00	$0.00	$242.72	$2,427.20	50%	9%	$3,968	FLC FLC Datacenter	
L14	Paralegal	20	HR	1.00	$91.35	$91.35	$0.00	$0.00	$0.00	$0.00	$91.35	$1,827.00	50%	9%	$2,987	FLC FLC Datacenter	
L3	Clerks, Typist, Bookkeeper & Receptionist	10	HR	1.00	$54.89	$54.89	$0.00	$0.00	$0.00	$0.00	$54.89	$548.90	50%	9%	$897	FLC FLC Datacenter	
M1	Institutional Controls Report Allowance	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	Per Estimator
	Regulated Navigation Area (RNA) Setup																
L12	Project Manager	40	HR	1.00	$216.33	$216.33	$0.00	$0.00	$0.00	$0.00	$216.33	$8,653.20	50%	9%	$14,148	FLC FLC Datacenter	
L4	Environmental Engineer	24	HR	1.00	$130.74	$130.74	$0.00	$0.00	$0.00	$0.00	$130.74	$3,137.76	50%	9%	$5,130	FLC FLC Datacenter	
L3	Clerks, Typist, Bookkeeper & Receptionist	8	HR	1.00	$54.89	$54.89	$0.00	$0.00	$0.00	$0.00	$54.89	$439.12	50%	9%	$718	FLC FLC Datacenter	
A69	Buoy Placement	32	HR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$274.69	$274.69	$8,790.08	15%	9%	$11,018	MII MII Assemblies	
L9	Field Technician	64	HR	1.00	$73.71	$73.71	$0.00	$0.00	$0.00	$0.00	$73.71	$4,717.44	50%	9%	$7,713	FLC FLC Datacenter	
M91	Regulatory Buoy	16	EA	1.00	$0.00	$0.00	$0.00	$0.00	$975.61	$0.00	$975.61	$15,609.76	15%	9%	$19,567	V Allowance	Go2Marine, 2025
	Informational Devices-Fish Consumption Advisory																
L12	Project Manager	40	HR	1.00	$216.33	$216.33	$0.00	$0.00	$0.00	$0.00	$216.33	$8,653.20	50%	9%	$14,148	FLC FLC Datacenter	
L4	Environmental Engineer	20	HR	1.00	$130.74	$130.74	$0.00	$0.00	$0.00	$0.00	$130.74	$2,614.80	50%	9%	$4,275	FLC FLC Datacenter	
L6	Environmental Scientist	20	HR	1.00	$110.55	$110.55	$0.00	$0.00	$0.00	$0.00	$110.55	$2,211.00	50%	9%	$3,615	FLC FLC Datacenter	
L3	Clerks, Typist, Bookkeeper & Receptionist	10	HR	1.00	$54.89	$54.89	$0.00	$0.00	$0.00	$0.00	$54.89	$548.90	50%	9%	$897	FLC FLC Datacenter	
L5	Environmental Lawyer	5	HR	1.00	$242.72	$242.72	$0.00	$0.00	$0.00	$0.00	$242.72	$1,213.60	50%	9%	$1,984	FLC FLC Datacenter	
L14	Paralegal	5	HR	1.00	$91.35	$91.35	$0.00	$0.00	$0.00	$0.00	$91.35	$456.75	50%	9%	$747	FLC FLC Datacenter	
L9	Field Technician	16	HR	1.00	$73.71	$73.71	$0.00	$0.00	$0.00	$0.00	$73.71	$1,179.36	50%	9%	$1,928	FLC FLC Datacenter	
														TOTAL UNIT COST:	$99,335		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
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Cost Adjustment Checklist:

FACTOR:	**NOTES:**
H&S Productivity (labor and equipment only)	Field work will be in Level "D" PPE.
Escalation to Base Year	MII assembly costs include HPF adjustments.
Area Cost Factor (AF)	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Subcontractor Overhead and Profit	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 500%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

CDM Smith	PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY: Steve Clinch
	JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE:	7/7/2025	DATE CHECKED: 7/10/2025
	CLIENT:	EPA Region 2			WRKSHT NO.: Alt 3

Description: Assumptions and calculations for Alternative 3.

Alternative 3

Capital Costs

Project Schedule

Number of Months for Project Duration, MO:	**16**	*assumes 1 additional month before and after construction duration for prep/closeout.*
Estimated duration of Project, WK:	69	
Number of Months for Construction, MO:	**14**	
Estimated duration of construction project, WK:	61	
Calendar days, DY:	427	
Total Number of Work Days, DY:	305	*Work days (based on 5 days per week)*

Institutional Controls

Legal Controls

Environmental Lawyer, HR:	**40**	
Paralegal, HR:	**80**	
Admin Clerk, HR:	**40**	
Reproduction Costs for Institutional Controls, LS:	**1**	

Regulated Navigation Area (RNA) Setup

Project Manager,HR:	**40**	*Assumed*
Environmental Engineer,HR:	**24**	*Assumed*
Admin Clerk,HR:	**8**	*Assumed*
Buoy Placement EA:	**16**	*Assumes 1 an acre*
Buoy Placement ,HR:	**2**	*Assumed per buoy*
Field Technician,HR:	**64**	*Assumes 2 technicians*
Boat Operator,HR:	**32**	
Boat, HR:	**32**	

Informational Devices- Fish Consumption Advisory

Environmental Scientist,HR:	**20**	*Assumed*
Admin Clerk,HR:	**10**	*Assumed*
Environmental Lawyer,HR:	**5**	*Assumed*
Paralegal,HR:	**5**	*Assumed*
Signage, EA:	**8**	*Assumes 1 every 2 acres*
Sign Placement,HR:	**1**	*Assumed*
Field Technician,HR:	**16**	*Assumes 2 technicians*

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Description: Assumptions and calculations for Alternative 3.

Site Surveying

Pre-Construction Bathymetric Survey

Total Area of Disturbance, SF:	672,757	
Extra Survey Area, %:	10%	
Total Survey Area, SF:	740,033	
Site Area, AC:	17.0	
Acres Surveyed,DY	2	*assumed*
Bathymetric Survey, DY:	9	
Bathymetric Surveying Report, EA:	1	

Post-Construction Bathymetric Survey

Total Area of Disturbance, SF:	672,757	
Extra Survey Area, %:	10%	
Total Survey Area, SF:	740,033	
Site Area, AC:	17.0	
Acres Surveyed,DY	2	*assumed*
Bathymetric Survey, DY:	9	
Bathymetric Surveying Report, EA:	1	

Site Preparation

Clearing and Grubbing

Removal Area, SF:	81,433
Removal Area, AC:	1.9
Clearing and Grubbing in Open Areas, %:	100%
Clearing and Grubbing - Open, AC:	2
Clearing and Grubbing - Open, AC:	2
Length for equipment laydown area, FT:	125
Width of equipment laydown area, FT:	40
Area for equipment laydown area, SY:	556
Length for temporary road, FT:	826
Width of temporary road, FT:	15
Area for road, SF:	12,390
Area for temporary road, SY:	1,377
Area for equipment laydown are and road, SY:	1,940
Area of stripping, AC:	0.40
Depth of stripping, IN:	6
Depth of stripping, FT:	0.5
Stripped volume, CF:	8,695
Stripped volume, BCY:	330
Stripped volume, LCY:	396
Gravel %:	50%
Pavement %:	50%

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Description: Assumptions and calculations for Alternative 3.

Thickness of gravel for equipment laydown area, IN:	6	
Volume of gravel needed, ECY:	46	
Volume of gravel needed, LCY:	54	
Thickness of gravel for road, IN:	6	
Volume of gravel needed, ECY:	115	
Volume of gravel needed, LCY:	135	
Gravel Volume,LCY:	189	
Gravel volume, TON:	**308**	
Area for equipment laydown are and road(Pavement), SY:	**970**	
Depth of Sub Base Course, IN:	6	
Depth of Base Course, IN:	4	
Depth of Pavement, IN:	2	
Sub Base Course Required, ECY:	162	
Sub Base Course Required, LCY:	190	
Sub Base Course Required, TON:	**309**	
Base Course Required, CY:	108	
Base Course Required, TON:	**175**	
Pavement Required, CY:	54	
Pavement Required, TON:	**80**	

Sheetpiling

Length of Sheetpiling Wall,FT	**200**	
Depth of Sheet Pile,FT:	**30**	
Area of Sheetpile, SF:	**6,000**	
Area of gravel,SF:	**321**	
Depth of gravel,ft:	**8**	
Gravel Placement CF::	**2,568**	
Gravel Placement BCY:	**95**	
Gravel Placement LCY:	**107**	
Gravel Tons:	**173**	

Erosion Control Measures

Silt Fencing, LF:	2,104	*Estimated based on area of disturbance*
Assumed % Replaced during Construction, %:	10%	
Length of Silt Fence Required, LF:	**2,400**	*Rounded up to nearest Hundred*
Number of Straw Bales, EA:	170	*Rounded up to nearest ten*
Length of Each Straw Bale, FT:	3	
Total length of Straw Bales, FT:	**500**	*Assumed. Based on previous work*
Erosion Control Maintenance Crew, HR/WK:	4	*assumed*
Erosion Control Maintenance Crew, HR:	**244**	

Turbidity Curtain

Installation of Turbidity Curtain

Assumed Length of Turbidity Curtain Required, LF:	2,000	*Assumed by estimator*
Assumed % of turbidity curtain to be reused, %:	50%	
Amount of turbidity curtain to be purchased, LF:	**1,000**	
Length per section, LF/EA:	50	
Number of sections, EA:	20	
Total length, FT:	1,000	
No. of anchor kits per section, EA/EA:	2	
No. of anchor kits, EA:	40	
Assumed installation productivity, LF/HR:	100	*Assumed by estimator*
Assumed Duration of Installation, HR:	20	

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Description: Assumptions and calculations for Alternative 3.

Inspection and Maintenance

Number of weeks turbidity curtain required, WK:	61	
Maintenance time of turbidity curtains per week, HR/WK:	2	
Turbidity Curtain Maintenance, HR:	122	*Assume 2 hr per week during construction*

Removal of Turbidity Curtain

Removal of turbidity curtains and anchors, LF:	2,000	

Dredging

In Channel

Total Dredging Volume BCY:	9,306	
Bulking Factor BCY to LCY:	1.15	*Dredged Sediment Bulking Factor*
Dredging,LCY:	10,702	
Dredging Area,SF:	143,860	
Dredging Area,AC:	3.3	
Dredged Sediment Density (LB/CY):	3,100	*Source: Caterpillar Performance Handbook, edition 3.1 (Assumes Sand - Wet)*
Dredged Sediment Density (TON/CY):	1.55	
Weight of Dredged Sediments, TONS:	16,587	
Scow Capacity,LCY:	1,500	
Scow Transport,EA:	8	

Shoreline

Total Dredging Volume BCY:	13,535	
Bulking Factor BCY to LCY:	1.15	*Dredged Sediment Bulking Factor*
Confined Dredging,LCY:	15,565	
Dredging Area,SF:	215,913	
Dredging Area,AC:	5.0	
Dredged Sediment Density (LB/CY):	3,100	*Source: Caterpillar Performance Handbook, edition 3.1 (Assumes Sand - Wet)*
Dredged Sediment Density (TON/CY):	1.55	
Weight of Dredged Sediments, TONS:	24,126	
Scow Capacity,LCY:	1,500	
Scow Transport,EA:	11	

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Description: Assumptions and calculations for Alternative 3.

Embayment Area

Additional Dredging for Access Area Channel AVG Depth ft:	1.5	*Assumes additional dredging depth to allow equipment access*
Additional Dredging for Access Area Channel sf:	65510	
Additional Dredging cf:	98265	
Additional Dredging BCY:	3640	
Total Dredging Volume BCY:	20,716	
Bulking Factor BCY to LCY:	1.15	*Dredged Sediment Bulking Factor*
Dredging,LCY:	**23,823**	
Dredging Area,SF:	299,520	
Dredging Area,AC:	6.9	
Dredged Sediment Density (LB/CY):	3,100	*Source: Caterpillar Performance Handbook, edition 3.1 (Assumes Sand - Wet)*
Dredged Sediment Density (TON/CY):	1.55	
Weight of Dredged Sediments, TONS:	36,926	
Scow Capacity,LCY:	1,500	
Scow Transport,EA:	**16**	

Bridge Area

Total Dredging Volume BCY:	997	
Bulking Factor BCY to LCY:	1.15	*Dredged Sediment Bulking Factor*
Dredging,LCY:	**1,147**	
Dredging Area,SF:	13,464	
Dredging Area,AC:	0.3	
Dredged Sediment Density (LB/CY):	3,100	*Source: Caterpillar Performance Handbook, edition 3.1 (Assumes Sand - Wet)*
Dredged Sediment Density (TON/CY):	1.55	
Weight of Dredged Sediments, TONS:	1,778	
Scow Capacity,LCY:	1,500	
Scow Transport,EA:	**1**	

CDM Smith

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CLIENT:	EPA Region 2			WRKSHT NO.:	Alt 3

Description: Assumptions and calculations for Alternative 3.

Floodplain Soils

Width of Area,ft:	50	*assumed*
Depth of Area,ft:	0.5	*assumed*
Length of Area,ft:	2046	*assumed*
Volume for excavation, cf:	51150	
Volume for excavation, BCY:	1894	
Volume for excavation, LCY:	2273	
Volume for Disposal,TONS:	2983.75	

Offloading

Offloading Volume,LCY:	51,237	

Barge Equipment

Mob/Demob Spud Barge,EA:	2	
Mob/Demob Material Barge,EA:	2	
Spud Barge Rental (1-90) Rate,DY:	90	
Spud Barge Rental (90-180) Rate,DY:	60	
Material Barge Rental (1-90) Rate,DY:	90	
Material Barge Rental (90-180) Rate,DY:	60	

Cultural Resources Oversight

Archeologist,HR:	80	*Assumed*
Per Diem,DY:	8	
Pickup Truck, DY:	8	

Confirmation Sampling

Dredge Area, SF:	672,757	
Dredge Area, AC:	15.44	
Total Samples, EA:	78	*Assumes 5 samples an acre*
Estimated Duration of Sampling DY:	16	*Assumed*
Total number of chemical sample sets, EA:	**78**	*Maximum number of samples for a specific analysis*
Total number of chemical samples, EA:	**234**	
Time for sediment sample locations, DY:	16	
Time for sediment sample locations, HR:	64	
Total time, DY:	**16**	
Total time, HR:	**64**	
Number of mobilizations, EA/EA:	**1**	
Number of crews, EA:	1	
Number of workers per crew, EA/EA:	2	
Number of scientists per boat, EA:	2	
Assumed IDW per surface sediment sample, CF/EA:	0.2	
IDW generated from sample locations, CF:	16	
Total IDW generated, CF:	16	
Total IDW generated, GAL:	120	
Number of 55-gallon drums needed, EA:	3	
Total IDW generated, TON:	0.8	
Number of days for container rental, DY:	16	
Assumed solid waste container capacity, TON:	8	
Number of times container will need to be emptied, EA:	2	
Decon water generated per sediment sample, GAL/EA:	1	
IDW generated from decontamination of equipment, GAL:	78	
Number of 55-gallon drums needed, EA:	2	
Staff Scientist, HR:	64	
Project Scientist, HR:	64	
Pickup Truck, DY:	7	
Per Diem, DY:	13	
PCBs, EA:	78	
Dioxin/Furans, EA:	78	
Pesticides, EA:	78	
Total Metals, EA:	78	
Mercury, EA:	78	
SVOCs,EA:	78	
Shipping, per Sample Analysis, EA:	468	1 Set of Analyses per Sample
Miscellaneous Sampling Supplies, per Sample, EA:	468	

Rental Fee for Solid Waste Disposal Container, DAY:	16
Hauling for Disposal, EA:	2
Waste Disposal (non-regulated solid waste),TONs:	0.8
Lab Analysis - Soil Disposal TCLP Analyte List, EA:	2
Water Disposal Fee, GAL:	78
55-gallon Drum, EA:	2
Water Testing for Waste Profiling - Standard Analyte List, EA:	2

Containment - Reactive/Engineered Cap

Amendment Addition %: 6% Assumes % by weight

In-Channel

Carbon amendment, TON:	740	
Carbon Density,lb/cf:	45	*Based on density of Sedimite*
Density of Carbon,TON/CY:	0.61	
Carbon Amendment Volume, LCY:	1218	
Sand, LCY:	8,000	
Density of Sand (dry), TON/LCY:	1.20	
Sand,TON:	9,600	
Mixing Volume,LCY:	9,218	
Reactive Layer Placement, LCY:	9,218	

Shoreline

Carbon amendment, TON:	1030	
Carbon Density,lb/cf:	45	*Based on density of Sedimite*
Density of Carbon,TON/CY:	0.61	
Carbon Amendment Volume, LCY:	1696	
Sand, LCY:	11,100	
Density of Sand (dry), TON/LCY:	1.20	
Sand,TON:	13,320	
Mixing Volume,LCY:	12,796	
Reactive Layer Placement, LCY:	12,796	

Embayment

Carbon amendment, TON:	1113	
Carbon Density,lb/cf:	45	*Based on density of Sedimite*
Density of Carbon,TON/CY:	0.61	
Carbon Amendment Volume, LCY:	1832	
Sand, LCY:	12,000	
Density of Sand (dry), TON/LCY:	1.20	
Sand,TON:	14,400	
Mixing Volume,LCY:	13,832	
Reactive Layer Placement, LCY:	13,832	

Bridge Area

Carbon amendment, TON:	93	
Carbon Density,lb/cf:	45	*Based on density of Sedimite*
Density of Carbon,TON/CY:	0.61	
Carbon Amendment Volume, LCY:	153	
Sand, LCY:	1,000	
Density of Sand (dry), TON/LCY:	1.20	
Sand,TON:	1,200	
Mixing Volume,LCY:	1,153	
Reactive Layer Placement, LCY:	1,153	

Floodplains

Assumes floodplains cap is not reactive

Sand, LCY:	2,273
Density of Sand (dry), TON/LCY:	1.20
Sand,TON:	2,728
Sand Placement, LCY:	2,273

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	CLIENT:	EPA Region 2			WRKSHT NO.: Alt 3

Description: Assumptions and calculations for Alternative 3.

Backfill Conformance Sampling

Total Fill Volume,LCY:	32,100
Dioxin/Furans, EA:	65
PAHs, EA:	65
Pesticides, EA:	65
TCLP Metals and mercury, EA:	65
PCBs, EA:	65
RCRA Metals, EA:	65
TPH Diesel, EA:	65
Grain Size Distribution,EA:	65
Total Organic Carbon (TOC),EA:	65
Shipping Allowance,EA:	65
Miscellaneus Supplies, EA:	65
Total Samples, EA:	65
Assumed Sample Location Productivity, EA/DY:	20
Estimated Duration of Sampling DY:	4
Crew Size,EA:	2
Field Engineer DY:	8
Field Engineer, HRs:	80
Pickup Truck,DY:	8

Temporary Water Treatment System Set up

Mob/Demob of Water Treatment System

Mob/Demob of Water Treatment System, LS:	1	
Startup Testing, DAY:	2	*Assumes 2 operators for 10 days*

Startup Testing - Influent Sampling

Influent Sampling Frequency, EA/DY:	1	*Assumed*
Influent Samples, EA:	2	*Assumes daily sampling for 10 days during startup*
Field Duplicates, EA:	1	*Assume 5% of total samples*
Total Influent Samples, EA:	3	*Assumes PCB analysis only*
Shipping, per Sample Analysis, EA:	3	
Miscellaneous Sampling Supplies, per Sample, EA:	3	

Startup Testing - Effluent Sampling

Effluent Sampling Frequency, EA/DY:	1	*Assumed*
Effluent Samples, EA:	2	*Assumes daily sampling for 10 days during startup*
Field Duplicates, EA:	1	*Assume 5% of total samples*
Total Effluent Samples, EA:	3	*Assumes PCB analysis only*
Shipping, per Sample Analysis, EA:	3	
Miscellaneous Sampling Supplies, per Sample, EA:	3	

CDM Smith	PROJECT: Wappinger Creek Superfund Site	COMPUTED BY: Jacob Hill		CHECKED BY: Steve Clinch	
	JOB NO.: 253508.3501-F0064-4_2FS.FSRPT	DATE: 7/7/2025		DATE CHECKED: 7/10/2025	
	CLIENT: EPA Region 2			WRKSHT NO.: Alt 3	

Description: Assumptions and calculations for Alternative 3.

Water Treatment Area - Pavement

Total Surface Area - Water Treatment Area, SF:	625	*assumed*
Water Treatment Area, SY:	**69**	*Rounded up to the nearest tens*
Depth of Sub Base Course, IN:	6	*Dense graded aggregate sub base course*
Depth of Base Course, IN:	4	*Bituminous base course*
Depth of Pavement, IN:	2	*Pavement surface course*
Sub Base Course Required, ECY:	12	
Sub Base Course Required, LCY:	14	
Sub Base Course Required, TON:	**22**	
Base Course Required, CY:	8	
Base Course Required, TON:	**13**	
Pavement Required, CY:	4	
Pavement Required, TON:	**6**	

Dewatering of Stockpiles

Sump Pump, EA:	2	
Sump Pump Operating Days, DY:	**101**	
Total Sump Pumps, EA:	**2**	
Sump Pump Operating Days, DY:	**101**	
Volume of Material For Mixing, LCY:	**51,237**	
Percent by Volume of Cement,%:	**5%**	
Addition of Portland Cement, LCY:	**2,562**	
Addition of Portland Cement, Tons:	**3,362**	
amendment Mixing, LCY:	**53,799**	

Temporary Water Treatment System Operation

Full-Scale Operation of Water Treatment System

Duration of Dredging, MO:	9	
Duration of Dredging, WK:	21	
Duration of Dredging, DYs:	101	
Water Treatment System Operation/Rental, MO:	**9**	
Electrical Power Requirements, HP:	200	*Per Engineer*
Required Operation Duration per Week, HR/WK:	10	*Assumed*
Required Operation Duration per Month, HR/MO:	40	*Per Engineer*
Electricity Requirements per Month, KWH/MO:	5,966	
Total Electricity Requirements, KWH:	**53,694**	*For duration of full-scale operation*
Operator Frequency, DY/MO:	12	*Assumed*
Total Operator, DY:	**108**	
Total Operator, HR/DY:	10	
Total Operator, HR:	1,080	
Bag Filter Replacement, EA/DY:	1	*assumed*
Total Bag Filter Replacement, EA:	**108**	
Activated Carbon Vessels, EA:	2	
Activated Carbon Vessel Loading, LB/EA:	4,000	
Total Activated Carbon, LB:	8,000	

CDM Smith	PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY: Steve Clinch
	JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE:	7/7/2025	DATE CHECKED: 7/10/2025
	CLIENT:	EPA Region 2			WRKSHT NO.: Alt 3

Description: Assumptions and calculations for Alternative 3.

Number of Activated Carbon Changeout, EA:	5	*assumes changeout every other month*
Water Storage Tank, GAL:	10,000	
Water Storage Tank Rental, DY:	101	
Water Storage Tank Transportation, EA:	2	*includes delivery and pickup*
Tank Cleaning/Decontamination, EA:	9	*Assumes 1 cleaning per month*

Effluent Sampling

Effluent Sampling Frequency, EA/WK:	1	*Assumed*
Total Effluent Samples, EA:	21	
Field Duplicates, EA:	2	*Assume 5% of total samples*
Total Effluent Samples, EA:	23	*Assumes PCB analysis only*
Shipping, per Sample Analysis, EA:	23	
Miscellaneous Sampling Supplies, per Sample, EA:	23	

Waste Characterization Sampling

Waste Characterization Sampling Frequency, LCY/EA:	1,000	*Assumed*
Total Waste Material, LCY:	53,799	*Off-Site Disposal Volume*
Waste Characterization Samples, EA:	54	
Field Duplicates, EA:	3	*Assume 5% of total samples*
TCLP Analysis, EA:	57	
Paint Filter Test,EA:	57	
Reactive Cyanide,EA:	57	
Reactive Sulfide,EA:	57	
Corrosivity,EA:	57	
Ignitability,EA:	57	
PCBs,EA:	57	
Field Engineer, HR:	19	*Assumes 20 minutes per sample.*
Pickup Truck, DY:	2	
Per Diem, DY:	2	
Shipping, per Sample Analysis, EA:	399	*7 Set of Analyses per Sample*
Miscellaneous Sampling Supplies, per Sample, EA:	57	

CDM Smith	PROJECT: Wappinger Creek Superfund Site	COMPUTED BY: Jacob Hill		CHECKED BY: Steve Clinch	
	JOB NO.: 253508.3501-F0064-4_2FS.FSRPT	DATE: 7/7/2025		DATE CHECKED: 7/10/2025	
	CLIENT: EPA Region 2			WRKSHT NO.: Alt 3	

Description: Assumptions and calculations for Alternative 3.

Transportation and Disposal

TSCA Waste Disposal Volume

Disposal Volume Classified as TSCA Waste, %: 0% *Assumed percentage of overall disposal volume*

	BCY	LCY	TON	
TSCA Volume :	0	0	0	
Total Mixed Cement:	-	-	0	
Total Volume:	0	0	**0**	*Rounded up to nearest ten*

Subtitle C (Hazardous) Waste Disposal Volume

Disposal Volume Classified as Subtitle C (Hazardous) Waste, %: 55% *Assumed percentage of overall disposal volume*

	BCY	LCY	TON	
Haz Waste Volume :	25,546	29,378	40,870	
Total Mixed Cement:	-	1,409	1,849	
Total Volume:	25,550	30,790	**42,720**	*Rounded up to nearest ten*

Subtitle D (Non-Haz) Waste Disposal Volume

Disposal Volume Classified as Subtitle D (Non-Hazardous) Waste, %: 45% *Assumed percentage of overall disposal volume*

	BCY	LCY	TON	
Non-Haz Waste Volume (Upper Creek):	20,902	24,037	33,440	
Total Mixed Cement:	-	1,153	1,513	
Total Volume:	20,910	25,190	**34,960**	*Rounded up to nearest ten*

Restoration

Removal of Asphalt

Power Washing of Asphalt

Power Washing of Asphalt, SF:	**9,320**	*Power washing of asphalt prior to demolition*

Pavement Demolition

Pavement for Demolition, SY:	**1,036**	
Pavement/Aggregate for Off-Site Recycling, LCY:	**377**	
Pavement/Aggregate for Off-Site Recycling, TON:	**605**	

Removal of Gravel

Aggregate for Disposal, BCY:	**169**	
Aggregate for Disposal, TON:	**308**	

Topsoil and Seeding

Disturbed Areas,SF:	**18,015**	
Topsoil Depth,FT:	**0.5**	
Estimated area for Restoration, SF:	18,015	*Assumes half an acre*
Rough Grading, SF:	**18,015**	
Assumed Thickness of Topsoil, IN:	6	
Placement of Topsoil, ECY:	334	
Placement of Topsoil, LCY:	**450**	*Rounded up to nearest ten*
Placement of Topsoil, TON:	600	*Rounded up to nearest ten*
Restoration Area, SF:	18,015	
Restoration Area, AC:	0.4	
Seed Mix, AC:	**0.4**	

CDM Smith	PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY: Steve Clinch
	JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE:	7/7/2025	DATE CHECKED: 7/10/2025
	CLIENT:	EPA Region 2			WRKSHT NO.: Alt 3

Description: Assumptions and calculations for Alternative 3.

Annual O&M

Containment System Monitoring

Inspection Event Frequency, EA/YR:	2	*Assumed*
Inspection Duration, DY/EA:	1	*Assumed*
Project Engineer, DY:	**2**	
Project Engineer, HR:	**20**	
Pickup Truck, DY:	**2**	
Per Diem, DY:	**2**	
Maintenance Allowance, LS:	**1**	

Periodic O&M

Institutional Control Maintenance

Legal Controls

Environmental Lawyer, HR:	**10**	
Paralegal, HR:	**20**	
Admin Clerk, HR:	**10**	
Reproduction Costs for Institutional Controls, LS:	**1**	

Regulated Navigation Area (RNA) Setup

Project Manager,HR:	**40**	*Assumed*
Environmental Engineer,HR:	**24**	*Assumed*
Admin Clerk,HR:	**8**	*Assumed*
Buoy Replacement EA:	**16**	*Assumes 1 an acre*
Buoy Relacement ,HR:	**2**	*Assumed*
Field Technician,HR:	**64**	*Assumes 2 technicians*
Boat Operator,HR:	**32**	
Boat Mobilization Demob,EA:	**2**	
Boat, HR:	**32**	

Informational Devices- Fish Consumption Advisory

Project Manager,HR:	**40**	*Assumed*
Environmental Engineer,HR:	**20**	*Assumed*
Environmental Scientist,HR:	**20**	*Assumed*
Admin Clerk,HR:	**10**	*Assumed*
Environmental Lawyer,HR:	**5**	*Assumed*
Paralegal,HR:	**5**	*Assumed*
Signage, EA:	**8**	*Assumes 1 every 2 acres*
Sign Replacement,HR:	**1**	*Assumed*
Field Technician,HR:	**16**	*Assumes 2 technicians*

CDM Smith

PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY:	Steve Clinch
JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE:	11/15/2025	DATE CHECKED:	7/10/2025
CLIENT:	EPA Region 2			WRKSHT NO.:	Quantities

Description: Quantities for Alternative SED3.

Area of Disturbance

	Area (SF)
In-Channel	143,860
Shoreline	215,913
Embayment	299,520
Bridge Area	13,464
Floodplains	
TOTAL	672,757

Remediation Zone Total Quantities

	Remedial Technology	Area (SF)	Depth (LF)	Overdredge (LF)	Total Dredge Volume (BCY)
In-Channel	Dredging	143,860	Varies	Varies	9,306
Shoreline	Dredging	215,913	Varies	Varies	13,535
Embayment	Dredging	299,520	Varies	Varies	17,076
Bridge Area	Dredging	13,464	Varies	Varies	997
Floodplains					
TOTAL		**672,757**			**40,914**

Dredging Quantities

Wappinger Creek				
Section	Area (SF)	Depth (FT)	Volume (BCY)	Volume (LCY)
In-Channel	143,860	Varies	9,306	10,702
Shoreline	215,913	Varies	13,535	15,565
Embayment	299,520	Varies	17,076	19,637
Bridge	13,464	Varies	997	1,147

Waste Quantities

	In-Channel	Shoreline	Embayment	Bridge
Volume of Hazardous Waste (Subtitle C) (BCY)	5,118	7,444	9,392	549
Volume of Hazardous Waste (Subtitle C) (LCY)	5,886	8,561	10,801	631
Volume of Non-Hazardous Waste (Subtitle D) (BCY)	4,188	6,091	7,684	449
Volume of Non-Hazardous Waste (Subtitle D) (LCY)	4,816	7,004	8,837	516

Disposal Volume Classified as TSCA (Hazardous) Waste, %:	0%	*Assumed percentage of overall disposal volume*
Disposal Volume Classified as Subtitle C (Hazardous) Waste, %:	55%	*Assumed percentage of overall disposal volume*
Disposal Volume Classified as Subtitle D (Non-Hazardous) Waste, %:	45%	*Assumed percentage of overall disposal volume*

Containment System Quantities

	In-Channel	Shoreline	Embayment	Bridge	Total	ACRES
Area for In-Place Containment in Creek 1-foot, SF:	72,933	132,781	275,976	0	481,690	11.06
Area for In-Place Containment in Creek 2-foot, SF:	70,927	83,132	23,545	13,464	191,068	4.39
Area for In-Place Containment in Creek Total, SF:	143,860	215,913	299,520	13,464	672,757	15.44

	Layer	Depth (IN)	In-Channel (BCY)	Shoreline (BCY)	Embayment(BCY)	Bridge	
Sand and Sedimite	Chemical Isolation Layer (sand mixed with 6% sedimite by volume)	12	2,701	4,918	10,221	0	
Sand and Sedimite	Chemical Isolation Layer (sand mixed with 6% sedimite by volume)	24	5,254	6,158	1,744	997	
	Total	Varies	7,955	11,076	11,965	997	*Rounded up to nearest hundred*

CDM Smith

PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY:	Steve Clinch
JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE:	11/15/2025	DATE CHECKED:	7/10/2025
CLIENT:	EPA Region 2			WRKSHT NO.:	Quantities

Description: Quantities for Alternative SED3.

Quantity Summary

Alternative SED3					
	In-Channel	Shoreline	Embayment	Bridge	TOTAL
Areas					
Remediation Area (SF)	143,860	215,913	299,520	13,464	672,757
Area of Containment System (SF)	143,860	215,913	299,520	13,464	672,757
Depths					
Depth of Remediation Zone	2	2	2	2	2
Excavation					
Volume for Disposal (BCY)	9,306	13,535	17,076	997	40,914
Disposal					
Subtitle C Hazardous Waste (BCY)	5,118	7,444	9,392	549	22,503
Subtitle D Non-Hazardous Waste(BCY)	4,188	6,091	7,684	449	18,411
Containment					
Volume of Material Placed for Containment System (BCY)	7,955	11,076	11,965	997	31,994

Estimated Project Duration

Major Construction Activity	Total Volume		Productivity		Estimated Duration		
					DY	WK	MO
Dredging (Shoreline and Channel)	22,840	BCY	228	BCY/DY	101	21	5
Dredging (Embayment and Bridge)	18,073	BCY	153	BCY/DY	119	15	4
Containment System Construction	31,994	ECY	467	ECY/DY	69	9	3
Site Preparation							1
Site Restoration							1
						Estimated Project Duration	14
						Construction Season, MO/YR:	8
						Construction Seasons, EA:	2

TABLE CW4-1

Alternative 4 **Cost Worksheet: CW4-1**

Capital Cost Sub-Element

Institutional Controls

COST WORKSHEET

Site: Wappinger Creek Superfund Site **Prepared By:** Jacob Hill **Date:** 7/7/2025

Location: Dutchess County, New York

Phase: Focused Feasibility Study **Checked By:** Steve Clinch **Date:** 7/10/2025

Base Year: 2025

Work Statement:

This sub-element involves implementation of institutional controls for the site. The following cost includes hours for legal document submission and recording. ICs are intended to prevent changes in landuse and prevent intrusive work on the site.

Cost Analysis:

Cost for Institutional Controls (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Legal Controls																
L5	Environmental Lawyer	40	HR	1.00	$242.72	$242.72	$0.00	$0.00	$0.00	$0.00	$242.72	$9,708.80	50%	9%	$15,874	FLC FLC Datacenter	
L14	Paralegal	80	HR	1.00	$91.35	$91.35	$0.00	$0.00	$0.00	$0.00	$91.35	$7,308.00	50%	9%	$11,949	FLC FLC Datacenter	
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$54.89	$54.89	$0.00	$0.00	$0.00	$0.00	$54.89	$2,195.60	50%	9%	$3,590	FLC FLC Datacenter	
M1	Institutional Controls Report Allowance	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	Per Estimator
	Informational Devices-Fish Consumption Advisory																
L12	Project Manager	40	HR	1.00	$216.33	$216.33	$0.00	$0.00	$0.00	$0.00	$216.33	$8,653.20	50%	9%	$14,148	FLC FLC Datacenter	
L4	Environmental Engineer	20	HR	1.00	$130.74	$130.74	$0.00	$0.00	$0.00	$0.00	$130.74	$2,614.80	50%	9%	$4,275	FLC FLC Datacenter	
L6	Environmental Scientist	20	HR	1.00	$110.55	$110.55	$0.00	$0.00	$0.00	$0.00	$110.55	$2,211.00	50%	9%	$3,615	FLC FLC Datacenter	
L3	Clerks, Typist, Bookkeeper & Receptionist	10	HR	1.00	$54.89	$54.89	$0.00	$0.00	$0.00	$0.00	$54.89	$548.90	50%	9%	$897	FLC FLC Datacenter	
L5	Environmental Lawyer	5	HR	1.00	$242.72	$242.72	$0.00	$0.00	$0.00	$0.00	$242.72	$1,213.60	50%	9%	$1,984	FLC FLC Datacenter	
L14	Paralegal	5	HR	1.00	$91.35	$91.35	$0.00	$0.00	$0.00	$0.00	$91.35	$456.75	50%	9%	$747	FLC FLC Datacenter	
M34	Aluminum Warning Signs (24" x 24")	9	EA	1.00	$0.00	$0.00	$0.00	$0.00	$59.34	$0.00	$59.34	$534.06	15%	9%	$669	V Vendor Quote	Source: Signs.com, 2025
L9	Field Technician	18	HR	1.00	$73.71	$73.71	$0.00	$0.00	$0.00	$0.00	$73.71	$1,326.78	50%	9%	$2,169	FLC FLC Datacenter	
												TOTAL UNIT COST:			$64,917		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$64,917	$64,917

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001

The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:

NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:

MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW4-2

Alternative 4 **Cost Worksheet: CW4-2**

Capital Cost Sub-Element

Site Surveying

COST WORKSHEET

Site: Wappinger Creek Superfund Site **Prepared By:** Jacob Hill **Date:** 7/7/2025

Location: Dutchess County, New York

Phase: Focused Feasibility Study **Checked By:** Steve Clinch **Date:** 7/10/2025

Base Year: 2025

Work Statement:

This sub-element involves costs for site surveys. The following line items include costs for a Pre-Construction Survey and Post-Construction Survey of the site.

Cost Analysis:

Cost for Site Surveying (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Pre-Construction Bathymetric Survey																
A51	Bathymetric Surveying	9	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$11,963.09	$11,963.09	$107,667.81	15%	9%	$134,962	MII MII Assemblies	
M80	Bathymetric Survey Report	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$10,300.00	$10,300.00	$10,300.00	0%	0%	$10,300	A Allowance	Per Estimator
	Post-Construction Bathymetric Survey																
A51	Bathymetric Surveying	9	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$11,963.09	$11,963.09	$107,667.81	15%	9%	$134,962	MII MII Assemblies	
M80	Bathymetric Survey Report	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$10,300.00	$10,300.00	$10,300.00	0%	0%	$10,300	A Allowance	Per Estimator
												TOTAL UNIT COST:			$290,524		

	Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$290,524	$290,524

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001

The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:

NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:

MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW4-3

Alternative 4 **Cost Worksheet:** **CW4-3**

Capital Cost Sub-Element

Site Preparation

COST WORKSHEET

Site:	Wappinger Creek Superfund Site	**Prepared By:** Jacob Hill	**Date:** 7/7/2025
Location:	Dutchess County, New York		
Phase:	Focused Feasibility Study	**Checked By:** Steve Clinch	**Date:** 7/10/2025
Base Year:	2025		

Work Statement:
This sub-element involves site preparation including clearing and grubbing, prepping the laydown area, prepping the temporary road, and sheetpiling for the access ramp.

Cost Analysis:
Cost for Site Preparation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Clearing and Grubbing																
A1	Light Clearing (Open Areas)	2.00	AC	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,885.62	$2,885.62	$5,771.24	15%	9%	$7,234	MII MII Assemblies	
A2	Rough Site Grading	81,433	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.08	$0.08	$6,514.64	15%	9%	$8,166	MII MII Assemblies	
	Sediment Processing Area-Gravel																
A11	Gravel Placement	189	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.09	$8.09	$1,529.01	15%	9%	$1,917	MII MII Assemblies	
M26	Gravel - 1-1/2"	308	TON	1.00	$0.00	$0.00	$0.00	$0.00	$32.60	$0.00	$32.60	$10,040.80	15%	9%	$12,586	V Vendor Quote	
A33	Earth Stripping and Stockpiling	330	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.40	$2.40	$792.00	15%	9%	$993	MII MII Assemblies	
	Sediment Processing Area-Pavement																
A70	Asphalt Paving 4" Base Course	970	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.61	$2.61	$2,531.70	15%	9%	$3,173	MII MII Assemblies	
M92	Binder Course 4"	175	TON	1.00	$0.00	$0.00	$0.00	$0.00	$88.00	$0.00	$88.00	$15,412.22	15%	9%	$19,319	V CostWorks	
A71	Asphalt Paving 2" Surface Course	970	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.83	$1.83	$1,775.10	15%	9%	$2,225	MII MII Assemblies	
M93	Wearing Course 2"	80	TON	1.00	$0.00	$0.00	$0.00	$0.00	$87.00	$0.00	$87.00	$6,985.62	15%	9%	$8,756	V CostWorks	
A72	Aggregate Sub Base Placement	970	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5.39	$5.39	$5,228.30	15%	9%	$6,554	MII MII Assemblies	
M26	Gravel - 1-1/2"	309	TON	1.00	$0.00	$0.00	$0.00	$0.00	$32.60	$0.00	$32.60	$10,075.64	15%	9%	$12,630	V Vendor Quote	
	Sheet Piling																
A22	Sheet Piling Installation and Salvage	6,000	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$30.26	$30.26	$181,560.00	15%	9%	$227,585	MII MII Assemblies	
A11	Gravel Placement	107	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.09	$8.09	$861.78	15%	9%	$1,080	MII MII Assemblies	
M26	Gravel - 1-1/2"	173	TON	1.00	$0.00	$0.00	$0.00	$0.00	$32.60	$0.00	$32.60	$5,643.13	15%	9%	$7,074	V Vendor Quote	
														TOTAL UNIT COST:	$311,138		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$311,138	$311,138

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW4-4

Alternative 4 **Cost Worksheet: CW4-4**

Capital Cost Sub-Element

Erosion Control Measures

COST WORKSHEET

Site: Wappinger Creek Superfund Site **Prepared By:** Jacob Hill **Date:** 7/7/2025

Location: Dutchess County, New York

Phase: Focused Feasibility Study **Checked By:** Steve Clinch **Date:** 7/10/2025

Base Year: 2025

Work Statement:

This sub-element involves erosion control measures for the site. The following line items include costs for materials, installation, and maintenance of silt fencing and turbidity curtains are included.

Cost Analysis:

Cost for Erosion Control Measures (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Erosion Control Measures																
M22	Silt Fence	2,400	LF	1.00	$0.00	$0.00	$0.00	$0.00	$2.05	$0.00	$2.05	$4,920.00	15%	9%	$6,167	CW CostWorks	Source: 31 25 1416 1000
A3	Silt Fence Installation	2,400	LF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4.10	$4.10	$9,840.00	15%	9%	$12,334	MII MII Assemblies	
A24	Erosion Control Maintenance Crew	328	HR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$240.21	$240.21	$78,788.88	15%	9%	$98,762	MII MII Assemblies	
	Turbidity Curtains																
A48	Turbidity Curtain Install	2,000	LF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$18.69	$18.69	$37,380.00	15%	9%	$46,856	MII MII Assemblies	
M76	DOT Type 2 Turbidity Curtain	20	EA	1.00	$0.00	$0.00	$0.00	$0.00	$1,372.42	$0.00	$1,372.42	$27,448.40	15%	9%	$34,407	V Vendor Quote	Paramount Materials 2023
M77	Turbidity Curtain Anchor Kit	40	EA	1.00	$0.00	$0.00	$0.00	$0.00	$503.20	$0.00	$503.20	$20,128.00	15%	9%	$25,230	V Vendor Quote	Paramount Materials 2023
A49	Turbidity Curtain Maintenance	164	HR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$350.30	$350.30	$57,449.20	15%	9%	$72,013	MII MII Assemblies	
A50	Turbidity Curtain Removal	2,000	LF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$9.34	$9.34	$18,680.00	15%	9%	$23,415	MII MII Assemblies	
												TOTAL UNIT COST:			$319,184		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$319,184	$319,184

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001

The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:

NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:

MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW4-5

Alternative 4 **Cost Worksheet:** **CW4-5**

Capital Cost Sub-Element

Dredging for Off-Site Disposal

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025

Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves dredging and the transfer of waste to the soil stockpile areas for dewatering. Contaminated materials will be excavated and consolidated onsite.

Cost Analysis:
Cost for Excavation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	In-Channel																
A52	Dredging	16,056	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$61.32	$61.32	$984,547.39	15%	9%	$1,234,130	MII MII Assemblies	
A55	Scow Transport	13	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$835.45	$835.45	$10,860.85	15%	9%	$13,614	MII MII Assemblies	
	Shore-Line																
A52	Dredging	23,035	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$61.32	$61.32	$1,412,506.20	15%	9%	$1,770,577	MII MII Assemblies	
A55	Scow Transport	18	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$835.45	$835.45	$15,038.10	15%	9%	$18,850	MII MII Assemblies	
	Embayment																
A67	Embayment Dredging	18,597	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$20.11	$20.11	$373,985.67	15%	9%	$468,791	MII MII Assemblies	
A55	Scow Transport	15	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$835.45	$835.45	$12,531.75	15%	9%	$15,709	MII MII Assemblies	
	Other Confined Dredging Areas																
A68	Other Dredging	2,493	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$30.08	$30.08	$74,989.44	15%	9%	$93,999	MII MII Assemblies	
A56	Offloading- Barge	2,867	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7.14	$7.14	$20,472.15	15%	9%	$25,662	MII MII Assemblies	
A55	Scow Transport	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$835.45	$835.45	$1,670.90	15%	9%	$2,094	MII MII Assemblies	
	Floodplain Soils																
A15	Excavation	1,894	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.09	$3.09	$5,853.83	15%	9%	$7,338	MII MII Assemblies	
A75	Loading Material	2,273	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.68	$0.68	$1,545.87	15%	9%	$1,938	MII MII Assemblies	
A76	Onsite Hauling	2,273	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4.65	$4.65	$10,571.00	15%	9%	$13,251	MII MII Assemblies	
	Offloading																
A56	Offloading- Barge	69,208	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7.14	$7.14	$494,143.63	15%	9%	$619,409	MII MII Assemblies	
	Barge Equipment																
S71	Spud Barge 1 to 90 days	90	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$933.00	$933.00	$83,970.00	15%	9%	$105,256	V Vendor Quote	FlexiFloat 2025
S72	Spud Barge 91 to 180 days	180	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$699.75	$699.75	$125,955.00	15%	9%	$157,885	V Vendor Quote	FlexiFloat 2025
S73	Spud Barge Mob/Demob	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$56,000.00	$56,000.00	$112,000.00	15%	9%	$140,392	V Vendor Quote	FlexiFloat 2025,Spud Barge Freight
S74	Material Barge Mob/Demob	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$36,000.00	$36,000.00	$72,000.00	15%	9%	$90,252	V Vendor Quote	FlexiFloat 2025 , Material Barge Freight
S75	Material Barge 1 to 90 days	90	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$592.00	$592.00	$53,280.00	15%	9%	$66,786	V Vendor Quote	FlexiFloat 2025
S76	Material Barge 91 to 180 days	180	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$444.00	$444.00	$79,920.00	15%	9%	$100,180	V Vendor Quote	FlexiFloat 2025
	Cultural Resources Oversight																
L22	Archeologist	80	HR	1.00	$85.25	$85.25	$0.00	$0.00	$0.00	$0.00	$85.25	$6,820.00	50%	9%	$11,151	FLC FLC Datacenter	
M21	Per Diem	8	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$115.00	$115.00	$920.00	0%	0%	$920	GSA gsa.gov	gsa.gov local per diem rates
M20	Pick up Truck	8	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$263.00	$263.00	$2,104.00	15%	9%	$2,637	CW CostWorks	Source: 01 54 3340 7200
														TOTAL UNIT COST:	$4,960,821		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	62,075	BCY	$4,960,821	$80

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW4-6

Alternative 4 **Cost Worksheet: CW4-6**
Capital Cost Sub-Element
Confirmation Sampling

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025
Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves confirmation sampling of dredged areas.

Cost Analysis:
Cost for Waste Characterization Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Confirmation Sampling																
S18	TAL Metals Analysis (soil media)	82	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$154.76	$154.76	$12,690.32	15%	9%	$15,907	V Vendor Quote	MSA Lab Pricing, 2025
S5	PCB Analysis (soil media)	82	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$173.33	$173.33	$14,213.06	15%	9%	$17,816	V Vendor Quote	MSA Lab Pricing, 2025
S16	Mercury Analysis (soil media)	82	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$27.24	$27.24	$2,233.68	15%	9%	$2,800	V Vendor Quote	MSA Lab Pricing, 2025
S12	Dioxins/Furans (soil media)	82	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$441.53	$441.53	$36,205.46	15%	9%	$45,384	V Vendor Quote	MSA Lab Pricing, 2025
S29	SVOCs	82	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$160.95	$160.95	$13,197.90	15%	9%	$16,544	V Vendor Quote	MSA Lab Pricing, 2025
S21	Pesticides	82	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$149.01	$149.01	$12,218.82	15%	9%	$15,316	V Vendor Quote	MSA Lab Pricing, 2025
L15	Senior Scientist	68	HR	1.00	$133.15	$133.15	$0.00	$0.00	$0.00	$0.00	$133.15	$9,054.20	50%	9%	$14,804	FLC FLC Datacenter	
L16	Staff Scientist	68	HR	1.00	$87.94	$87.94	$0.00	$0.00	$0.00	$0.00	$87.94	$5,979.92	50%	9%	$9,777	FLC FLC Datacenter	
M20	Pick up Truck	7	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$263.00	$263.00	$1,841.00	15%	9%	$2,308	CW CostWorks	Source: 01 54 3340 7200
M21	Per Diem	14	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$115.00	$115.00	$1,610.00	0%	0%	$1,610	GSA gsa.gov	gsa.gov local per diem rates
M35	Sample Shipping per Analysis	492	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.50	$13.50	$6,642.00	0%	0%	$6,642	A Allowance	Per Estimator
M36	Sample Supplies per Analysis	492	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.24	$3.24	$1,594.08	0%	0%	$1,594	A Allowance	Per Estimator
	IDW Handling																
S77	Rental Fee for Solid Waste Disposal Container	17	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$18.30	$18.30	$311.10	15%	9%	$390	A Allowance	Per Estimator
S78	Hauling for Disposal	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$566.95	$566.95	$1,700.85	15%	9%	$2,132	A Allowance	Per Estimator
S79	IDW Disposal	1	TON	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$209.62	$209.62	$167.70	15%	9%	$210	A Allowance	Per Estimator
S80	Water Disposal Fee	82	GAL	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.47	$1.47	$120.54	15%	9%	$151	A Allowance	Per Estimator
S81	55-gallon drum	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$178.00	$178.00	$356.00	15%	9%	$446	A Allowance	Per Estimator
S82	Water Testing for Waste Progiling- Standard Analyte List	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,102.24	$1,102.24	$2,204.48	15%	9%	$2,763	A Allowance	Per Estimator
												TOTAL UNIT COST:			$156,594		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	82	EA	$156,594	$1,910

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW4-7

Alternative 4 **Cost Worksheet:** **CW4-7**
Capital Cost Sub-Element
Residual Cover

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025
Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves placement of the residual layer.

Cost Analysis:
Cost for Excavation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	In-Channel																
A54	Placement	19,781	CY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$24.45	$24.45	$483,642.05	15%	9%	$606,245	MII MII Assemblies	
M70	Sand	23,737	TON	1.00	$0.00	$0.00	$0.00	$0.00	$20.00	$0.00	$20.00	$474,740.66	0%	0%	$474,741	V Vendor Quote	Peckham 2025
	Shore																
A54	Placement	28,379	CY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$24.45	$24.45	$693,863.98	15%	9%	$869,758	MII MII Assemblies	
M70	Sand	34,055	TON	1.00	$0.00	$0.00	$0.00	$0.00	$20.00	$0.00	$20.00	$681,093.47	0%	0%	$681,093	V Vendor Quote	Peckham 2025
	Embayment																
A54	Placement	18,427	CY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$24.45	$24.45	$450,532.23	15%	9%	$564,742	MII MII Assemblies	
M70	Sand	22,112	TON	1.00	$0.00	$0.00	$0.00	$0.00	$20.00	$0.00	$20.00	$442,240.23	0%	0%	$442,240	V Vendor Quote	Peckham 2025
	Bridge Area																
A54	Placement	2,359	CY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$24.45	$24.45	$57,668.34	15%	9%	$72,287	MII MII Assemblies	
M70	Sand	2,830	TON	1.00	$0.00	$0.00	$0.00	$0.00	$20.00	$0.00	$20.00	$56,606.96	0%	0%	$56,607	V Vendor Quote	Peckham 2025
	Floodplain Soils																
A77	Backfill/Compaction	2,273	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5.06	$5.06	$11,503.07	15%	9%	$14,419	MII MII Assemblies	
M37	Common Borrow Fill	2,728	TON	1.00	$0.00	$0.00	$0.00	$0.00	$35.47	$0.00	$35.47	$96,762.16	15%	8%	$120,179	V Vendor Quote	Source: 31 05 1310 0200
												TOTAL UNIT COST:			$3,902,311		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	16.28	ACR	$3,902,311	$239,662

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
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Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW4-8

Alternative 4 **Cost Worksheet:** **CW4-8**

Capital Cost Sub-Element

Backfill Conformance Sampling

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025

Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves backfill conformance sampling of imported materials.

Cost Analysis:
Cost for Waste Characterization Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Waste Characterization Sampling																
S12	Dioxins/Furans (soil media)	134	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$441.53	$441.53	$59,165.02	15%	9%	$74,163	V Vendor Quote	MSA Lab Pricing, 2025
S20	PAHs	134	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$93.82	$93.82	$12,571.88	15%	9%	$15,759	V Vendor Quote	MSA Lab Pricing, 2025
S21	Pesticides	134	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$149.01	$149.01	$19,967.34	15%	9%	$25,029	V Vendor Quote	MSA Lab Pricing, 2025
S26	TCLP Full Analytical Suite	134	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$866.64	$866.64	$116,129.76	15%	9%	$145,569	V Vendor Quote	MSA Lab Pricing, 2025
S16	Mercury Analysis (soil media)	134	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$27.24	$27.24	$3,650.16	15%	9%	$4,575	V Vendor Quote	MSA Lab Pricing, 2025
S5	PCB Analysis (soil media)	134	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$173.33	$173.33	$23,226.22	15%	9%	$29,114	V Vendor Quote	MSA Lab Pricing, 2025
S25	TPH-Diesel	134	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$74.28	$74.28	$9,953.52	15%	9%	$12,477	V Vendor Quote	MSA Lab Pricing, 2025
S18	TAL Metals Analysis (soil media)	134	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$154.76	$154.76	$20,737.84	15%	9%	$25,995	V Vendor Quote	MSA Lab Pricing, 2025
S27	Grain Size Distribution	134	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$173.33	$173.33	$23,226.22	15%	9%	$29,114	V Vendor Quote	MSA Lab Pricing, 2025
S28	Total Organic Carbon	134	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$55.71	$55.71	$7,465.14	15%	9%	$9,358	V Vendor Quote	MSA Lab Pricing, 2025
L7	Field Engineer	140	HR	1.00	$72.87	$72.87	$0.00	$0.00	$0.00	$0.00	$72.87	$10,201.80	50%	9%	$16,680	FLC FLC Datacenter	
M20	Pick up Truck	14	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$263.00	$263.00	$3,682.00	15%	9%	$4,615	CW CostWorks	Source: 01 54 3340 7200
M21	Per Diem	14	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$115.00	$115.00	$1,610.00	0%	0%	$1,610	GSA gsa.gov	gsa.gov local per diem rates
M35	Sample Shipping per Analysis	134	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.50	$13.50	$1,809.00	0%	0%	$1,809	A Allowance	Per Estimator
M36	Sample Supplies per Analysis	134	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.24	$3.24	$434.16	0%	0%	$434	A Allowance	Per Estimator
												TOTAL UNIT COST:			$396,301		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	134	EA	$396,301	$2,957

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
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Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist: **NOTES:**

FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW4-9

Alternative 4 **Cost Worksheet:** **CW4-9**

Capital Cost Sub-Element

Temporary Water Treatment Set Up

COST WORKSHEET

Site:	Wappinger Creek Superfund Site	**Prepared By:** Jacob Hill	**Date:** 7/7/2025
Location:	Dutchess County, New York		
Phase:	Focused Feasibility Study	**Checked By:** Steve Clinch	**Date:** 7/10/2025
Base Year:	2025		

Work Statement:

This sub-element involves set up of a temporary water treatment system. Water collected from dewatering operations will be piped to a temporary water treatment system onsite. The treatment system will operate on top of a gravel surface and within a containment barrier. Dewatered liquids from the soil stockpiles and excavations will be pumped to the water treatment system and treated. Effluent will be discharged into Wappinger Creek.

Cost Analysis:

Cost for Temporary Water Treatment Set Up (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Mob/Demob of Water Treatment System																
S32	Mobilization Water Treatment System	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$37,510.00	$37,510.00	$37,510.00	15%	9%	$47,019	V Vendor Quote	Ground Water Treatment & Technology, LLC, 2021. Includes start up testing.
S33	Demobilization Water Treatment System	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$19,965.00	$19,965.00	$19,965.00	15%	9%	$25,026	V Vendor Quote	Ground Water Treatment & Technology, LLC, 2021
S35	Water Treatment System - Start up Testing	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,288.00	$2,288.00	$4,576.00	15%	9%	$5,736	V Vendor Quote	Ground Water Treatment & Technology, LLC, 2017
M60	Sump Pump - 4" Dia	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$7,750.75	$0.00	$7,750.75	$15,501.50	15%	9%	$19,431	CW CostWorks	Source: 22 14 2913 2060
S53	Water Storage Tank (10,000 GAL) Transportation	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$541.06	$541.06	$1,082.12	15%	9%	$1,356	V Vendor Quote	Ironclad Environmental Solutions 2024
S37	Tank Cleaning	13	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,183.00	$2,183.00	$28,379.00	15%	9%	$35,573	V Vendor Quote	Previous Work, 2015
	Startup Testing - Influent Sampling																
S17	Mercury Analysis (aqueous media)	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$27.24	$27.24	$81.72	15%	9%	$102	V Vendor Quote	MSA Lab Pricing, 2025
M35	Sample Shipping per Analysis	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.50	$13.50	$40.50	0%	0%	$41	A Allowance	Per Estimator
M36	Sample Supplies per Analysis	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.24	$3.24	$9.72	0%	0%	$10	A Allowance	Per Estimator
	Startup Testing - Effluent Sampling								$0.00		$0.00	$0.00			$0		
S17	Mercury Analysis (aqueous media)	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$27.24	$27.24	$81.72	15%	9%	$102	V Vendor Quote	MSA Lab Pricing, 2025
M35	Sample Shipping per Analysis	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.50	$13.50	$40.50	0%	0%	$41	A Allowance	Per Estimator
M36	Sample Supplies per Analysis	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.24	$3.24	$9.72	0%	0%	$10	A Allowance	Per Estimator
	Treatment Area - Pavement																
A70	Asphalt Paving 4" Base Course	69	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.61	$2.61	$181.25	15%	9%	$227	MII MII Assemblies	
M92	Binder Course 4"	13	TON	1.00	$0.00	$0.00	$0.00	$0.00	$88.00	$0.00	$88.00	$1,103.40	15%	9%	$1,383	V CostWorks	Source: 32 12 1613 0813
A71	Asphalt Paving 2" Surface Course	69	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.83	$1.83	$127.08	15%	9%	$159	MII MII Assemblies	
M93	Wearing Course 2"	6	TON	1.00	$0.00	$0.00	$0.00	$0.00	$87.00	$0.00	$87.00	$500.12	15%	9%	$627	V CostWorks	Source: 32 12 1613 0882
A72	Aggregate Sub Base Placement	69	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5.39	$5.39	$374.31	15%	9%	$469	MII MII Assemblies	
M26	Gravel - 1-1/2"	22	TON	1.00	$0.00	$0.00	$0.00	$0.00	$32.60	$0.00	$32.60	$721.34	15%	9%	$904	V Vendor Quote	Peckham 2025
												TOTAL UNIT COST:			$138,216		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$138,216	$138,216

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001

The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:

NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:

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Cost Adjustment Checklist:

FACTOR:	**NOTES:**
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW4-10

Alternative 4 **Cost Worksheet:** **CW4-10**

Capital Cost Sub-Element

Temporary Water Treatment System Operation

COST WORKSHEET

Site:	Wappinger Creek Superfund Site	**Prepared By:** Jacob Hill	**Date:** 7/7/2025
Location:	Dutchess County, New York		
Phase:	Focused Feasibility Study	**Checked By:** Steve Clinch	**Date:** 7/10/2025
Base Year:	2025		

Work Statement:

This sub-element involves water treatment system operation. The treatment system will operate at full scale during excavation activities.

Cost Analysis:

Cost for Temporary Water Treatment System Operation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Full Scale Operation																
S34	Water Treatment System Rental	13	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,238.50	$2,238.50	$29,100.50	15%	9%	$36,477	V Vendor Quote	Ground Water Treatment & Technology, LLC, 2021
S36	Electricity Cost	77,558	KWH	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.14	$0.14	$10,931.02	15%	9%	$13,702	V Vendor Quote	US Energy Information Administration, 2022.
S11	Operator for Water Treatment System	156	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,287.00	$1,287.00	$200,772.00	15%	9%	$251,668	V Vendor Quote	Ground Water Treatment & Technology, LLC, 2017
S51	Bag Filter Replacement	156	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$6.05	$6.05	$943.80	15%	9%	$1,183	V Vendor Quote	Ground Water Treatment & Technology, LLC, 2022
S54	Water Treatment System - Activated Carbon Changeout	7	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$41,040.00	$41,040.00	$266,760.00	15%	9%	$334,384	V Vendor Quote	Ground Water Treatment & Technology, LLC, 2022. Includes onsite removal and refill of two - 4000lb vessels.
S52	Water Storage Tank (10,000 GAL) Rental	172	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$36.57	$36.57	$6,289.18	15%	9%	$7,883	V Vendor Quote	Ironclad Environmental Solutions 2024
	Effluent Sampling																
S17	Mercury Analysis (aqueous media)	37	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$27.24	$27.24	$1,007.88	15%	9%	$1,263	V Vendor Quote	MSA Lab Pricing, 2025
M35	Sample Shipping per Analysis	37	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.50	$13.50	$499.50	0%	0%	$500	A Allowance	Per Estimator
M36	Sample Supplies per Analysis	37	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.24	$3.24	$119.88	0%	0%	$120	A Allowance	Per Estimator
	Dewatering																
A66	Sump Pump Operation	172	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$300.38	$300.38	$51,665.36	15%	9%	$64,763	MII MII Assemblies	
A43	Amendment Mixing	72,668	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.40	$2.40	$174,403.63	15%	9%	$218,615	MII MII Assemblies	
M75	Portland Cement	4,542	TON	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$199.82	$199.82	$907,534.73	15%	9%	$1,137,595	V CostWorks	Cost Works 03 05 1330 0010
												TOTAL UNIT COST:			$2,068,153		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	13	MO	$2,068,153	$159,089

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001

The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:

NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:

MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW4-11

Alternative 4 **Cost Worksheet: CW4-11**

Capital Cost Sub-Element

Waste Characterization Sampling

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025

Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves waste characterization sampling for off-site disposal.

Cost Analysis:
Cost for Waste Characterization Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Waste Characterization Sampling																
S26	TCLP Full Analytical Suite	77	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$866.64	$866.64	$66,731.28	15%	9%	$83,648	V Vendor Quote	MSA Lab Pricing, 2025
S9	Paint Filter Test	77	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$27.24	$27.24	$2,097.48	15%	9%	$2,629	V Vendor Quote	MSA Lab Pricing, 2025
S2	Reactivity-Cyanide	77	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$30.95	$30.95	$2,383.15	15%	9%	$2,987	V Vendor Quote	MSA Lab Pricing, 2025
S3	Reactivity-Sulfide	77	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$49.52	$49.52	$3,813.04	15%	9%	$4,780	V Vendor Quote	MSA Lab Pricing, 2025
S1	Corrosivity	77	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$18.57	$18.57	$1,429.89	15%	9%	$1,792	V Vendor Quote	MSA Lab Pricing, 2025
S19	Ignitability	77	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$49.52	$49.52	$3,813.04	15%	9%	$4,780	V Vendor Quote	MSA Lab Pricing, 2025
S5	PCB Analysis (soil media)	77	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$173.33	$173.33	$13,346.41	15%	9%	$16,730	V Vendor Quote	MSA Lab Pricing, 2025
L7	Field Engineer	26	HR	1.00	$72.87	$72.87	$0.00	$0.00	$0.00	$0.00	$72.87	$1,894.62	50%	9%	$3,098	FLC FLC Datacenter	
M20	Pick up Truck	3	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$263.00	$263.00	$789.00	15%	9%	$989	CW CostWorks	Source: 01 54 3340 7200
M21	Per Diem	3	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$115.00	$115.00	$345.00	0%	0%	$345	GSA gsa.gov	gsa.gov local per diem rates
M35	Sample Shipping per Analysis	539	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.50	$13.50	$7,276.50	0%	0%	$7,277	A Allowance	Per Estimator
M36	Sample Supplies per Analysis	77	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.24	$3.24	$249.48	0%	0%	$249	A Allowance	Per Estimator
												TOTAL UNIT COST:			$129,304		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	77	EA	$129,304	$1,679

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
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Source of Cost Data:
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MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW4-12

Alternative 4 **Cost Worksheet: CW4-12**

Capital Cost Sub-Element

Off-Site Transportation and Disposal

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025

Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves costs for off-site disposal, including transportation.

Cost Analysis:
Cost for Off-Site Transportation and Disposal (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Off-Site Transportation and Disposal																
S23	Non-Hazardous Waste Disposal	46,740	TON	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$265.00	$265.00	$12,386,100.00	2%	0%	$12,633,822	V Vendor Quote	Republic Services 2025
S24	Hazardous Waste Disposal	57,130	TON	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$455.00	$455.00	$25,994,150.00	2%	0%	$26,514,033	V Vendor Quote	Republic Services 2025
												TOTAL UNIT COST:			$39,147,855		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	103,870	TON	$39,147,855	$377

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote. For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist: **NOTES:**

FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW4-13

Alternative 4 **Cost Worksheet:** **CW4-13**

Capital Cost Sub-Element

Restoration of Laydown Area

COST WORKSHEET

Site: Wappinger Creek Superfund Site
Location: Dutchess County, New York
Phase: Focused Feasibility Study
Base Year: 2025

Prepared By: Jacob Hill **Date:** 7/7/2025

Checked By: Steve Clinch **Date:** 7/10/2025

Work Statement:
This sub-element involves costs for restoration.

Cost Analysis:
Cost for Restoration (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Asphalt Removal																
A73	Power Washing of Surfaces	9,320	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.12	$0.12	$1,118.40	15%	9%	$1,402	MII MII Assemblies	
A74	Asphalt Demolition	1,036	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$11.81	$11.81	$12,229.91	15%	9%	$15,330	MII MII Assemblies	
S23	Non-Hazardous Waste Disposal	605	TON	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$265.00	$265.00	$160,302.71	2%	0%	$163,509	V Vendor Quote	Republic Services 2025
	Gravel Removal																
A15	Excavation	169	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.09	$3.09	$521.44	15%	9%	$654	MII MII Assemblies	
S23	Non-Hazardous Waste Disposal	308	TON	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$265.00	$265.00	$81,620.00	2%	0%	$83,252	V Vendor Quote	Republic Services 2025
	Topsoil and Seeding																
A2	Rough Site Grading	18,015	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.08	$0.08	$1,441.20	15%	9%	$1,807	MII MII Assemblies	
A19	Top Soil Placement	450	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.11	$2.11	$949.50	15%	9%	$1,190	MII MII Assemblies	
M31	Screened Topsoil	450	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$37.50	$0.00	$37.50	$16,875.00	15%	9%	$21,153	V CostWorks	Costworks 31 05 1310 0700
A9	Seeding	0.4	AC	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,227.67	$1,227.67	$507.72	15%	9%	$636	MII MII Assemblies	
M30	Lawn Seed	0.4	AC	1.00	$0.00	$0.00	$0.00	$0.00	$1,125.00	$0.00	$1,125.00	$465.26	15%	9%	$583	V CostWorks	Costworks 32 92 1913 1900
												TOTAL UNIT COST:			$289,516		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$289,516	$289,516

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
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MII (MII Assemblies), GSA (www.gsa.gov), FLC (www.flcdatacenter.com), A (Allowance), V (Vendor Quote), CW (Means CostWorks 2025), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
Area Cost Factor (AF)	An AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

ADJ EQUIP	Adjusted Equipment for HFP	CLF	100 Linear Foot
ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

TABLE CW4-14

Alternative 4 **Cost Worksheet:** **CW4-14**

Periodic Cost Sub-Element

Institutional Control Maintenance

COST WORKSHEET

Site:	Wappinger Creek Superfund Site	**Prepared By:** Jacob Hill	**Date:** 7/7/2025
Location:	Dutchess County, New York		
Phase:	Focused Feasibility Study	**Checked By:** Steve Clinch	**Date:** 7/10/2025
Base Year:	2025		

Work Statement:

This sub-element involves maintenance of institutional controls for the site.

Cost Analysis:

Cost for Institutional Controls (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Legal Controls																
L5	Environmental Lawyer	10	HR	1.00	$242.72	$242.72	$0.00	$0.00	$0.00	$0.00	$242.72	$2,427.20	50%	9%	$3,968	FLC FLC Datacenter	
L14	Paralegal	20	HR	1.00	$91.35	$91.35	$0.00	$0.00	$0.00	$0.00	$91.35	$1,827.00	50%	9%	$2,987	FLC FLC Datacenter	
L3	Clerks, Typist, Bookkeeper & Receptionist	10	HR	1.00	$54.89	$54.89	$0.00	$0.00	$0.00	$0.00	$54.89	$548.90	50%	9%	$897	FLC FLC Datacenter	
M1	Institutional Controls Report Allowance	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	Per Estimator
	Informational Devices-Fish Consumption Advisory																
L12	Project Manager	40	HR	1.00	$216.33	$216.33	$0.00	$0.00	$0.00	$0.00	$216.33	$8,653.20	50%	9%	$14,148	FLC FLC Datacenter	
L4	Environmental Engineer	20	HR	1.00	$130.74	$130.74	$0.00	$0.00	$0.00	$0.00	$130.74	$2,614.80	50%	9%	$4,275	FLC FLC Datacenter	
L6	Environmental Scientist	20	HR	1.00	$110.55	$110.55	$0.00	$0.00	$0.00	$0.00	$110.55	$2,211.00	50%	9%	$3,615	FLC FLC Datacenter	
L3	Clerks, Typist, Bookkeeper & Receptionist	10	HR	1.00	$54.89	$54.89	$0.00	$0.00	$0.00	$0.00	$54.89	$548.90	50%	9%	$897	FLC FLC Datacenter	
L5	Environmental Lawyer	5	HR	1.00	$242.72	$242.72	$0.00	$0.00	$0.00	$0.00	$242.72	$1,213.60	50%	9%	$1,984	FLC FLC Datacenter	
L14	Paralegal	5	HR	1.00	$91.35	$91.35	$0.00	$0.00	$0.00	$0.00	$91.35	$456.75	50%	9%	$747	FLC FLC Datacenter	
M34	Aluminum Warning Signs (24" x 24")	9	EA	1.00	$0.00	$0.00	$0.00	$0.00	$59.34	$0.00	$59.34	$534.06	15%	9%	$669	V Vendor Quote	Source: Signs.com, 2025
L9	Field Technician	18	HR	1.00	$73.71	$73.71	$0.00	$0.00	$0.00	$0.00	$73.71	$1,326.78	50%	9%	$2,169	FLC FLC Datacenter	
												TOTAL UNIT COST:			$41,356		

	Representative Unit Quantity	Unit(s)	Total Cost	Unit Cost
COST WORKSHEET SUMMARY	1	LS	$41,356	$41,356

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2001

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Source of Cost Data:

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Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "D" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2025 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, 31 March 2025
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Prime Contractor Overhead and Profit	It is assumed that home office OH is 15% and profit is 9% for the Prime Contractor. Professional labor overhead is 50%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

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ADJ LABOR	Adjusted Labor for HFP	ACR	Acres
BUR LIC	Burdened Line Item Cost	BCY	Bank Cubic Yard
EQUIP	Equipment	DY	Days
HPF	HTRW Productivity Factor	EA	Each
MATL	Material	HR	Hours
PC OH	Prime Contractor Overhead	LF	Linear Foot
PC PF	Prime Contractor Profit	LCY	Loose Cubic Yard
QTY	Quantity	LS	Lump Sum
UNBUR LIC	Unburdened Line Item Cost	LB	Pounds
UNMOD LIC	Unmodified Line Item Cost	RL	Roll
UNMOD UC	Unmodified Unit Cost	SY	Square Yard
		TN	Tons

CDM Smith	PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY: Steve Clinch
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	CLIENT:	EPA Region 2			WRKSHT NO.: Alt 4

Description: Assumptions and calculations for Alternative 4.

Alternative 4

Capital Costs

Project Schedule

Number of Months for Project Duration, MO:	**21**	*assumes 1 additional month before and after construction duration for prep/closeout.*
Estimated duration of Project, WK:	91	
Number of Months for Construction, MO:	**19**	
Estimated duration of construction project, WK:	82	
Calendar days, DY:	574	
Total Number of Work Days, DY:	410	*Work days (based on 5 days per week)*

Institutional Controls

Legal Controls

Environmental Lawyer, HR:	**40**	*Assumed*
Paralegal, HR:	**80**	*Assumed*
Admin Clerk, HR:	**40**	*Assumed*
Reproduction Costs for Institutional Controls, LS:	**1**	*Assumed*

Informational Devices-Fish Consumption Advisory

Project Manager,HR:	**40**	*Assumed*
Environmental Engineer,HR:	**20**	*Assumed*
Environmental Scientist,HR:	**20**	*Assumed*
Admin Clerk,HR:	**10**	*Assumed*
Environmental Lawyer,HR:	**5**	*Assumed*
Paralegal,HR:	**5**	*Assumed*
Signage, EA:	**9**	*Assumes 1 every 2 acres*
Sign Placement,HR:	**1**	*Assumed*
Field Technician,HR:	**18**	*Assumes 2 technicians*

CDM Smith

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CLIENT:	EPA Region 2			WRKSHT NO.:	Alt 4

Description: Assumptions and calculations for Alternative 4.

Site Surveying

Pre-Construction Bathymetric Survey

Total Area of Disturbance, SF:	709,269	
Extra Survey Area, %:	10%	
Total Survey Area, SF:	780,196	
Site Area, AC:	**18.0**	
Acres Surveyed,DY	**2**	*assumed*
Bathymetric Survey, DY:	**9**	
Bathymetric Surveying Report, EA:	**1**	

Post-Construction Bathymetric Survey

Total Area of Disturbance, SF:	709,269	
Extra Survey Area, %:	10%	
Total Survey Area, SF:	780,196	
Site Area, AC:	**18.0**	
Acres Surveyed,DY	**2**	*assumed*
Bathymetric Survey, DY:	**9**	
Bathymetric Surveying Report, EA:	**1**	

Site Preparation

Clearing and Grubbing

Removal Area, SF:	81,433
Removal Area, AC:	1.9
Clearing and Grubbing in Open Areas, %:	100%
Clearing and Grubbing - Open, AC:	**2**
Clearing and Grubbing - Open, AC:	**2**
Length for equipment laydown area, FT:	**125**
Width of equipment laydown area, FT:	**40**
Area for equipment laydown area, SF:	5,000
Area for equipment laydown area, SY:	556
Length for temporary road, FT:	826
Width of temporary road, FT:	15
Area for road, SF:	12,390
Area for temporary road, SY:	1,377
Area for equipment laydown are and road, SY:	**1,940**
Area of stripping, AC:	0.40
Depth of stripping, IN:	**6**
Depth of stripping, FT:	0.5
Stripped volume, CF:	8,695
Stripped volume, BCY:	**330**
Stripped volume, LCY:	396
Gravel %:	50%
Pavement %:	50%
Thickness of gravel for equipment laydown area, IN:	6
Volume of gravel needed, ECY:	46
Volume of gravel needed, LCY:	54
Thickness of gravel for road, IN:	6
Volume of gravel needed, ECY:	115
Volume of gravel needed, LCY:	135
Gravel volume, LCY:	189
Gravel volume, TON:	**308**

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	CLIENT:	EPA Region 2			WRKSHT NO.: Alt 4

Description: Assumptions and calculations for Alternative 4.

Area for equipment laydown are and road(Pavement), SY:	**970**
Depth of Sub Base Course, IN:	6
Depth of Base Course, IN:	4
Depth of Pavement, IN:	2
Sub Base Course Required, ECY:	162
Sub Base Course Required, LCY:	190
Sub Base Course Required, TON:	**309**
Base Course Required, CY:	108
Base Course Required, TON:	**175**
Pavement Required, CY:	54
Pavement Required, TON:	**80**

Sheetpiling

Length of Sheetpiling Wall,FT	**200**
Depth of Sheet Pile,FT:	**30**
Area of Sheetpile, SF:	**6,000**
Area of gravel,SF:	**321**
Depth of gravel,ft:	**8**
Gravel Placement CF::	**2,568**
Gravel Placement BCY:	**95**
Gravel Placement LCY:	**107**
Gravel Tons:	**173**

Erosion Control Measures

Silt Fencing, LF:	2,104	*Estimated based on area of disturbance*
Assumed % Replaced during Construction, %:	10%	
Length of Silt Fence Required, LF:	**2,400**	*Rounded up to nearest Hundred*
Number of Straw Bales, EA:	170	*Rounded up to nearest ten*
Length of Each Straw Bale, FT:	3	
Total length of Straw Bales, FT:	**500**	*Assumed. Based on previous work*
Erosion Control Maintenance Crew, HR/WK:	4	*assumed*
Erosion Control Maintenance Crew, HR:	**328**	

Turbidity Curtain

Installation of Turbidity Curtain

Assumed Length of Turbidity Curtain Required, LF:	2,000	*Assumed by estimator*
Assumed % of turbidity curtain to be reused, %:	50%	
Amount of turbidity curtain to be purchased, LF:	**1,000**	
Length per section, LF/EA:	50	
Number of sections, EA:	20	
Total length, FT:	1,000	
No. of anchor kits per section, EA/EA:	2	
No. of anchor kits, EA:	40	
Assumed installation productivity, LF/HR:	100	*Assumed by estimator*
Assumed Duration of Installation, HR:	20	

Inspection and Maintenance

Number of weeks turbidity curtain required, WK:	82	
Maintenance time of turbidity curtains per week, HR/WK:	2	
Turbidity Curtain Maintenance, HR:	164	*Assume 2 hr per week during construction*

Removal of Turbidity Curtain

Removal of turbidity curtains and anchors, LF:	2,000	

CDM Smith	PROJECT: Wappinger Creek Superfund Site	COMPUTED BY: Jacob Hill		CHECKED BY: Steve Clinch	
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	CLIENT: EPA Region 2			WRKSHT NO.: Alt 4	

Description: Assumptions and calculations for Alternative 4.

Dredging

Dredging Volumes include 50% overdregde for polygons deeper than 3 ft

In Channel

Dredging, BCY:	16,056	
Bulking Factor BCY to LCY:	1.15	*Dredged Sediment Bulking Factor*
Dredging,LCY:	**18,464**	
Dredging Area,SF:	162,269	
Dredging Area,AC:	3.7	
Dredged Sediment Density (LB/CY):	3,100	*Source: Caterpillar Performance Handbook, edition 3.1 (Assumes Sand - Wet)*
Dredged Sediment Density (TON/CY):	1.55	
Weight of Dredged Sediments, TONS:	28,620	
Scow Capacity,LCY:	1,500	
Scow Transport,EA:	**13**	

Shoreline

Total Dredging Volume BCY:	23,035	
Bulking Factor BCY to LCY:	1.15	*Dredged Sediment Bulking Factor*
Dredging,LCY:	**26,490**	
Dredging Area,SF:	234,016	
Dredging Area,AC:	5.4	
Dredged Sediment Density (LB/CY):	3,100	*Source: Caterpillar Performance Handbook, edition 3.1 (Assumes Sand - Wet)*
Dredged Sediment Density (TON/CY):	1.55	
Weight of Dredged Sediments, TONS:	41,060	
Scow Capacity,LCY:	1,500	
Scow Transport,EA:	**18**	

Embayment Area

Additional Dredging for Access Area Channel AVG Depth ft:	1.5	*Assumes additional dredging depth to allow equipment access*
Additional Dredging for Access Area Channel sf:	65510	
Additional Dredging cf:	98265	
Additional Dredging BCY:	3640	
Total Dredging Volume BCY:	18,597	
Bulking Factor BCY to LCY:	1.15	*Dredged Sediment Bulking Factor*
Dredging,LCY:	**21,386**	
Dredging Area,SF:	299,520	
Dredging Area,AC:	6.9	
Dredged Sediment Density (LB/CY):	3,100	*Source: Caterpillar Performance Handbook, edition 3.1 (Assumes Sand - Wet)*
Dredged Sediment Density (TON/CY):	1.55	
Weight of Dredged Sediments, TONS:	33,149	
Scow Capacity,LCY:	1,500	
Scow Transport,EA:	**15**	

Bridge Area

Total Dredging Volume BCY:	2,493	
Bulking Factor BCY to LCY:	1.15	*Dredged Sediment Bulking Factor*
Dredging,LCY:	**2,867**	
Dredging Area,SF:	13,464	
Dredging Area,AC:	0.3	
Dredged Sediment Density (LB/CY):	3,100	*Source: Caterpillar Performance Handbook, edition 3.1 (Assumes Sand - Wet)*
Dredged Sediment Density (TON/CY):	1.55	
Weight of Dredged Sediments, TONS:	4,444	
Scow Capacity,LCY:	1,500	
Scow Transport,EA:	**2**	

Floodplain Soils

Width of Area,ft:	**50**	*assumed*
Depth of Area,ft:	**0.5**	*assumed*
Length of Area,ft:	**2046**	*assumed*
Area,AC:	**2.35**	
Volume for excavation, cf:	**51150**	
Volume for excavation, BCY:	**1894**	
Volume for excavation, LCY:	**2273**	
Volume for Disposal,TONS:	**2983.75**	

Offloading

Offloading Volume,LCY:	**69,208**	

CDM Smith	PROJECT: Wappinger Creek Superfund Site	COMPUTED BY: Jacob Hill		CHECKED BY: Steve Clinch	
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	CLIENT: EPA Region 2			WRKSHT NO.: Alt 4	

Description: Assumptions and calculations for Alternative 4.

Barge Equipment

Mob/Demob Spud Barge,EA:	2	
Mob/Demob Material Barge,EA:	2	
Spud Barge Rental (1-90) Rate,DY:	90	
Spud Barge Rental (90-180) Rate,DY:	180	
Material Barge Rental (1-90) Rate,DY:	90	
Material Barge Rental (90-180) Rate,DY:	180	

Cultural Resources Oversight

Archeologist,HR:	80	*Assumed*
Per Diem,DY:	8	
Pickup Truck, DY:	8	

Confirmation Sampling

Dredge Area, SF:	709,269	
Dredge Area, AC:	16.28	
Total Samples, EA:	82	*Assumes 5 samples an acre*
Estimated Duration of Sampling DY:	17	*Assumed*
Total number of chemical sample sets, EA:	**82**	*Maximum number of samples for a specific analysis*
Total number of chemical samples, EA:	**246**	
Time for sediment sample locations, DY:	17	
Time for sediment sample locations, HR:	68	
Total time, DY:	**17**	
Total time, HR:	**68**	
Number of mobilizations, EA/EA:	**1**	
Number of crews, EA:	1	
Number of workers per crew, EA/EA:	2	
Number of scientists per boat, EA:	2	
Assumed IDW per surface sediment sample, CF/EA:	0.2	
IDW generated from sample locations, CF:	16	
Total IDW generated, CF:	16	
Total IDW generated, GAL:	120	
Number of 55-gallon drums needed, EA:	3	
Total IDW generated, TON:	0.8	
Number of days for container rental, DY:	17	
Assumed solid waste container capacity, TON:	8	
Number of times container will need to be emptied, EA:	3	
Decon water generated per sediment sample, GAL/EA:	1	
IDW generated from decontamination of equipment, GAL:	82	
Number of 55-gallon drums needed, EA:	2	
Staff Scientist, HR:	68	
Project Scientist, HR:	68	
Pickup Truck, DY:	7	
Per Diem, DY:	14	
PCBs, EA:	82	
Dioxin/Furans, EA:	82	
Pesticides, EA:	82	
Total Metals, EA:	82	
Mercury, EA:	82	
SVOCs,EA:	82	
Shipping, per Sample Analysis, EA:	492	1 Set of Analyses per Sample
Miscellaneous Sampling Supplies, per Sample, EA:	492	
Rental Fee for Solid Waste Disposal Container, DAY:	17	
Hauling for Disposal, EA:	3	
Waste Disposal (non-regulated solid waste),TONs:	0.8	
Lab Analysis - Soil Disposal TCLP Analyte List, EA:	3	
Water Disposal Fee, GAL:	82	
55-gallon Drum, EA:	2	
Water Testing for Waste Profiling - Standard Analyte List, EA:	2	

Residual Covers

In-Channel

Dredged Volume BCY:	16056
Assumed Additional Volume for Coverage,%:	10%

Description: Assumptions and calculations for Alternative 4.

Sand Placement BCY:	17661
Sand Placement LCY:	19781
Sand Density (TON/CY):	1.2
Sand Placement, TONS:	**23737**

Shoreline

Dredged Volume BCY:	23035
Assumed Additional Volume for Coverage,%:	10%
Sand Placement BCY:	25338
Sand Placement LCY:	28379
Sand Density (TON/CY):	1.2
Sand Placement, TONS:	**34055**

Embayment

Dredged Volume BCY:	14957
Assumed Additional Volume for Coverage,%:	10%
Sand Placement BCY:	16452
Sand Placement LCY:	18427
Sand Density (TON/CY):	1.2
Sand Placement, TONS:	**22112**

Bridge Area

Dredged Volume BCY:	2493
Assumed Additional Volume for Coverage,%:	10%
Sand Placement BCY:	2743
Sand Placement LCY:	2359
Sand Density (TON/CY):	1.2
Sand Placement, TONS:	**2830**

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CLIENT:	EPA Region 2			WRKSHT NO.:	Alt 4

Description: Assumptions and calculations for Alternative 4.

Floodplains

Assumes floodplains cap is not reactive

Sand, LCY:	2,273
Density of Sand (dry), TON/LCY:	1.20
Sand,TON:	2,728
Sand Placement, LCY:	2,273

Backfill Conformance Sampling

Total Fill Volume,LCY:	66,586
Dioxin/Furans, EA:	134
PAHs, EA:	134
Pesticides, EA:	134
TCLP Metals and mercury, EA:	134
PCBs, EA:	134
RCRA Metals, EA:	134
TPH Diesel, EA:	134
Grain Size Distribution,EA:	134
Total Organic Carbon (TOC),EA:	134
Shipping Allowance,EA:	134
Miscellaneus Supplies, EA:	134
Total Samples, EA:	134
Assumed Sample Location Productivity, EA/DY:	20
Estimated Duration of Sampling DY:	7
Crew Size,EA:	2
Field Engineer DY:	14
Field Engineer, HRs:	140
Pickup Truck,DY:	14

CDM Smith	PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY: Steve Clinch
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	CLIENT:	EPA Region 2			WRKSHT NO.: Alt 4

Description: Assumptions and calculations for Alternative 4.

Temporary Water Treatment System Set up

Mob/Demob of Water Treatment System

Mob/Demob of Water Treatment System, LS:	1	
Startup Testing, DAY:	2	*Assumes 2 operators for 10 days*

Startup Testing - Influent Sampling

Influent Sampling Frequency, EA/DY:	1	*Assumed*
Influent Samples, EA:	2	*Assumes daily sampling for 10 days during startup*
Field Duplicates, EA:	1	*Assume 5% of total samples*
Total Influent Samples, EA:	3	*Assumes PCB analysis only*
Shipping, per Sample Analysis, EA:	3	
Miscellaneous Sampling Supplies, per Sample, EA:	3	

Startup Testing - Effluent Sampling

Effluent Sampling Frequency, EA/DY:	1	*Assumed*
Effluent Samples, EA:	2	*Assumes daily sampling for 10 days during startup*
Field Duplicates, EA:	1	*Assume 5% of total samples*
Total Effluent Samples, EA:	3	*Assumes PCB analysis only*
Shipping, per Sample Analysis, EA:	3	
Miscellaneous Sampling Supplies, per Sample, EA:	3	

Water Treatment Area - Pavement

Total Surface Area - Water Treatment Area, SF:	625	*assumed*
Water Treatment Area, SY:	69	*Rounded up to the nearest tens*
Depth of Sub Base Course, IN:	6	*Dense graded aggregate sub base course*
Depth of Base Course, IN:	4	*Bituminous base course*
Depth of Pavement, IN:	2	*Pavement surface course*
Sub Base Course Required, ECY:	12	
Sub Base Course Required, LCY:	14	
Sub Base Course Required, TON:	22	
Base Course Required, CY:	8	
Base Course Required, TON:	13	
Pavement Required, CY:	4	
Pavement Required, TON:	6	

Dewatering of Stockpiles

Sump Pump, EA:	2	
Sump Pump Operating Days, DY:	172	
Total Sump Pumps, EA:	2	
Sump Pump Operating Days, DY:	172	
Volume of Material For Mixing, LCY:	69,208	
Percent by Volume of Cement,%:	5%	
Addition of Portland Cement, LCY:	3,460	
Addition of Portland Cement, Tons:	4,542	
Ammendment Mixing, LCY:	72,668	

Temporary Water Treatment System Operation

Full-Scale Operation of Water Treatment System

Duration of Dredging, MO:	13	
Duration of Dredging, WK:	35	
Duration of Dredging, DYs:	172	
Water Treatment System Operation/Rental, MO:	13	
Electrical Power Requirements, HP:	200	*Per Engineer*
Required Operation Duration per Week, HR/WK:	10	*Assumed*
Required Operation Duration per Month, HR/MO:	40	*Per Engineer*
Electricity Requirements per Month, KWH/MO:	5,966	
Total Electricity Requirements, KWH:	77,558	*For duration of full-scale operation*
Operator Frequency, DY/MO:	12	*Assumed*
Total Operator, DY:	156	
Total Operator, HR/DY:	10	
Total Operator, HR:	1,560	
Bag Filter Replacement, EA/DY:	1	*assumed*
Total Bag Filter Replacement, EA:	156	
Activated Carbon Vessels, EA:	2	
Activated Carbon Vessel Loading, LB/EA:	4,000	
Total Activated Carbon, LB:	8,000	

CDM Smith	PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY: Steve Clinch
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	CLIENT:	EPA Region 2			WRKSHT NO.: Alt 4

Description: Assumptions and calculations for Alternative 4.

Number of Activated Carbon Changeout, EA:	7	*assumes changeout every other month*
Water Storage Tank, GAL:	10,000	
Water Storage Tank Rental, DY:	172	
Water Storage Tank Transportation, EA:	2	*includes delivery and pickup*
Tank Cleaning/Decontamination, EA:	13	*Assumes 1 cleaning per month*
Effluent Sampling		
Effluent Sampling Frequency, EA/WK:	1	*Assumed*
Total Effluent Samples, EA:	35	
Field Duplicates, EA:	2	*Assume 5% of total samples*
Total Effluent Samples, EA:	37	*Assumes PCB analysis only*
Shipping, per Sample Analysis, EA:	37	
Miscellaneous Sampling Supplies, per Sample, EA:	37	

Waste Characterization Sampling

Waste Characterization Sampling Frequency, LCY/EA:	1,000	*Assumed*
Total Waste Material, LCY:	72,668	*Off-Site Disposal Volume*
Waste Characterization Samples, EA:	73	
Field Duplicates, EA:	4	*Assume 5% of total samples*
TCLP Analysis, EA:	77	
Paint Filter Test,EA:	77	
Reactive Cyanide,EA:	77	
Reactive Sulfide,EA:	77	
Corrosivity,EA:	77	
Ignitability,EA:	77	
PCBs,EA:	77	
Field Engineer, HR:	26	*Assumes 20 minutes per sample.*
Pickup Truck, DY:	3	
Per Diem, DY:	3	
Shipping, per Sample Analysis, EA:	539	*7 Set of Analyses per Sample*
Miscellaneous Sampling Supplies, per Sample, EA:	77	

CDM Smith

PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY:	Steve Clinch
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CLIENT:	EPA Region 2			WRKSHT NO.:	Alt 4

Description: Assumptions and calculations for Alternative 4.

Transportation and Disposal

TSCA Waste Disposal Volume

Disposal Volume Classified as TSCA Waste, %: 0% *Assumed percentage of overall disposal volume*

	BCY	LCY	TON	
TSCA Volume :	0	0	0	
Total Mixed Cement:	-	-	0	
Total Volume:	0	0	**0**	*Rounded up to nearest ten*

Subtitle C (Hazardous) Waste Disposal Volume

Disposal Volume Classified as Subtitle C (Hazardous) Waste, %: 55% *Assumed percentage of overall disposal volume*

	BCY	LCY	TON	
Haz Waste Volume :	34,141	39,263	54,630	
Total Mixed Cement:	-	1,903	2,498	
Total Volume:	34,150	41,170	**57,130**	*Rounded up to nearest ten*

Subtitle D (Non-Haz) Waste Disposal Volume

Disposal Volume Classified as Subtitle D (Non-Hazardous) Waste, %: 45% *Assumed percentage of overall disposal volume*

	BCY	LCY	TON	
Non-Haz Waste Volume (Upper Creek):	27,934	32,124	44,690	
Total Mixed Cement:	-	1,557	2,044	
Total Volume:	27,940	33,690	**46,740**	*Rounded up to nearest ten*

Restoration

Removal of Asphalt

Power Washing of Asphalt

Power Washing of Asphalt, SF:	**9,320**	*Power washing of asphalt prior to demolition*

Pavement Demolition

Pavement for Demolition, SY:	**1,036**	
Pavement/Aggregate for Off-Site Recycling, LCY:	**377**	
Pavement/Aggregate for Off-Site Recycling, TON:	**605**	

Removal of Gravel

Aggregate for Disposal, BCY:	**169**	
Aggregate for Disposal, TON:	**308**	

Topsoil and Seeding

Disturbed Areas,SF:	**18,015**	
Topsoil Depth,FT:	**0.5**	
Topsoil Required for Restoration, ECY:	334	
Estimated area for Restoration, SF:	18,015	*Assumes half an acre*
Rough Grading, SF:	**18,015**	
Assumed Thickness of Topsoil, IN:	6	
Placement of Topsoil, ECY:	334	
Placement of Topsoil, LCY:	**450**	*Rounded up to nearest ten*
Placement of Topsoil, TON:	600	*Rounded up to nearest ten*
Restoration Area, SF:	18,015	
Restoration Area, AC:	0.4	
Seed Mix, AC:	**0.4**	

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Description: Assumptions and calculations for Alternative 4.

Periodic O&M

Institutional Control Maintenance

Legal Controls

Environmental Lawyer, HR:	10	
Paralegal, HR:	20	
Admin Clerk, HR:	10	
Reproduction Costs for Institutional Controls, LS:	1	

Informational Devices-Fish Consumption Advisory

Project Manager,HR:	40	*Assumed*
Environmental Engineer,HR:	20	*Assumed*
Environmental Scientist,HR:	20	*Assumed*
Admin Clerk,HR:	10	*Assumed*
Environmental Lawyer,HR:	5	*Assumed*
Paralegal,HR:	5	*Assumed*
Signage, EA:	9	*Assumes 1 every 2 acres*
Sign Replacement,HR:	1	*Assumed*
Field Technician,HR:	18	*Assumes 2 technicians*

CDM Smith

PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY:	Steve Clinch
JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE:	11/15/2025	DATE CHECKED:	7/10/2025
CLIENT:	EPA Region 2			WRKSHT NO.:	Quantities

Description: Quantities for Alternative SED6.

Area of Disturbance

	Area (SF)
In-Channel	162,269
Shoreline	234,016
Embayment	299,520
Bridge Area	13,464
TOTAL	709,269

Dredging Quantities

Wappinger Creek				
Section	Area (SF)	Depth (FT)	Volume (BCY)	Volume (LCY)
In-Channel	162,269	Varies	16,056	18,464
Shoreline	234,016	Varies	23,035	26,490
Embayment	299,520	Varies	14,957	17,200
Bridge	13,464	Varies	2,493	2,867

Waste Quantities

	In-Channel	Shoreline	Embayment	Bridge
Volume of Hazardous Waste (Subtitle C) (BCY)	8,831	12,669	8,226	1,371
Volume of Hazardous Waste (Subtitle C) (LCY)	10,155	14,570	9,460	1,577
Volume of Non-Hazardous Waste (Subtitle D) (BCY)	7,225	10,366	6,731	1,122
Volume of Non-Hazardous Waste (Subtitle D) (LCY)	8,309	11,921	7,740	1,290

Disposal Volume Classified as TSCA (Hazardous) Waste, %:	0%	*Assumed percentage of overall disposal volume*
Disposal Volume Classified as Subtitle C (Hazardous) Waste, %:	55%	*Assumed percentage of overall disposal volume*
Disposal Volume Classified as Subtitle D (Non-Hazardous) Waste, %:	45%	*Assumed percentage of overall disposal volume*

Residual Cover

	In-Channel	Shoreline	Embayment	Bridge	Total	ACRES
Area for Residual Cover Creek, SF:	162,269	234,016	299,520	13,464	709,269	16.28

	Layer	Depth (IN)	In-Channel (BCY)	Shoreline (BCY)	Embayment(BCY)	Bridge	
Sand and Sedimite	Residual Cover Sand Only	Varies	16,056	23,035	14,957	2,493	
	Total	**Varies**	**16,100**	**23,100**	**15,000**	**2,500**	*Rounded up to nearest hundred*

CDM Smith

PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY:	Jacob Hill	CHECKED BY:	Steve Clinch
JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE:	11/15/2025	DATE CHECKED:	7/10/2025
CLIENT:	EPA Region 2			WRKSHT NO.:	Quantities

Description: Quantities for Alternative SED6.

Quantity Summary

Alternative SED6

	In-Channel	Shoreline	Embayment	Bridge	TOTAL
Areas					
Remediation Area (SF)	162,269	234,016	299,520	13,464	709,269
Area of Residual Cover	162,269	234,016	299,520	13,464	709,269
Depths					
Depth of Remediation Zone	Varies	Varies	Varies	Varies	Varies
Excavation					
Volume for Disposal (BCY)	16,056	23,035	14,957	2,493	56,541
Disposal					
Subtitle C Hazardous Waste (BCY)	8,831	12,669	8,226	1,371	31,097
Subtitle D Non-Hazardous Waste(BCY)	7,225	10,366	6,731	1,122	25,443
Containment					
Volume of Material Placed for Residual Cover (BCY)	16,100	23,100	15,000	2,500	56,700

Estimated Project Duration

Major Construction Activity	Total Volume		Productivity		Estimated Duration		
					DY	WK	MO
Dredging (Shoreline and Channel)	39,091	BCY	228	BCY/DY	172	35	9
Dredging (Embayment and Bridge)	17,450	BCY	153	BCY/DY	115	15	4
Containment System Construction	56,700	ECY	467	ECY/DY	122	16	4
Site Preparation							1
Site Restoration							1
						Estimated Project Duration	19
						Construction Season, MO/YR:	8
						Construction Seasons, EA:	3

CDM Smith

PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY :	Justin Nielsen	CHECKED BY:	Colin Scheil
JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE :	3/6/2025	DATE CHECKED:	3/7/2025
CLIENT:	EPA Region 2			WRKSHT NO. :	PDSM-01

Description: Determination of number of shifts per day and number of crews needed and duration assumptions.

General Assumptions

In-water work window, DY/YR:	122	
In-water work window, WK/YR:	17.4	
Number of dredging days per week, DY/WK:	7	
Actual dredging days per year, DY/YR:	122	
Total Hours per Shift, HR:	10	
Crew shift time, breaks, etc., HR:	2	
Actual Work Hours per Shift, HR:	8	*Assumes crew shift time, breaks, etc. (approx. 2 hours)*

Dredging/Removal Activities

	Number of Shifts EA/DY	No. of Crews EA/SHIFT	Total Hours HR/DY	Work Hours HR/DY	Unit Productivity CY/HR/SHIFT	Unit Productivity CY/DY/SHIFT	Overall Productivity CY/DY	Volume to Dredge CY	Dredging Duration DY	Dredging Duration YR
Confined Dredging	1	1	10	8	35.6	285	**285**		0	0
	1	1	10	8	23.8	190	**190**	0	0	0
								0	**0**	
								Estimated	**#DIV/0!**	

	Number of Shifts EA/DY	No. of Crews EA/SHIFT	Total Hours HR/DY	Barge Time to Facility HR	Return Barge Time HR
Transportation to Disposal Facility	1	1	10	1	1

	Number of Shifts EA/DY	No. of Crews EA/SHIFT	Total Hours HR/DY	Work Hours HR/DY	Unit Productivity CY/HR/SHIFT	Unit Productivity CY/DY/SHIFT	Overall Productivity CY/DY	Volume to Offload CY	Offloading Duration DY
Offloading	1	1	10	8	76.2	610	**610**	91,699	151

Capping/Placement Activities

	Number of Shifts EA/DY	No. of Crews EA/SHIFT	Total Hours HR/DY	Work Hours HR/DY	Unit Productivity CY/HR/SHIFT	Unit Productivity CY/DY/SHIFT	Overall Productivity CY/DY	Volume to Place CY	Placement Duration DY	Placement Duration YR
Placement - Confined	1	1	10	8	58.3	466	**466**	4,584	10	0.08
								4,584	**10**	

Construction Duration Assumptions

	Overall Productivity CY/DY	Volume CY	Duration DY	Duration MO	Duration YR
Confined Dredging	**285**	0	0	0.0	0.0
Placement - Confined	**466**	4,584	10	0.3	0.08
Total Duration for Removal and Backfill/Capping Activities			10	0.3	
Assumed Duration of Site Preparation (Removal of Obstructions, Turbidity Controls, etc.):				2	0.5
Assumed Duration of Site Restoration:				1	0.25
Estimated Total Duration (Based on In-Water Schedule):			101	3.3	0.83
Estimated Total Duration (Based on Calendar Days):			101	3.3	0.3

Based on In-Water Work Schedule

CDM Smith

PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY :	Justin Nielsen
JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE :	3/6/2025
CLIENT:	EPA Region 2		

CHECKED BY:	Colin Scheil		
DATE CHECKED:	3/7/2025		
WRKSHT NO. :	CRW-01		

Description: Assumptions for crew composition development. Adjusts crew composition based on productivity and duration determination. Adjusted crew man and equipment hours and adjusted productivity used to determine unit costs.

Overtime Assumptions

	# Days/Week	# Hrs/Shift	# Shifts/Day	# Work Hours/Shift 1st	2nd	3rd	Total Hrs/Day
Standard:	5	10	1	8	0	0	8

Day	OT	Work
Monday	1	Y
Tuesday	1	Y
Wednesday	1	Y
Thursday	1	Y
Friday	1.5	Y
Saturday	1.5	N
Sunday	1.5	N

Confined Dredging with Barge-Mounted Excavator

Number of Shifts, EA/DY:	1	*See Worksheet PDSM-01*
Number of Crews per Shift, EA/DY:	1	*See Worksheet PDSM-01*
Dredge time, HR/DY:	8	*See Worksheet PDSM-01*
Adjusted productivity, CY/DY:	**285**	*See Worksheet PDSM-01*
Total time, HR/DY:	10	
Adjusted productivity, CY/HR:	**28.5**	

Mll Assumptions

Labor Tag	Labor	Crew Labor Type	Man Hours	Adj. Crew Man Hours
B-EQOPRCRB	Equip. Operators Crane with Boom Pay	Journeyman	1	**1**
X-LABORER4	Outside Laborers, Group 4 Skilled	Foreman	1	**1**
X-LABORER4	Outside Laborers, Group 4 Skilled	Journeyman	1	**1**
X-EQOPRMED	Outside Equip. Operators, Medium	Journeyman	1	**1**

Equip Tag	Equipment	Condition	Eq Hours	Adj. Crew Eq. Hours
H25CA045	HYDRAULIC EXCAVATOR, CRAWLER, 84,600 LBS, 2.01 CY BUCKET, 22.9' MAX DIGGING DEPTH	Average	1	**1**
M10XX022	MARINE EQUIPMENT, BOATS & LAUNCHES, 45' LENGTH, 16' BEAM, 5' 0" DRAFT, PUSH BOAT	Average	1	**1**
M10SM004	MARINE EQUIPMENT, BOATS & LAUNCHES, 23' LITTLE GIANT, W/CABIN TRI-HULL, CAP 3,400 LBS, OUTBOARD, 23.4' X 8.5' X 1.2'	Average	1	**1**
XX0XX740	WORK BARGE, FLAT DECK, 2000 TON WITH 4 SPUDS		4	**4**
XX0XX800	DUMP SCOW BARGE, 1,500 CY	Average	4	**4**
U-MISC-010	Miscellaneous Equipment (crane mats, etc.)	Average	1	**1**

CDM Smith

PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY :	Justin Nielsen	CHECKED BY:	Colin Scheil
JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE :	3/6/2025	DATE CHECKED:	3/7/2025
CLIENT:	EPA Region 2			WRKSHT NO. :	CRW-01

Description: Assumptions for crew composition development. Adjusts crew composition based on productivity and duration determination. Adjusted crew man and equipment hours and adjusted productivity used to determine unit costs.

Offloading

Number of Shifts, EA/DY:	1	*See Worksheet PDSM-01*
Number of Crews per Shift, EA/DY:	1	*See Worksheet PDSM-01*
Dredge time, HR/DY:	8	*See Worksheet PDSM-01*
Adjusted productivity, CY/DY:	**610**	*See Worksheet PDSM-01*
Work time, HR/DY:	10	
Adjusted productivity, CY/HR:	**61.0**	

MII Assumptions

Labor Tag	Labor	Labor Type	Man Hours	Adj. Crew Man Hours
B-EQOPRCRN	Equip. Operators, Heavy	Journeyman	1	**1**
X-LABORER4	Outside Laborers, Group 4 Skilled	Foreman	1	**1**
X-LABORER4	Outside Laborers, Group 4 Skilled	Journeyman	2	**2**
X-EQOPROIL	Outside Equip. Oilers / Grade Checker	Journeyman	1	**1**

Equip Tag	Equipment	Condition	Eq Hours	Adj. Crew Eq. Hours
XX0XX400	BARGE MOUNTED CLAMSHELL, 5 CY CRANE	Average	1	**1**
M10XX022	MARINE EQUIPMENT, BOATS & LAUNCHES, 45' LENGTH, 16' BEAM, 5' 0" DRAFT, PUSH BOAT	Average	1	**1**

Placement - Confined

Number of Shifts, EA/DY:	1	*See Worksheet PDSM-01*
Number of Crews per Shift, EA/DY:	1	*See Worksheet PDSM-01*
Placement time, HR/DY:	8	*See Worksheet PDSM-01*
Adjusted productivity, CY/DY:	**466**	*See Worksheet PDSM-01*
Work time, HR/DY:	10	
Adjusted productivity, CY/HR:	**46.6**	

MII Assumptions

Labor Tag	Labor	Labor Type	Man Hours	Adj. Crew Man Hours
B-EQOPRCRN	Equip. Operators, Heavy	Journeyman	1	**1**
X-EQOPRHVY	Outside Equip. Operators, Heavy	Journeyman	1	**1**
X-LABORER4	Outside Laborers, Group 4 Skilled	Foreman	1	**1**
X-LABORER4	Outside Laborers, Group 4 Skilled	Journeyman	2	**2**
X-EQOPRMED	Outside Equip. Operators, Medium	Journeyman	1	**1**

Equip Tag	Equipment	Condition	Eq Hours	Adj. Crew Eq. Hours
H25CA045	HYDRAULIC EXCAVATOR, CRAWLER, 84,600 LBS, 2.01 CY BUCKET, 22.9' MAX DIGGING DEPTH	Average	1	**1**
M10XX033	MARINE EQUIPMENT, TUGS, 60 FT LENGTH, 21 FT BEAM, 5'0" DRAFT, 80 TON, TOW BOAT	Average	1	**1**
M10SM004	MARINE EQUIPMENT, BOATS & LAUNCHES, 23' LITTLE GIANT, W/CABIN TRI-HULL, CAP 3,400 LBS, OUTBOARD, 23.4' X 8.5' X 1.2'	Average	1	**1**
XX0XX740	WORK BARGE, FLAT DECK, 2000 TON WITH 4 SPUDS	Average	2	**2**
XX0XX800	DUMP SCOW BARGE, 1,500 CY	Average	2	**2**
M10XX022	MARINE EQUIPMENT, BOATS & LAUNCHES, 45' LENGTH, 16' BEAM, 5' 0" DRAFT, PUSH BOAT	Average	1	**1**
S30KB033	SCREENING & CRUSHING PLANTS, CONVEYOR, ADJUSTABLE HEIGHT RADIAL STACKER, 36" WIDE X 150' LONG, PORTABLE, 2,000 TPH	Average	1	**1**
U-MISC-010	Miscellaneous Equipment (crane mats, etc.)	Average	1	**1**

PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY :	Marc Schlebusch	CHECKED BY:	Justin Nielsen
JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE :	3/1/2016	DATE CHECKED:	3/4/2016
CLIENT:	EPA Region 2			WRKSHT NO. :	PD-01

Description: Determine estimated productivities for typical crews including open water dredging, confined dredging, riverbank excavation, in-barge stabilization, off-loading, and placement of various cap materials.

Confined Area Dredging - Barge Mounted Excavator (Channel and Shoreline)

Assumptions

Assumes barge mounted excavator.

Total Hours per Shift, HR:	10
Crew shift time, breaks, etc., HR:	2
Actual Work Hours per Shift*, HR:	8
**Assumes crew shift time, breaks, etc. (approx. 2 hours)*	
Assumed Bucket Capacity, CY:	2
Work Efficiency, %:	90%
Operator Ability Correction Factor:	0.9
Bucket Fill Factor, %:	55%
Load Time, MIN:	0.34
Swing Time Loaded, MIN:	0.18
Dump Time, MIN:	0.04
Swing Time Unloaded, MIN:	0.14
Maneuver Time, MIN:	0.8

Productivity Calculations

Bucket Volume	CY	2
Bucket Fill Factor	%	55%
Bucket Payload	CY	1.1
Cycle Time	MIN/cycle	1.50
Ideal Loader Productivity	BCY/HR	44
Work Efficiency	%	90%
Operator Ability Correction Factor		0.9
Adjusted Loader Productivity	BCY/HR	35.6
	BCY/SHIFT	**228**

PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY :	Marc Schlebusch	CHECKED BY:	Justin Nielsen
JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE :	3/1/2016	DATE CHECKED:	3/4/2016
CLIENT:	EPA Region 2			WRKSHT NO. :	PD-01

Description: Determine estimated productivities for typical crews including open water dredging, confined dredging, riverbank excavation, in-barge stabilization, off-loading, and placement of various cap materials.

Confined Area Dredging - Barge Mounted Excavator (Bridge and Embayment)

Assumptions

Assumes barge mounted excavator.

Total Hours per Shift, HR:	10
Crew shift time, breaks, etc., HR:	2
Actual Work Hours per Shift*, HR:	8

**Assumes crew shift time, breaks, etc. (approx. 2 hours)*

Assumed Bucket Capacity, CY:	2
Work Efficiency, %:	60%
Operator Ability Correction Factor:	0.9
Bucket Fill Factor, %:	55%

Load Time, MIN:	0.34
Swing Time Loaded, MIN:	0.18
Dump Time, MIN:	0.04
Swing Time Unloaded, MIN:	0.14
Maneuver Time, MIN:	0.8

Productivity Calculations

Bucket Volume	CY	2
Bucket Fill Factor	%	55%
Bucket Payload	CY	1.1
Cycle Time	MIN/cycle	1.50
Ideal Loader Productivity	BCY/HR	44
Work Efficiency	%	60%
Operator Ability Correction Factor		0.9
Adjusted Loader Productivity	BCY/HR	23.8
	BCY/SHIFT	**153**

Riverbank Excavation - Barge Mounted Excavator

Assumptions

Assumes barge mounted excavator loading telebelt and material transfer barge.

Total Hours per Shift, HR:	10
Crew shift time, breaks, etc., HR:	2
Actual Work Hours per Shift*, HR:	8
Assumed Bucket Capacity, CY:	4
Work Efficiency, %:	90%
Operator Ability Correction Factor:	0.9
Bucket Fill Factor, %:	75%

Load Time, MIN:	0.11
Swing Time Loaded, MIN:	0.1
Dump Time, MIN:	0.04
Swing Time Unloaded, MIN:	0.09
Maneuver Time, MIN:	0.5

**Assumes crew shift time, breaks, etc. (approx. 2 hours)*

Productivity Calculations

Bucket Volume	CY	4
Bucket Fill Factor	%	75%
Bucket Payload	CY	3
Cycle Time	MIN/cycle	0.84
Ideal Loader Productivity	BCY/HR	214.3
Work Efficiency	%	90%
Operator Ability Correction Factor		0.9
Adjusted Loader Productivity	BCY/HR	173.6
	BCY/SHIFT	**1,389**

PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY :	Marc Schlebusch	CHECKED BY:	Justin Nielsen
JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE :	3/1/2016	DATE CHECKED:	3/4/2016
CLIENT:	EPA Region 2			WRKSHT NO. :	PD-01

Description: Determine estimated productivities for typical crews including open water dredging, confined dredging, riverbank excavation, in-barge stabilization, off-loading, and placement of various cap materials.

Offloading - Clam Shell

Assumptions

Total Hours per Shift, HR:	10	
Crew shift time, breaks, etc., HR:	2	
Actual Work Hours per Shift*, HR:	8	*Assumes crew shift time, breaks, etc. (approx. 2 hours)*
Assumed Bucket Capacity, CY:	5	
Work Efficiency, %:	80%	
Operator Ability Correction Factor:	0.9	
Bucket Fill Factor, %:	60%	
Load Time, MIN:	0.5	
Swing Time Loaded, MIN:	0.25	
Dump Time, MIN:	0.2	
Swing Time Unloaded, MIN:	0.25	
Maneuver Time, MIN:	0.5	

Productivity Calculations

Bucket Volume	CY	5
Bucket Fill Factor	%	60%
Bucket Payload	CY	3
Cycle Time	MIN/cycle	1.7
Ideal Loader Productivity	BCY/HR	105.9
Work Efficiency	%	80%
Operator Ability Correction Factor		0.9
Adjusted Loader Productivity	BCY/HR	76.2
	BCY/SHIFT	**610**

PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY :	Marc Schlebusch	CHECKED BY:	Justin Nielsen
JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE :	3/1/2016	DATE CHECKED:	3/4/2016
CLIENT:	EPA Region 2			WRKSHT NO. :	PD-01

Description: Determine estimated productivities for typical crews including open water dredging, confined dredging, riverbank excavation, in-barge stabilization, off-loading, and placement of various cap materials.

Placement - Confined

Assumptions

Assumes barge mounted excavator loading telebelt. Assumes large excavator similar to CAT 375 or Komatsu PC 1100.

Total Hours per Shift, HR:	10
Crew shift time, breaks, etc., HR:	2
Actual Work Hours per Shift*, HR:	8
**Assumes crew shift time, breaks, etc. (approx. 2 hours)*	
Assumed Bucket Capacity, CY:	2
Work Efficiency, %:	90%
Operator Ability Correction Factor:	0.9
Bucket Fill Factor, %:	90%
Load Time, MIN:	0.34
Swing Time Loaded, MIN:	0.18
Dump Time, MIN:	0.04
Swing Time Unloaded, MIN:	0.14
Maneuver Time, MIN:	0.8

Productivity Calculations

Bucket Volume	CY	2
Bucket Fill Factor	%	90%
Bucket Payload	CY	1.8
Cycle Time	MIN/cycle	1.5
Ideal Loader Productivity	BCY/HR	72
Work Efficiency	%	90%
Operator Ability Correction Factor		0.9
Adjusted Loader Productivity	BCY/HR	58.3
	BCY/SHIFT	**467**

CDM Smith

PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY :	Justin Nielsen	CHECKED BY:	Abby Broadstone
JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE :	2/29/2016	DATE CHECKED:	3/1/2016
CLIENT:	EPA Region 2			WRKSHT NO. :	PD-02 (2)

Description: General assumptions for loading sediments onto trucks at the offsite transload facility and hauling of the sediments to a landfill for disposal.

Productivity Determinations - Load and Haul - Landfill

Loader and Hauling

Excavator Productivity Determination

Assumed Bucket Capacity, CY:	**4**
Hours per Shift, HR:	**8**
Work Efficiency, %:	**70%**
Operator Ability Correction Factor:	**0.9**

Hauling Productivity Determination

Hours per Shift, HR:	8
Assumed Payload Capacity, LCY:	**22**
Work Efficiency, %:	**90%**
Estimated haul distance, MI:	**45**
Assumed Average Haul Speed, MPH:	**50**
Assumed Average Return Speed, MPH:	**55**
Payload Fill Factor:	**90%**

Summary	Number	Prod	Units
Loader	1.0	134.9	LCY/HR
Laborer (Loading)	1.0	HR/Loader HR	
Haul Trucks	15.0	134.9	LCY/HR

[1] (Ref: CAT Performance Handbook-40, Page 12-108)
[2] (Ref: CAT Performance Handbook-40, Page 12-107)

Bucket Size	CY	4
		Moist loam
Bucket Fill Factor [1]	%	100%
Bucket Payload	CY	4.0
Work Efficiency	%	70%
Operator Ability Correction Factor	Factor	0.9
Total Cycle Time [2]	Min/Cycle	0.55
Ideal Loader Productivity	LCY/HR	436.4
Adjusted Loader Productivity	LCY/HR	274.9
Total Loader Productivity	**LCY/HR**	**274.9**

Assumed Payload Capacity	LCY/truck	20
Hours per Shift	HR/DY	8
Work Efficiency	%	90%
Adjusted Loading Productivity	LCY/HR	274.9
Load Time per Truck	MIN	4.8
Dump and Maneuver Time	MIN	**20**
Loaded Haul Time	MIN	54.0
Unloaded Return Time	MIN	49.1
Cycle Time per Truck	MIN/cycle	127.9
Cycle Time per Truck	HR/cycle	2.14
Ideal Cycles Per Day	Cyc/Truck/DY	4
Ideal Productivity per Truck	LCY/HR	10
Adjusted Productivity per Truck	LCY/HR	9.0

Number of Loaders Anticipated		**1**
Total Loader Productivity	LCY/HR	274.9
	LCY/DY	2199.2
Volume to Load	LCY	125,036
Loading Time	HR	455
Haul Time	HR	927
Est total time to completion	HR	927
Imp. loader productivity	**LCY/HR**	**134.9**

Number of Haul Trucks Anticipated		**15**
Total Hauling Productivity	LCY/HR	135.0
	LCY/DY	1080.0
Volume to Haul	LCY	125,036
Haul Time	HR	927
Excavation Time	HR	455
Est total time to completion	HR	927
Imp. hauling productivity	**LCY/HR**	**134.9**

CDM Smith	PROJECT:	Wappinger Creek Superfund Site	COMPUTED BY :	Shelby Kapperman	CHECKED BY: Breanna Moak
	JOB NO.:	253508.3501-F0064-4_2FS.FSRPT	DATE :	10/28/2025	DATE CHECKED: 10/31/2025
	CLIENT:	EPA - Region 2			WRKSHT NO.: PD-02A

Description:	Productivity determinations for mixing amendments with backhoe.

Productivity Determinations - Amendment Mixing with Backhoe

Backhoe

Type of loader (make and model): **CAT - 416**

Assumptions

Assumed Bucket Capacity, CY:	2
Hours per Shift, HR:	8
Work Efficiency, %:	70%
Operator Ability Correction Factor:	0.8

Backhoe Mixing Productivity Determination

Bucket Size, CY:	2	
	Loose Material	
Bucket Fill Factor, %:	95%	*(Ref: CAT Performance Handbook-40, Pages 12-107 to -108)*
Bucket Payload, CY:	1.9	
Work Efficiency, %:	70%	*Assumed*
Operator Ability Correction Factor:	0.8	*Assumed*
Total Cycle Time, MIN/cycle:	1	*Assumed*
Ideal Mixing Productivity, LCY/HR:	114	
Adjusted Mixing Productivity, LCY/HR:	63.8	
Total Mixing Productivity, LCY/HR:	**63.8**	
Estimated Sediment Density, TN/CY:	1.55	
Total Mixing Productivity, TON/HR:	**98.9**	

Cost Estimate Backup

COST INDICES FOR ESCALATION

Base Year for Work: **2025**

Year	Cost Index[1]
2000	497.07
2001	503.52
2002	517.46
2003	529.95
2004	571.29
2005	608.36
2006	641.91
2007	673.52
2008	716.54
2009	703.00
2010	724.17
2011	756.48
2012	773.75
2013	787.64
2014	804.05
2015	804.97
2016	810.92
2017	835.57
2018	862.56
2019	888.57
2020	897.19
2021	984.80
2022	1105.90
2023	1133.78
2024	1157.79
2025	1187.91
2026	1218.80
2027	1250.49
2028	1283.00
2029	1316.36
2030	1350.58
2031	1385.70
2032	1421.73
2033	1458.69
2034	1496.62
2035	1535.53

1 Yearly composite cost index (weighted average) from the U.S. Army Corps of Engineers Civil Works Construction Cost Index System (CWCCIS), EM 1110-2-1304, 31 March 2025.

Base Year: 2025

COST CODES FOR LABOR AND UNIT COSTS

Cost Code	Description	Units	Unit Labor Cost	Unit Equipment Cost	Unit Material Cost	Unit Other Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted Labor Cost	Adjusted Equipment Cost	Adjusted Material Cost	Adjusted Other Cost	PC OH	PC PF	Cost Source		Comments
																Source	Source ID	
L1	CAD Drafter	HR	**$82.13**	$0.00	$0.00	$0.00	2025	1	1	$82.13	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L2	Civil Engineer	HR	**$134.20**	$0.00	$0.00	$0.00	2025	1	1	$134.20	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L3	Clerks, Typist, Bookkeeper & Receptionist	HR	**$54.89**	$0.00	$0.00	$0.00	2025	1	1	$54.89	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L4	Environmental Engineer	HR	**$130.74**	$0.00	$0.00	$0.00	2025	1	1	$130.74	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L5	Environmental Lawyer	HR	**$242.72**	$0.00	$0.00	$0.00	2025	1	1	$242.72	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L6	Environmental Scientist	HR	**$110.55**	$0.00	$0.00	$0.00	2025	1	1	$110.55	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L7	Field Engineer	HR	**$72.87**	$0.00	$0.00	$0.00	2025	1	1	$72.87	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L8	Security, Watchmen/Guards	HR	**$50.20**	$0.00	$0.00	$0.00	2025	1	1	$50.20	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L9	Field Technician	HR	**$73.71**	$0.00	$0.00	$0.00	2025	1	1	$73.71	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L10	Geologist	HR	**$97.41**	$0.00	$0.00	$0.00	2025	1	1	$97.41	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L11	General Superintendent (P.M.)	HR	**$217.62**	$0.00	$0.00	$0.00	2025	1	1	$217.62	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L12	Project Manager	HR	**$216.33**	$0.00	$0.00	$0.00	2025	1	1	$216.33	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L13	Quality Control Engineer	HR	**$177.11**	$0.00	$0.00	$0.00	2025	1	1	$177.11	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L14	Paralegal	HR	**$91.35**	$0.00	$0.00	$0.00	2025	1	1	$91.35	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L15	Senior Scientist	HR	**$133.15**	$0.00	$0.00	$0.00	2025	1	1	$133.15	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L16	Staff Scientist	HR	**$87.94**	$0.00	$0.00	$0.00	2025	1	1	$87.94	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L17	Surveyor Chief	HR	**$130.07**	$0.00	$0.00	$0.00	2025	1	1	$130.07	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L18	Surveyor Assistant	HR	**$90.86**	$0.00	$0.00	$0.00	2025	1	1	$90.86	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L19	Project Engineer	HR	**$155.95**	$0.00	$0.00	$0.00	2025	1	1	$155.95	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L20	Procurement Specialist	HR	**$141.94**	$0.00	$0.00	$0.00	2025	1	1	$141.94	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L21	Safety Engineer	HR	**$130.52**	$0.00	$0.00	$0.00	2025	1	1	$130.52	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	
L22	Archeologist	HR	**$85.25**	$0.00	$0.00	$0.00	2025	1	1	$85.25	$0.00	$0.00	$0.00	50%	9%	FLC	FLC Datacenter	

Base Year: 2025

COST CODES FOR MATERIAL AND UNIT COSTS

Cost Code	Description	Units	Unit Labor Cost	Unit Equipment Cost	Unit Material Cost	Unit Other Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted Labor Cost	Adjusted Equipment Cost	Adjusted Material Cost	Adjusted Other Cost	PC OH	PC PF	Cost Source		Comments
																Source	Source ID	
M1	Institutional Controls Report Allowance	EA	$0.00	$0.00	$0.00	$5,000.00	2025	1	1	$0.00	$0.00	$0.00	$5,000.00	0%	0%	A	Allowance	Per Estimator
M2	Office Trailer/Storage Box Delivery and Setup	EA	$0.00	$0.00	$0.00	$4,500.00	2025	1	1	$0.00	$0.00	$0.00	$4,500.00	0%	0%	A	Allowance	Per Estimator
M3	Office Trailer (50' x 10', Furnished, excl. hookups)	MO	$0.00	$0.00	$0.00	$425.00	2025	1	1	$0.00	$0.00	$0.00	$425.00	15%	9%	CW	CostWorks	Source: 01 52 1320 0450
M4	Storage Box (40' x 8')	MO	$0.00	$0.00	$0.00	$160.00	2025	1	1	$0.00	$0.00	$0.00	$160.00	15%	9%	CW	CostWorks	Source: 01 52 1320 1350
M5	Portable Toilet (Chemical)	MO	$0.00	$0.00	$0.00	$241.00	2025	1	1	$0.00	$0.00	$0.00	$241.00	15%	9%	CW	CostWorks	Source: 01 54 3340 6410
M6	Portable Wash Station	MO	$0.00	$0.00	$0.00	$60.00	2022	1.08	1	$0.00	$0.00	$0.00	$64.80	0%	0%	A	Allowance	Per Estimator
M7	Office Equipment Rental	MO	$0.00	$0.00	$0.00	$274.00	2025	1	1	$0.00	$0.00	$0.00	$274.00	15%	9%	CW	CostWorks	Source: 01 52 1340 0100
M8	Field Office Expenses - Office Supplies	MO	$0.00	$0.00	$0.00	$108.00	2025	1	1	$0.00	$0.00	$0.00	$108.00	15%	9%	CW	CostWorks	Source: 01 52 1340 0120
M9	Water Cooler Rental	MO	$0.00	$0.00	$0.00	$25.00	2022	1.08	1	$0.00	$0.00	$0.00	$27.00	0%	0%	A	Allowance	Per Estimator
M10	Water Cooler Water - 5 gallon bottle	EA	$0.00	$0.00	$0.00	$12.00	2022	1.08	1	$0.00	$0.00	$0.00	$12.96	0%	0%	A	Allowance	Per Estimator
M11	Office Trailer Teardown and Removal	EA	$0.00	$0.00	$0.00	$1,600.00	2022	1.08	1	$0.00	$0.00	$0.00	$1,728.00	0%	0%	A	Allowance	Per Estimator
M12	Satellite Internet - Monthly Fees	MO	$0.00	$0.00	$0.00	$214.98	2024	1.03	1	$0.00	$0.00	$0.00	$221.43	15%	9%	V	Vendor Quote	Source: Viasat, 2024.
M13	Satellite Internet Cancellation Fee	EA	$0.00	$0.00	$0.00	$299.00	2024	1.03	1	$0.00	$0.00	$0.00	$307.97	15%	9%	V	Vendor Quote	Source: Viasat, 2024.
M14	Temporary Electrical Hookup	EA	$0.00	$0.00	$0.00	$3,500.00	2024	1.03	1	$0.00	$0.00	$0.00	$3,605.00	0%	0%	A	Allowance	Per Estimator
M15	Satellite Internet Installation Fee	EA	$0.00	$0.00	$0.00	$350.00	2024	1.03	1	$0.00	$0.00	$0.00	$360.50	15%	9%	V	Vendor Quote	Source: Viasat 2024
M16	Field Office Expenses - Lights and HVAC	MO	$0.00	$0.00	$0.00	$195.00	2025	1	1	$0.00	$0.00	$0.00	$195.00	15%	9%	CW	CostWorks	Source: 01 52 1340 0160
M17	Office Trailer - Air Conditioning	MO	$0.00	$0.00	$0.00	$63.50	2025	1	1	$0.00	$0.00	$0.00	$63.50	15%	9%	CW	CostWorks	Source: 01 52 1320 0700
M18	Dumpster Delivery	EA	$0.00	$0.00	$0.00	$125.00	2025	1	1	$0.00	$0.00	$0.00	$125.00	15%	9%	CW	CostWorks	Source: 02 41 1919 0910
M19	Dumpster Service	MO	$0.00	$0.00	$0.00	$133.00	2025	1	1	$0.00	$0.00	$0.00	$133.00	15%	9%	CW	CostWorks	Source: 02 41 1919 0940
M20	Pick up Truck	DY	$0.00	$0.00	$0.00	$263.00	2025	1	1	$0.00	$0.00	$0.00	$263.00	15%	9%	CW	CostWorks	Source: 01 54 3340 7200
M21	Per Diem	DY	$0.00	$0.00	$0.00	$115.00	2025	1	1	$0.00	$0.00	$0.00	$115.00	0%	0%	GSA	gsa.gov	gsa.gov local per diem rates
M22	Silt Fence	LF	$0.00	$0.00	$2.05	$0	2025	1	1	$0.00	$0.00	$2.05	$0.00	15%	9%	CW	CostWorks	Source: 31 25 1416 1000
M23	Straw Bale	LF	$0.00	$0.00	$10.75	$0	2025	1	1	$0.00	$0.00	$10.75	$0.00	15%	9%	CW	CostWorks	Source: 31 25 1416 1250
M24	Pick up Truck	MO	$0.00	$0.00	$0.00	$2,175.00	2025	1	1	$0.00	$0.00	$0.00	$2,175.00	15%	9%	CW	CostWorks	Source: 01 54 3340 7200
M26	Gravel - 1-1/2"	TON	$0.00	$0.00	$32.60	$0	2025	1	1	$0.00	$0.00	$32.60	$0.00	15%	9%	V	Vendor Quote	Peckham 2025
M28	Riprap Material	TON	$0.00	$0.00	$44.00	$0	2025	1	1	$0.00	$0.00	$44.00	$0.00	15%	9%	V	Vendor Quote	Peckham 2025
M29	Maintenance Report Allowance	LS	$0.00	$0.00	$0.00	$1,500	2022	1.08	1	$0.00	$0.00	$0.00	$1,620.00	0%	0%	A	Allowance	Per Estimator
M30	Lawn Seed	AC	$0.00	$0.00	$1,125.00	$0	2025	1	1	$0.00	$0.00	$1,125.00	$0.00	15%	9%	V	CostWorks	Costworks 32 92 1913 1900
M31	Screened Topsoil	LCY	$0.00	$0.00	$37.50	$0	2025	1	1	$0.00	$0.00	$37.50	$0.00	15%	9%	V	CostWorks	Costworks 31 05 1310 0700
M40	Survey Report	EA	$0.00	$0.00	$0.00	$7,500	2024	1.03	1	$0.00	$0.00	$0.00	$7,725.00	0%	0%	A	Allowance	Per Estimator
M45	Sump Pump (150 GPM)	EA	$0.00	$0.00	$5,700.00	$0	2025	1	1	$0.00	$0.00	$5,700.00	$0.00	15%	9%	CW	CostWorks	Source: 22 14 2913 2040
M46	PVC Discharge Hose (4" Dia, 50 Ft long)	EA	$0.00	$0.00	$199.99	$0	2022	1.08	1	$0.00	$0.00	$215.99	$0.00	15%	9%	V	Vendor Quote	Source: Water Pumps Direct, 2022
M32	Chainlink Fencing	LF	$0.00	$0.00	$27.50	$0.00	2025	1	1	$0.00	$0.00	$27.50	$0.00	15%	9%	CW	CostWorks	Source: 32 31 1320 0800
M33	Chainlink Vehicular Gate	EA	$0.00	$0.00	$605.00	$0.00	2025	1	1	$0.00	$0.00	$605.00	$0.00	15%	9%	CW	CostWorks	Source: 32 31 1320 5060
M34	Aluminum Warning Signs (24" x 24")	EA	$0.00	$0.00	$59.34	$0	2025	1	1	$0.00	$0.00	$59.34	$0.00	15%	9%	V	Vendor Quote	Source: Signs.com, 2025
M37	Common Borrow Fill	TON	$0.00	$0.00	$35.47	$0	2025	1	1	$0.00	$0.00	$35.47	$0.00	15%	9%	V	Vendor Quote	Source: 31 05 1310 0200
M58	Water	KGAL	$0.00	$0.00	$5.58	$0	2016	1.47	1	$0.00	$0.00	$8.20	$0.00	15%	9%	V	Vendor Quote	Source: Middlesex Water Company, 2016
M35	Sample Shipping per Analysis	EA	$0.00	$0.00	$0.00	$12.50	2022	1.08	1	$0.00	$0.00	$0.00	$13.50	0%	0%	A	Allowance	Per Estimator
M36	Sample Supplies per Analysis	EA	$0.00	$0.00	$0.00	$3.00	2022	1.08	1	$0.00	$0.00	$0.00	$3.24	0%	0%	A	Allowance	Per Estimator
M41	Winterization of Water Treatment System	EA	$0.00	$0.00	$0.00	$50,000.00	2022	1.08	1	$0.00	$0.00	$0.00	$54,000.00	0%	0%	A	Allowance	Per Estimator
M56	100 Ft Roll LDPE Tubing	EA	$0.00	$0.00	$30.00	$0	2022	1.08	1	$0.00	$0.00	$32.40	$0.00	15%	9%	V	Vendor Quote	Source: Field Environmental, 2022
M57	50 Ft Roll Silicon Tubing	EA	$0.00	$0.00	$112.50	$0	2022	1.08	1	$0.00	$0.00	$121.50	$0.00	15%	9%	V	Vendor Quote	Source: Field Environmental, 2022
M60	Sump Pump - 4" Dia	EA	$0.00	$0.00	$7,525.00	$0.00	2024	1.03	1	$0.00	$0.00	$7,750.75	$0.00	15%	9%	CW	CostWorks	Source: 22 14 2913 2060
M61	10,000 Gal Plastic Storage Tank	EA	$0.00	$0.00	$12,074.00	$0.00	2022	1.08	1	$0.00	$0.00	$13,039.92	$0.00	15%	9%	V	Vendor Quote	Source: Plastic-Mart, 2022.
M50	4" Perforated Piping	LF	$0.00	$0.00	$5.24	$0	2022	1.08	1	$0.00	$0.00	$5.66	$0.00	15%	9%	V	Vendor Quote	Source: ISCO 2022
M51	6" Solid Piping	LF	$0.00	$0.00	$8.10	$0	2022	1.08	1	$0.00	$0.00	$8.75	$0.00	15%	9%	V	Vendor Quote	Source: ISCO 2022
M59	Maintenance Supplies	EA	$0.00	$0.00	$0.00	$500	2022	1.08	1	$0.00	$0.00	$0.00	$540.00	0%	0%	A	Allowance	Per Estimator
M62	Allowance for Community Engagement Materials	EA	$0.00	$0.00	$0.00	$5,000	2022	1.08	1	$0.00	$0.00	$0.00	$5,400.00	0%	0%	A	Allowance	Per Estimator
M63	Sample Collection Allowance	EA	$0.00	$0.00	$0.00	$250	2022	1.08	1	$0.00	$0.00	$0.00	$270.00	0%	0%	A	Allowance	Per Estimator
M64	Groundwater Monitoring Report Allowance	EA	$0.00	$0.00	$0.00	$10,000	2022	1.08	1	$0.00	$0.00	$0.00	$10,800.00	0%	0%	A	Allowance	Per Estimator
M68	Armored Cover Maintenance Allowance	LS	$0.00	$0.00	$0.00	$1,000	2022	1.08	1	$0.00	$0.00	$0.00	$1,080.00	0%	0%	A	Allowance	Per Estimator
M70	Sand	TON	$0.00	$0.00	$20.00	$0	2025	1	1	$0.00	$0.00	$20.00	$0.00	0%	0%	A	Allowance	Peckham 2025
M71	Granular Activate Carbon (GAC)	TON	$0.00	$0.00	$3,900.00	$30	2024	1.03	1	$0.00	$0.00	$4,017.00	$30.90	15%	9%	V	Vendor Quote	CalgonCarbon, 2024. Delivery estimated.
M72	Wetland Mitigation Banking	AC	$0.00	$0.00	$0.00	$50,000	2022	1.08	1	$0.00	$0.00	$0.00	$54,000.00	0%	0%	A	Allowance	Per Estimator
M75	Portland Cement	TON	$0.00	$0.00	$0.00	$194.00	2024	1.03	1	$0.00	$0.00	$0.00	$199.82	15%	9%	V	CostWorks	Cost Works 03 05 1330 0010
M76	DOT Type 2 Turbidity Curtain	EA	$0.00	$0.00	$1,307.07	$0.00	2023	1.05	1	$0.00	$0.00	$1,372.42	$0.00	15%	9%	V	Vendor Quote	Paramount Materials 2023
M77	Turbidity Curtain Anchor Kit	EA	$0.00	$0.00	$479.24	$0	2023	1.05	1	$0.00	$0.00	$503.20	$0.00	15%	9%	V	Vendor Quote	Paramount Materials 2023
M78	Containment System Maintenance Allowance	LS	$0.00	$0.00	$0.00	$50,000	2025	1	1	$0.00	$0.00	$0.00	$50,000.00	0%	0%	A	Allowance	Per Estimator
M80	Bathymetric Survey Report	EA	$0.00	$0.00	$0.00	$10,000	2024	1.03	1	$0.00	$0.00	$0.00	$10,300.00	0%	0%	A	Allowance	Per Estimator
M81	Bladder Pump	WK	$0.00	$0.00	$147.00	$0	2024	1.03	1	$0.00	$0.00	$151.41	$0.00	0%	0%	A	Vendor Quote	Field Environmental 2024
M82	Controller	WK	$0.00	$0.00	$306.25	$0	2024	1.03	1	$0.00	$0.00	$315.44	$0.00	0%	0%	A	Vendor Quote	Field Environmental 2024
M83	Compressor	WK	$0.00	$0.00	$175.00	$0	2024	1.03	1	$0.00	$0.00	$180.25	$0.00	0%	0%	A	Vendor Quote	Field Environmental 2024
M84	Water Level Meter	WK	$0.00	$0.00	$61.25	$0	2024	1.03	1	$0.00	$0.00	$63.09	$0.00	0%	0%	A	Vendor Quote	Field Environmental 2024
M85	Water Quality Meter (including cable and flow-thru cell)	WK	$0.00	$0.00	$427.00	$0	2024	1.03	1	$0.00	$0.00	$439.81	$0.00	0%	0%	A	Vendor Quote	Field Environmental 2024
M86	Turbidity Meter	WK	$0.00	$0.00	$122.50	$0	2024	1.03	1	$0.00	$0.00	$126.18	$0.00	0%	0%	A	Vendor Quote	Field Environmental 2024
M87	55 Gal Drums	EA	$0.00	$0.00	$240.07	$0.00	2025	1	1	$0.00	$0.00	$240.07	$0.00	15%	9%	V	Vendor Quote	Grainger, 2024.
M89	Carbon Amendment	TON	$0.00	$0.00	$4,409.00	$0.00	2025	1	1	$0.00	$0.00	$4,409.00	$0.00	15%	9%	V	Vendor Quote	Sedimite.com 2025, Assumed sedimite amendment
M90	Environmental Monitoring	LS	$0.00	$0.00	$4,409.00	$0.00	2025	1	1	$0.00	$0.00	$4,409.00	$0.00	15%	9%	V	Allowance	Per Estimator
M91	Regulatory Buoy	EA	$0.00	$0.00	$975.61	$0.00	2025	1	1	$0.00	$0.00	$975.61	$0.00	15%	9%	V	Allowance	Go2Marine, 2025
M92	Binder Course 4"	TON	$0.00	$0.00	$88.00	$0.00	2025	1	1	$0.00	$0.00	$88.00	$0.00	15%	9%	V	CostWorks	Source: 32 12 1613 0813
M93	Wearing Course 2"	TON	$0.00	$0.00	$87.00	$0.00	2025	1	1	$0.00	$0.00	$87.00	$0.00	15%	9%	V	CostWorks	Source: 32 12 1613 0882

Base Year: 2025

COST CODES FOR SUBCONTRACTORS AND UNIT COSTS

Cost Code	Work or Material Description	Description for Cost Worksheets	Units	Unit Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted Unit Cost	PC OH	PC PF	Cost Source		Comments
											Source	Source ID	
S1	Corrosivity	Corrosivity	EA	**$18.57**	2025	1.00	1	$18.57	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S2	Reactivity-Cyanide	Reactivity-Cyanide	EA	**$30.95**	2025	1.00	1	$30.95	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S3	Reactivity-Sulfide	Reactivity-Sulfide	EA	**$49.52**	2025	1.00	1	$49.52	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S4	Paint Filter Test	Paint Filter Test	EA	**$27.24**	2025	1.00	1	$27.24	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S5	PCB Analysis (soil media)	PCB Analysis (soil media)	EA	**$173.33**	2025	1.00	1	$173.33	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S6	PCB Analysis (aqueous media)	PCB Analysis (aqueous media)	EA	**$173.33**	2025	1.00	1	$173.33	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S7	RCRA Metals (aqueous media)	RCRA Metals (aqueous media)	EA	**$105.24**	2025	1.00	1	$105.24	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S8	RCRA Metals (soil media)	RCRA Metals (soil media)	EA	**$105.24**	2025	1.00	1	$105.24	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S9	Paint Filter Test	Paint Filter Test	EA	**$27.24**	2025	1.00	1	$27.24	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S10	Full Scale Operation of Water Treatment System	Full Scale Operation of Water Treatment System	MO	**$25,000.00**	2017	1.43	1	$35,750.00	15%	9%	V	Vendor Quote	Ground Water Treatment & Technology, LLC, 2017
S11	Operator for Treatment System Operation	Operator for Water Treatment System	DY	**$900.00**	2017	1.43	1	$1,287.00	15%	9%	V	Vendor Quote	Ground Water Treatment & Technology, LLC, 2017
S12	Dioxins/Furans (soil media)	Dioxins/Furans (soil media)	EA	**$441.53**	2025	1.00	1	$441.53	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S13	Dioxins/Furans (aqueous media)	Dioxins/Furans (water)	EA	**$441.53**	2025	1.00	1	$441.53	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S14	VOCs Analysis (soil media)	VOCs Analysis (soil media)	EA	**$75.06**	2025	1.00	1	$75.06	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S15	VOCs Analysis (aqueous)	VOCs Analysis (water)	EA	**$75.06**	2025	1.00	1	$75.06	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S16	Mercury Analysis (soil media)	Mercury Analysis (soil media)	EA	**$27.24**	2025	1.00	1	$27.24	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S17	Mercury Analysis (aqueous media)	Mercury Analysis (aqueous media)	EA	**$27.24**	2025	1.00	1	$27.24	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S18	TAL Metals Analysis (soil media)	TAL Metals Analysis (soil media)	EA	**$154.76**	2025	1.00	1	$154.76	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S19	Ignitability	Ignitability	EA	**$49.52**	2025	1.00	1	$49.52	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S20	PAHs	PAHs	EA	**$93.82**	2025	1.00	1	$93.82	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S21	Pesticides	Pesticides	EA	**$149.01**	2025	1.00	1	$149.01	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S22	Debris and Vegetation Disposal	Debris and Vegetation Disposal	TON	**$76.00**	2022	1.08	1	$82.08	15%	9%	V	Vendor Quote	Seacoast Environmental Services, Inc., 2022
S23	Non-Hazardous Waste Disposal	Non-Hazardous Waste Disposal	TON	**$265.00**	2025	1.00	1	$265.00	15%	9%	V	Vendor Quote	Republic Services 2025
S24	Hazardous Waste Disposal	Hazardous Waste Disposal	TON	**$455.00**	2025	1.00	1	$455.00	15%	9%	V	Vendor Quote	Republic Services 2025
S25	TPH-Diesel	TPH-Diesel	EA	**$74.28**	2025	1.00	1	$74.28	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S26	TCLP Full Analytical Suite	TCLP Full Analytical Suite	EA	**$866.64**	2025	1.00	1	$866.64	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S27	Grain Size Distribution	Grain Size Distribution	EA	**$173.33**	2025	1.00	1	$173.33	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S28	Total Organic Carbon	Total Organic Carbon	EA	**$55.71**	2025	1.00	1	$55.71	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S29	SVOCs	SVOCs	EA	**$160.95**	2025	1.00	1	$160.95	15%	9%	V	Vendor Quote	MSA Lab Pricing, 2025
S30	Monitoring Well Stick-up Surface Completion	Monitoring Well Stick-up Surface Completion	EA	**$375.00**	2022	1.08	1	$405.00	15%	9%	V	Vendor Quote	Talon Drilling Company, 2022.
S31	Well Development	Well Development	HR	**$235.00**	2022	1.08	1	$253.80	15%	9%	V	Vendor Quote	Talon Drilling Company, 2022.
S32	Mobilization Water Treatment System	Mobilization Water Treatment System	LS	**$31,000**	2021	1.21	1	$37,510.00	15%	9%	V	Vendor Quote	Ground Water Treatment & Technology, LLC, 2021.
S33	Demobilization Water Treatment System	Demobilization Water Treatment System	LS	**$16,500**	2021	1.21	1	$19,965.00	15%	9%	V	Vendor Quote	Ground Water Treatment & Technology, LLC, 2021
S34	Water Treatment System Rental	Water Treatment System Rental	MO	**$1,850**	2021	1.21	1	$2,238.50	15%	9%	V	Vendor Quote	Ground Water Treatment & Technology, LLC, 2021
S35	Startup Testing	Water Treatment System - Start up Testing	DY	**$1,600**	2017	1.43	1	$2,288.00	15%	9%	V	Vendor Quote	Ground Water Treatment & Technology, LLC, 2017
S36	Electricity Cost	Electricity Cost	KWH	**$0.13**	2022	1.08	1	$0.14	15%	9%	V	Vendor Quote	US Energy Information Administration, 2022.
S45	Tank Cleaning	Tank Cleaning	EA	**$1,475.00**	2015	1.48	1	$2,183.00	15%	9%	V	Vendor Quote	Previous Work, 2015
S46	Sludge Disposal	Sludge Disposal	GAL	**$1.03**	2015	1.48	1	$1.52	15%	9%	V	Vendor Quote	Previous Work, 2015
S47	8 oz/sy Geotextile Liner	Geotextile Liner	SF	**$0.68**	2022	1.08	1	$0.73	15%	9%	V	Vendor Quote	Atlantic Lining Company, 2022. Includes delivery.
S48	40 mil LLDPE Liner	Geomembrane Liner	SF	**$0.73**	2022	1.08	1	$0.79	15%	9%	V	Vendor Quote	Atlantic Lining Company, 2022. Includes delivery.
S49	10 oz/sy Geocomposite Liner	Geocomposite Liner	SF	**$1.20**	2022	1.08	1	$1.30	15%	9%	V	Vendor Quote	Atlantic Lining Company, 2022. Includes delivery.
S50	30 mil LLDPE Liner	Stockpile Liner	SF	**$0.75**	2022	1.08	1	$0.81	15%	9%	V	Vendor Quote	Atlantic Lining Company, 2022. Includes delivery.
S51	Bag Filter Replacement	Bag Filter Replacement	EA	**$5.00**	2021	1.21	1	$6.05	15%	9%	V	Vendor Quote	Ground Water Treatment & Technology, LLC, 2022
S52	Water Storage Tank (10,000 GAL) Rental	Water Storage Tank (10,000 GAL) Rental	DY	**$35.50**	2024	1.03	1	$36.57	15%	9%	V	Vendor Quote	Ironclad Environmental Solutions 2024
S53	Water Storage Tank (10,000 GAL) Transportation	Water Storage Tank (10,000 GAL) Transportation	EA	**$525.30**	2024	1.03	1	$541.06	15%	9%	V	Vendor Quote	Ironclad Environmental Solutions 2024
S54	Water Treatment System - Activated Carbon Changeout	Water Treatment System - Activated Carbon Changeout	EA	**$38,000.00**	2022	1.08	1	$41,040.00	15%	9%	V	Vendor Quote	Ground Water Treatment & Technology, LLC, 2022. Includes onsite removal and refill of two - 4000lb vessels.
S56	Transportation and Disposal Non-Haz Solid Waste (Truck)	Transportation and Disposal Non-Haz Solid Waste (Truck)	TON	**$115.00**	2021	1.21	1	$139.15	15%	9%	V	Vendor Quote	ICE Service Group, 2021
S57	Transportation and Disposal TSCA Solid Waste (Truck)	Transportation and Disposal TSCA Solid Waste (Truck)	TON	**$304.18**	2022	1.08	1	$328.51	15%	9%	V	Vendor Quote	Clean Harbors, 2022
S59	Wastewater Disposal Fee	Wastewater Disposal Fee	GAL	**$0.78**	2016	1.47	1	$1.15	15%	9%	V	Vendor Quote	Seacoast Environmental Services, Inc., 2016
S63	Portland Cement	Portland Cement	TON	**$210.00**	2024	1.03	1	$216	15%	9%	V	Vendor Quote	Cemex, 2024.
S65	Soil Proccessing at Treatment Facility	Incidental Treatment at Disposal Facility (HTTD)	TON	**$7,300.00**	2022	1.08	1	$7,884	15%	9%	V	Vendor Quote	Based on similar work. Pierson's Creek OU2.
S66	Mercury Disposal	Mercury Disposal	LB	**$32.00**	2022	1.08	1	$35	15%	9%	V	Vendor Quote	Based on similar work. Pierson's Creek OU2.
S67	Condensate Disposal	Condensate Disposal	LB	**$10.00**	2022	1.08	1	$11	15%	9%	V	Vendor Quote	Based on similar work. Pierson's Creek OU2.
S68	Sediment Sampling	Sediment Sampling	DY	**$2,913.71**	2025	1.00	1	$2,914	15%	9%	V	Vendor Quote	Marine Samping Systems
S69	Vibracore Tube Assembly	Vibracore Tube Assembly	EA	**$81.58**	2025	1.00	1	$82	15%	9%	V	Vendor Quote	Marine Samping Systems
S70	Mob/Demob Sampling Boat	Mob/Demob Sampling Boat	EA	**$5,827.41**	2025	1.00	1	$5,827	15%	9%	V	Vendor Quote	Marine Samping Systems
S71	Spud Barge 1 to 90 days	Spud Barge 1 to 90 days	DY	**$933.00**	2025	1.00	1	$933	15%	9%	V	Vendor Quote	FlexiFloat 2025
S72	Spud Barge 91 to 180 days	Spud Barge 91 to 180 days	DY	**$699.75**	2025	1.00	1	$700	15%	9%	V	Vendor Quote	FlexiFloat 2025
S73	Spud Barge Mob/Demob	Spud Barge Mob/Demob	EA	**$56,000.00**	2025	1.00	1	$56,000	15%	9%	V	Vendor Quote	FlexiFloat 2025,Spud Barge Freight
S74	Material Barge Mob/Demob	Material Barge Mob/Demob	EA	**$36,000.00**	2025	1.00	1	$36,000	15%	9%	V	Vendor Quote	FlexiFloat 2025 , Material Barge Freight
S75	Material Barge 1 to 90 days	Material Barge 1 to 90 days	DY	**$592.00**	2025	1.00	1	$592	15%	9%	V	Vendor Quote	FlexiFloat 2025
S76	Material Barge 91 to 180 days	Material Barge 91 to 180 days	DY	**$444.00**	2025	1.00	1	$444	15%	9%	V	Vendor Quote	FlexiFloat 2025
S77	Rental Fee for Solid Waste Disposal Container	Rental Fee for Solid Waste Disposal Container	DY	**$18.30**	2025	1.00	1	$18	15%	9%	A	Allowance	Per Estimator
S78	Hauling for Disposal	Hauling for Disposal	EA	**$566.95**	2025	1.00	1	$567	15%	9%	A	Allowance	Per Estimator
S79	IDW Disposal	IDW Disposal	TON	**$209.62**	2025	1.00	1	$210	15%	9%	A	Allowance	Per Estimator
S80	Water Disposal Fee	Water Disposal Fee	GAL	**$1.47**	2025	1.00	1	$1	15%	9%	A	Allowance	Per Estimator
S81	55-gallon drum	55-gallon drum	EA	**$178.00**	2025	1.00	1	$178	15%	9%	A	Allowance	Per Estimator

Base Year: 2025

COST CODES FOR SUBCONTRACTORS AND UNIT COSTS

Cost Code	Work or Material Description	Description for Cost Worksheets	Units	Unit Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted Unit Cost	PC OH	PC PF	Cost Source		Comments
											Source	Source ID	
S82	Water Testing for Waste Progiling- Standard Analyte List	Water Testing for Waste Progiling- Standard Analyte List	EA	**$1,102.24**	2025	1.00	1	$1,102	15%	9%	A	Allowance	Per Estimator

Base Year: 2025

COST CODES FOR MII ASSEMBLIES AND UNIT COSTS

Cost Code	Work or Material Description	Description for Cost Worksheets	Units	MII Unit Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted MII Unit Cost	PC OH[1]	PC PF	Cost Source		Comments
											Source	Source ID	
A1	Clearing & Grubbing - Light Clearing (Open Areas)	Light Clearing (Open Areas)	AC	$2,885.62	2025	1.00	1	$2,885.62	15%	9%	MII	MII Assemblies	
A2	Rough Grading Sites, open, 10,000-20,000 SF Grader	Rough Site Grading	SF	$0.08	2025	1.00	1	$0.08	15%	9%	MII	MII Assemblies	
A3	Silt Fence Installation	Silt Fence Installation	LF	$4.10	2025	1.00	1	$4.10	15%	9%	MII	MII Assemblies	
A4	Straw Bale Installation	Straw Bale Installation	LF	$6.37	2025	1.00	1	$6.37	15%	9%	MII	MII Assemblies	
A5	Riprap Placement	Riprap Placement	LCY	$5.06	2025	1.00	1	$5.06	15%	9%	MII	MII Assemblies	
A6	Geomembrane Placement	Geomembrane Installation	SF	$0.96	2025	1.00	1	$0.96	15%	9%	MII	MII Assemblies	
A7	Geonet/Geocomposite Placement	Geocomposite Installation	SF	$1.52	2025	1.00	1	$1.52	15%	9%	MII	MII Assemblies	
A8	Dust Control	Dust Control	HR	$337.23	2025	1.00	1	$337.23	15%	9%	MII	MII Assemblies	
A9	Hydro-Seeding	Seeding	AC	$1,227.67	2025	1.00	1	$1,227.67	15%	9%	MII	MII Assemblies	
A10	Surveying (boat crew)	Surveying (per day)	DY	$5,593.32	2025	1.00	1	$5,593.32	15%	9%	MII	MII Assemblies	
A11	Gravel Placement	Gravel Placement	LCY	$8.09	2025	1.00	1	$8.09	15%	9%	MII	MII Assemblies	
A15	Shallow Excavation (0-7 ft)	Excavation	BCY	$3.09	2025	1.00	1	$3.09	15%	9%	MII	MII Assemblies	
A17	Backfill of Soils (Covers)	Subsoil Placement	LCY	$3.18	2025	1.00	1	$3.18	15%	9%	MII	MII Assemblies	
A18	Gravel Compaction	Gravel Compaction	LCY	$0.73	2025	1.00	1	$0.73	15%	9%	MII	MII Assemblies	
A19	Backfill - Top Soil	Top Soil Placement	LCY	$2.11	2025	1.00	1	$2.11	15%	9%	MII	MII Assemblies	
A20	Road Mat Installation	Road Mat Installation	DY	$3,520.31	2025	1.00	1	$3,520.31	15%	9%	MII	MII Assemblies	
A21	O&M for Cap	Cover Maintenance Crew	DY	$2,968.45	2025	1.00	1	$2,968.45	15%	9%	MII	MII Assemblies	
A22	Sheet Piling	Sheet Piling Installation and Salvage	SF	$30.26	2025	1.00	1	$30.26	15%	9%	MII	MII Assemblies	
A23	Fine Grading for Gravel Road Replacement	Fine Grading	SF	$0.12	2025	1.00	1	$0.12	15%	9%	MII	MII Assemblies	
A24	Erosion Control Maintenance Crew	Erosion Control Maintenance Crew	HR	$240.21	2025	1.00	1	$240.21	15%	9%	MII	MII Assemblies	
A25	Geotextile Placement	Geotextile Placement	SF	$0.15	2025	1.00	1	$0.15	15%	9%	MII	MII Assemblies	
A26	Excavation - Uncontaminated Fill	Excavation - Uncontaminated Fill	BCY	$4.73	2025	1.00	1	$4.73	15%	9%	MII	MII Assemblies	
A27	Road Mat Relocation	Road Mat Relocation	HR	$435.04	2025	1.00	1	$435.04	15%	9%	MII	MII Assemblies	
A28	Soil Placement - Interim Management Berm	Berm Construction	ECY	$13.37	2025	1.00	1	$13.37	15%	9%	MII	MII Assemblies	
A29	Asphalt Paving - 4" Base Course	Base Course Placement	SY	$2.14	2025	1.00	1	$2.14	15%	9%	MII	MII Assemblies	
A30	Asphalt Paving - 2" Surface Course	Surface Course Placement	SY	$1.57	2025	1.00	1	$1.57	15%	9%	MII	MII Assemblies	
A31	Aggregate Sub Base	Sub Base Course Placement	SY	$4.26	2025	1.00	1	$4.26	15%	9%	MII	MII Assemblies	
A32	Backfill, Dozer	Backfill of Spoils	LCY	$1.73	2025	1.00	1	$1.73	15%	9%	MII	MII Assemblies	
A33	Earth Stripping and Stockpiling	Earth Stripping and Stockpiling	BCY	$2.40	2025	1.00	1	$2.40	15%	9%	MII	MII Assemblies	
A34	Fill Compaction	Compaction	LCY	$2.00	2025	1.00	1	$2.00	15%	9%	MII	MII Assemblies	
A35	Loading for Offsite Disposal	Loading for Offsite Disposal	LCY	$2.82	2025	1.00	1	$2.82	15%	9%	MII	MII Assemblies	
A36	Geotextile Removal	Geotextile Removal	SF	$0.11	2025	1.00	1	$0.11	15%	9%	MII	MII Assemblies	
A37	Power Washing of Surfaces	Power Washing of Surfaces	SF	$0.09	2025	1.00	1	$0.09	15%	9%	MII	MII Assemblies	
A38	Road Mat Removal	Road Mat Removal	DY	$2,740.85	2025	1.00	1	$2,740.85	15%	9%	MII	MII Assemblies	
A39	Wetland Miscellaneous Maintenance	Wetland Maintenance	HR	$290.21	2025	1.00	1	$290.21	15%	9%	MII	MII Assemblies	
A40	Drill Seeding	Drill Seeding	AC	$827.11	2025	1.00	1	$827.11	15%	9%	MII	MII Assemblies	
A41	Dewatering	Sump Pump Operation (455 GPM, 4" Discharge)	HR	$10.75	2025	1.00	1	$10.75	15%	9%	MII	MII Assemblies	
A42	Sign Installation	Sign Installation	EA	$25.45	2025	1.00	1	$25.45	15%	9%	MII	MII Assemblies	
A43	Amendment Mixing	Amendment Mixing	LCY	$2.40	2025	1.00	1	$2.40	15%	9%	MII	MII Assemblies	
A44	Deep Excavation (>7 ft)	Long Reach Excavation	BCY	$3.28	2025	1.00	1	$3.28	15%	9%	MII	MII Assemblies	
A48	Turbidity Curtain Install	Turbidity Curtain Install	LF	$18.69	2025	1.00	1	$18.69	15%	9%	MII	MII Assemblies	
A49	Turbidity Curtain Maintenance	Turbidity Curtain Maintenance	HR	$350.30	2025	1.00	1	$350.30	15%	9%	MII	MII Assemblies	
A50	Turbidity Curtain Removal	Turbidity Curtain Removal	LF	$9.34	2025	1.00	1	$9.34	15%	9%	MII	MII Assemblies	
A51	Bathymetric Surveying (per day)	Bathymetric Surveying	DY	$11,963.09	2025	1.00	1	$11,963.09	15%	9%	MII	MII Assemblies	
A52	Dredging	Dredging	BCY	$61.32	2025	1.00	1	$61.32	15%	9%	MII	MII Assemblies	
A53	Riverbank Excavation	Riverbank Excavation	BCY	$5.07	2025	1.00	1	$5.07	15%	9%	MII	MII Assemblies	
A54	Placement	Placement	LCY	$24.45	2025	1.00	1	$24.45	15%	9%	MII	MII Assemblies	
A55	Scow Transport	Scow Transport	EA	$961.70	2025	1.00	1	$961.70	15%	9%	MII	MII Assemblies	
A56	Offloading- Barge	Offloading- Barge	LCY	$8.04	2025	1.00	1	$8.04	15%	9%	MII	MII Assemblies	
A57	Mob/Demob Sampling Boat	Mob/Demob Sampling Boat	EA	$6,118.78	2025	1.00	1	$6,118.78	15%	9%	MII	MII Assemblies	
A58	Mob/Demob Sampling Boat	Mob/Demob Sampling Boat	EA	$6,118.78	2025	1.00	1	$6,118.78	15%	9%	MII	MII Assemblies	
A59	Soil Placement -Berm	Soil Placement -Berm	ECY	$15.39	2025	1.00	1	$15.39	15%	9%	MII	MII Assemblies	
A66	Sump Pump Operation	Sump Pump Operation	DY	$300.38	2025	1.00	1	$300.38	15%	9%	MII	MII Assemblies	
A67	Embayment Dredging	Embayment Dredging	BCY	$20.11	2025	1.00	1	$20.11	15%	9%	MII	MII Assemblies	
A68	Other Dredging	Other Dredging	BCY	$30.08	2025	1.00	1	$30.08	15%	9%	MII	MII Assemblies	
A69	Buoy Placement	Buoy Placement	HR	$274.69	2025	1.00	1	$274.69	15%	9%	MII	MII Assemblies	
A70	Asphalt Paving 4" Base Course	Asphalt Paving 4" Base Course	SY	$2.61	2025	1.00	1	$2.61	15%	9%	MII	MII Assemblies	
A71	Asphalt Paving 2" Surface Course	Asphalt Paving 2" Surface Course	SY	$1.83	2025	1.00	1	$1.83	15%	9%	MII	MII Assemblies	
A72	Aggregate Sub Base Placement	Aggregate Sub Base Placement	SY	$5.39	2025	1.00	1	$5.39	15%	9%	MII	MII Assemblies	

Base Year: 2025

COST CODES FOR MII ASSEMBLIES AND UNIT COSTS

Cost Code	Work or Material Description	Description for Cost Worksheets	Units	MII Unit Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted MII Unit Cost	PC OH[1]	PC PF	Cost Source		Comments
											Source	Source ID	
A73	Power Washing of Surfaces	Power Washing of Surfaces	SF	$0.12	2025	1.00	1	$0.12	15%	9%	MII	MII Assemblies	
A74	Asphalt Demolition	Asphalt Demolition	SY	$11.81	2025	1.00	1	$11.81	15%	9%	MII	MII Assemblies	
A75	Loading Material	Loading Material	LCY	$0.68	2025	1.00	1	$0.68	15%	9%	MII	MII Assemblies	
A76	Onsite Hauling	Onsite Hauling	LCY	$4.65	2025	1.00	1	$4.65	15%	9%	MII	MII Assemblies	
A77	Backfill/Compaction	Backfill/Compaction	LCY	$5.06	2025	1.00	1	$5.06	15%	9%	MII	MII Assemblies	