Design Analysis Report

Final Remedial Design

DESIGN ENGINEERING SERVICES – EPA REGION 2
CONTRACT #68HE0318D0009

RARITAN BAY SLAG SUPERFUND SITE – SEAWALL SECTOR REMEDIAL DESIGN

Work Assignment Number Task Number 68HE0222F0017

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1 INTRODUCTION

1.1 Project Overview

This Draft Final Design Analysis Report (DAR) was prepared for the United States Environmental Protection Agency (EPA) by Henningson, Durham & Richardson Architecture and Engineering, P.C., in association with HDR Engineering, Inc. (HDR), for the Raritan Bay Slag Superfund Site – Seawall Sector, located in the Townships of Old Bridge and Sayreville, Middlesex County, New Jersey (**Figure 1-1**). The remediation of the Raritan Bay Slag Superfund Site is being conducted in phases, with this DAR addressing the Seawall Sector (Areas 1, 2, 3, 4, and 5) and an upland portion of Margaret's Creek Sector (Area 9) that had not been remediated previously, herein collectively referred to as "the site". No remedial target areas were identified in Area 3 and 6; therefore, no remedial action is required in these areas. The DAR is part of the Remedial Design (RD) being prepared by HDR under Work Assignment 68HE0222F0017, under the EPA Region 2 Design Engineering Services (DES), Contract Number 68HE0318D0009. This DAR presents the design analysis to achieve the requirements set forth in the EPA's May 2013 Record of Decision (ROD) (EPA, 2013) addressing the remediation of slag, battery casings, and associated wastes, soil, and sediments at the Raritan Bay Slag Superfund Site.

1.2 Purpose and Organization

The purpose of this DAR is to present the technical basis for the design proposed to achieve the Remedial Action Objectives (RAOs) specified in the 2013 ROD for addressing contamination at the site. This report has been structured as follows:

- **Section 1**: Introduction – This section provides introduction and identifies the purpose and scope of this DAR.
- **Section 2**: Project Background and Site Description – This section presents the history of Raritan Bay Slag Superfund Site, and it also presents the overall strategy for project delivery, including specific design components and rationale for key construction components.
- **Section 3**: Overall Strategy for Project Delivery – This section provides an overall design strategy, major design considerations, project schedule, and reporting requirements.
- **Section 4**: Remedial Design Summary – This section provides a summary of the RD. Major design and construction components, including site access, traffic control, dewatering, removal of source materials, contaminated material excavation, backfilling and grading, waste handling and disposal, stormwater control, water treatment and discharge, and wetland restoration, and seawall reconstruction are detailed in this section. Section 3 also includes general remedial construction schedule and summary of construction cost estimate.
- **Section 5**: Construction Quality Assurance/Construction Quality Control (QA/QC) – This section provides a summary of the quality assurance (QA) and quality control (QC) organization and the process and standards that are applicable to site construction.
- **Section 6**: Required Permits, Approvals, and Access Agreements – This section provides a summary of the required permits that have been identified for the construction and operation of the remedial activities.
- **Section 7**: References – References cited in the DAR are documented in this section.
- **Section 8**: List of Acronyms and Abbreviations.

Tables, figures, and appendices are also included in the DAR. These materials provide additional information, summarize relevant data, and serve as the basis for design decisions. In addition, the DAR consistently references the Design Drawings and the Specifications for the remedial action (RA), which are included under a separate cover.

2 PROJECT BACKGROUND AND SITE DESCRIPTION

2.1 Site Location and Description

The Raritan Bay Slag Superfund Site is located in the Laurence Harbor section of the townships of Old Bridge and Sayreville, Middlesex County, New Jersey. The Raritan Bay Slag Superfund Site is approximately 1.5 miles in length and consists of the waterfront area between Margaret's Creek and the areas just beyond the western jetty at the Cheesequake Creek Inlet (see **Figure 1-1**). For ease of discussion, the Raritan Bay Slag Superfund Site has been divided into eleven areas, as shown in **Figure 2-1**. These areas have been grouped into three sectors based on the type of environment and proximity to source areas. These sectors include:

1. Seawall Sector (Areas 1, 2, 3, 4, 5, and 6)
2. Jetty Sector (Areas 7, 8, and 11)
3. Margaret's Creek Sector (Area 9)

Note that Area 10 (see **Figure 2-1**) was used for the collection of background samples during the 2010/2011 Remedial Investigation (RI) (see **Section 2.2**), and it is not included within the areas subject to remediation.

Waves in Raritan Bay flow predominantly from the east and northeast (Atlantic Ocean), and contaminants from the Seawall and Margaret's Creek Sectors tend to migrate with the westward flow. Currents near the Jetty Sector are complex due to strong tidal currents within Cheesequake Creek. This complicated environment dictates a specific sequencing of cleanup activities to prevent recontamination of remediated areas. The sequence for the Raritan Bay Slag Superfund Site remediation to prevent recontamination is as follows: the Margaret's Creek Sector; the Seawall Sector; and then the Jetty Sector. The Margaret's Creek Sector was completed by the EPA in September 2018.

The Seawall Sector (addressed by this DAR) consists of the following areas:

- Area 1: Laurence Harbor Seawall – The seawall along Old Bridge Waterfront Park west of Margaret's Creek to the beach area at the foot of Laurence Parkway.
- Area 2: Laurence Harbor Beach – The beach area at the foot of Laurence Parkway between the western end of the seawall and the First Jetty.
- Area 3: Laurence Harbor Playground – The Park playground adjacent to the western end of the seawall. No remedial target areas were identified in Area 3; therefore, no remedial action is required in this area.
- Area 4: Old Bridge Waterfront Park – The Park area along the seawall (not including the playground) from the fence to the roadway.
- Area 5: Laurence Harbor Beach – The beach area between the first and third jetty.
- Area 6: Laurence Harbor Beach – The beach area between the third jetty and Cheesequake Creek Inlet eastern jetty. No remedial target areas were identified in Area 6; therefore, no remedial action is required in this area.

In addition to the Seawall Sector, the DAR addresses an upland portion, bordering Old Bridge Waterfront Park, of Area 9, the Margaret's Creek Sector.

An extent of the seawall located in Area 1 along Old Bridge Waterfront Park has been expanded/altered after the Superstorm Sandy as part of the response action. Available aerial photographs, topographic surveys conducted prior and post the 2012 Superstorm Sandy, and site photographs taken during the 2018 Pre-Design Investigation (PDI) were evaluated to estimate the existing extent of riprap and the post-Sandy footprint of seawall. Based on numerous photographs taken during the 2018 PDI and the post-Sandy aerial photographs, the extent of clean riprap placed after the Superstorm Sandy was clearly identified and presented in Figure A1 in **Appendix A.** The terms, "Footprint of Seawall" and "Extent of Riprap" refers to the following definitions in the Contract Documents:

- Footprint of Seawall – The extent of pre-Sandy seawall was estimated based on the 2010 topographic map converted from the aerial photographs. It is assumed that the extent of large pieces of slag pieces (approximately greater than 8 to 10 inches), debris and battery casings are limited to this area within the footprint of seawall. The footprint of seawall also consists of weathered riprap mixed clearly identified visually as brown to dark gray rock material comingled with the slag pieces.
- Extent of Riprap – The extent of riprap was estimated based on the 2018 topographic survey conducted during the 2018 PDI. The extent of the riprap includes the Footprint of Seawall plus the area where large riprap was placed after the Superstorm Sandy, which are clearly identified visually as gray to medium gray large riprap in size approximately greater than 18 to 24 inches.

Examples of site photographs used to estimate the footprint of seawall, extent of clean riprap placed after the Superstorm Sandy and an overall extent of existing riprap are provided in **Appendix A**.

The primary sources of contamination at the Raritan Bay Slag Superfund Site are slag and battery casings. The Footprint of Seawall is composed of up to 80 percent slag. During the RI, battery casings were found in the upper two inches of depositional zones in Areas 2 and 5. Buried slag was observed in test excavations on the upland side of the seawall in Area 1 and the eastern end of Area 4. In general, slag depths ranged from 1 to 5 feet below ground surface.

2.2 Background and Site History

The initial activities that led to the Raritan Bay Slag Superfund Site's National Priorities List (NPL) listing began in the late 1960s and early 1970s, when slag—mostly in the form of blast furnace pot bottoms from a secondary lead smelter—was used in the construction of a seawall in an area that had sustained significant beach erosion and damage due to a series of storms in the preceding years. Slag was used as fill/stabilizing material. Demolition debris in the form of concrete and a variety of bricks, including fire bricks, was also placed within the Footprint of Seawall. In addition, a portion of the seawall contains large riprap believed to have been placed over the slag.

In 2007, elevated levels of lead, antimony, arsenic, chromium, and copper were identified by the New Jersey Department of Environmental Protection (NJDEP) in soil along the seawall, as well as at the edge of the beach near the western end of the seawall. On April 24, 2008, EPA received a request from NJDEP to evaluate the Laurence Harbor seawall for a removal action under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). On November 3, 2008, NJDEP forwarded an amended request to include the Western Jetty along the Cheesequake Creek Inlet. Several investigations and RA activities were conducted by EPA, NJDEP, and the Old Bridge Municipal

Utilities Authority (OBMUA) between 2007 and 2015. Details of these investigations conducted from 2007 to 2010 are provided in Section 2.1 of the ROD (EPA, 2013).

A Remedial Investigation (RI) was conducted by CDM Smith between September 2010 and June 2011. Activities focused on collecting sufficient data to supplement the existing data as identified in the Final (Revised) Data Gap Evaluation Technical Memorandum (CDM Smith, 2010). Based on the RI results, a Feasibility Study (FS) was completed in September 2012 (CDM Smith, 2012). The ROD for the Raritan Bay Slag Superfund Site was signed by EPA in May 2013 (EPA, 2013) and called for removal of the source material, institutional controls, and long-term monitoring.

In October 2013, as a result of Hurricane Sandy, EPA's Removal Program completed removal of storm-deposited debris from the park, assessed and remediated contaminated park surface soils, repaired damaged portions of the seawall, and established fencing and signage along the park.

2.3 Record of Decision Requirements

The May 2013 ROD final remedy for the Raritan Bay Slag Superfund Site outlined the RAOs, which address the human health risks and environmental concerns (EPA, 2013). For soil, unacceptable risks were identified for receptors, including children exposed under future recreational use, the developing fetuses of female construction and utility workers under both current and future scenarios, and, from the ecological evaluation, aquatic and terrestrial receptors. Sediment and surface water receptors identified in the Screening Level Ecological Risk Assessment (SLERA) included aquatic receptors. Exposure pathways included ingestion of soil, sediment, and surface water.

2.4 Remedial Action Objectives

The RAOs are organized into these categories: slag, battery casings, and associated wastes, which comprise the principal threat waste (PTW); soil; sediment; and surface water.

In general, PTW are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or present a significant risk to human health, or the environment should exposure occur. PTW (i.e., source materials) at the site include:

1) Slag and battery casings/associated wastes, including particles of slag and battery casings/associated wastes identified in the soil and sediment media.
2) Highly impacted soil in the Seawall Sector in portions of Areas 1 and 2, and in the upland portion of the Margaret's Creek Sector.
3) Highly impacted sediment located in Areas 1 and 2 in the Seawall Sector.

The RAOs are listed below:

2.4.1 Slag and Battery Casings and Associated Wastes

The RAOs for the slag and battery casings and associated wastes are listed below.

- Reduce exposure resulting from incidental ingestion of slag and battery casings and associated wastes to levels that are protective of human health.
- Reduce exposure resulting from the ingestion of slag and battery casings and associated wastes to levels that are protective of ecological receptors.

- Reduce migration of contamination from the slag and battery casings and associated wastes to surface water, soil, and sediments to levels that are protective of human health and ecological receptors.

2.4.2 Soil

The RAOs for contaminated soil and highly impacted soil (containing PTW) are listed below.

- Reduce exposure resulting from incidental ingestion of contaminated soil to levels protective of human health.
- Reduce exposure resulting from the ingestion of contaminated soil and ingestion of contaminants via food chain to levels protective of ecological receptors.
- Reduce migration of contamination from the soil to surface water and sediments to levels that are protective of human health and ecological receptors in Area 9.

2.4.3 Sediment

The RAOs for contaminated sediment and highly impacted sediment (containing PTW) are listed below.

- Reduce exposure resulting from the ingestion of contaminated sediments and ingestion of contaminants via food chain to levels protective of ecological receptors.
- Reduce the migration of contamination from the sediments to surface water and soil to levels that are protective of human health and ecological receptors.

2.4.4 Surface Water

The RAO for surface water is listed below.

- Reduce metals concentrations to levels that are protective of ecological receptors by remediating source materials.

2.5 Selected Remedy

The selected remedy addresses the potential risks to human health and the environment associated with the site. The selected remedy as per the 2013 ROD includes the following components:

- Remediation of Slag, Battery Casings and Associated Wastes: PTW such as slag, battery casings and associated wastes will be excavated based on visual observation and disposed of at appropriate off-site facilities. Slag materials that are not readily visible will be remediated as soil/sediment. Demolition debris in the form of concrete and various bricks will also be removed and disposed of at appropriate off-site facilities.
- Surface Water: By removing PTW, surface water contamination will be reduced to acceptable levels over time. Monitoring will be implemented to ensure the effectiveness of the remedy by achieving the remedial goals presented in **Table 2-1**.
- Soil and Sediments: Contaminated soils and sediment above the lead remediation cleanup level of 400 mg/kg will be excavated and/or dredged and disposed of at appropriate off-site facilities.

Through the execution of these actions, the 2013 ROD states that RAOs for the site will be met and no institutional controls will be required.

2.6 Cleanup Levels for Chemicals of Concern

The selected remedy will remove the concentrations of lead above the cleanup levels in soil and sediment specified by the May 2013 ROD and listed in **Table 2-1**. Non-cancer hazards identified in the risk assessment will be reduced below the remedy cleanup levels. In addition, the selected remedy will reduce the concentrations of contaminants of concern (COCs) for surface water identified in the risk assessment over time to levels at or below the performance standards listed in **Table 2-1**.

2.7 Nature and Extent of Contamination

The evaluation of the nature and extent of contamination initially focused on those constituents identified as site-related contaminants (i.e., lead, arsenic, copper, antimony, chromium, and iron) in site sediment, surface water, soil, and groundwater. Conservative, health-protective preliminary screening criteria were used in the initial step to identify the nature and extent of contamination in site media. It is important to note that concentrations that exceeded these preliminary screening criteria are not necessarily associated with unacceptable risk to human health or the environment but were used to define the areas that required further evaluation.

The slag and battery casings and associated wastes contain high concentrations of lead which pose unacceptable human health and ecological risks, and act as a source of contamination for soil, sediment, groundwater, and surface water. As stated previously, the slag was subjected to a variety of leaching tests, which concluded that lead and other metals have the potential to leach under certain conditions to soil, sediment, groundwater, and surface water.

The primary sources of lead contamination are slag and battery casings. The footprint of seawall is up to 80 percent slag. Battery casings were found in the upper two inches of depositional zones in Areas 2 and 5. Buried slag was observed in test excavations on the upland side of the seawall in Area 1 and the eastern end of Area 4.

During the RI, multiple rounds of surface and subsurface soil sampling were conducted to investigate potential source areas of contamination, and to evaluate the potential risk to human health and the environment. Lead contamination in the sediment was identified in various areas in the Seawall Sector, in particular, areas near the seawall, and in Areas 2 and 5. Elevated concentration were found in sediments near the seawall (Area 1). The contaminated sediment serves as a secondary source for the surface water contamination. The RI report presents more detailed information with regard to findings of the sediment sampling events.

Along the eastern 1,000 feet of the seawall, most of the contamination is in the shallow soils and sediment. In Area 2, in the soils and near-shore sediments, lead and arsenic concentrations both exceeded the preliminary screening criteria. Deeper soils in this area also exceeded both the lead and arsenic human health screening criteria. In Area 5, near the first jetty, co-located lead and arsenic in soil and sediment exceeded the initial screening criteria. Deeper soil and sediment from this area did not. Other site-related metals were detected at some locations where lead and arsenic contamination were not co-located.

Surface Water

Based on the RI results, surface water in limited areas was found to contain lead, arsenic, copper, iron, manganese, vanadium, and zinc from leaching of slag and battery casings and associated wastes, contaminated soil, and sediment.

In surface water, lead was commonly detected above the site-specific screening criterion in surface water samples collected from the intertidal zone, between the eastern end of Area 1 and the western end of Area 6; the highest concentrations were in Areas 1 and 2. Arsenic was detected above its site-specific screening criterion less frequently than lead.

2.8 Summary of Site Risks

In 2011, EPA prepared a baseline human health risk assessment (HHRA) and a screening-level ecological risk assessment (SLERA) for the Raritan Bay Slag Superfund Site to estimate risks associated with current and future effects of contaminants on human health and the environment. An Ecological Risk Assessment (ERA) was prepared by EPA/Environmental Response Team (ERT) in 2010.

HHRA: Lead in soil is the only human health risk driver at the site. Future child recreational users in Area 2 and current/future construction/utility workers at the site have potential lead risks above the threshold level of concern due to the presence of lead in soil in all upland Areas.

ERA: A SLERA and an ERA prepared by EPA/ ERT (EPA/ERT 2010) evaluated the potential risks to ecological receptors from exposure to site chemicals. The SLERA evaluated Areas 8 and 9. EPA/ERT's risk assessment evaluated Area 1. A technical addendum to the SLERA was prepared to further evaluate potential risks to ecological receptors from exposure to site chemicals at Areas 1, 8, and 9 using fewer conservative assumptions. The results of the SLERA indicated that lead, arsenic, copper, iron, manganese, vanadium, and zinc in surface water, and lead in soil and sediment as the only risk drivers to aquatic receptors utilizing Areas 1 and 8 and terrestrial receptors utilizing Area 9 upland areas of the site.

Basis and Rationale for Remedial Action Objectives

The basis for the RAOs for slag and battery casings and associated wastes is to remediate based on visual observation (i.e., demolition debris in the form of concrete and a variety of bricks, including fire bricks observed on-site during remedial action will be removed or remediated).

Slag materials that are not readily visible will be remediated as highly impacted soil/sediment containing PTW. Removal will prevent high concentrations of lead which pose unacceptable human health and ecological risks from acting as a source of contamination for soil, sediment, and surface water.

Soil in all areas have been impacted by the slag and battery casings and associated wastes. Some of the areas contain slag particles with high concentrations of heavy metals. The contaminated soil poses risks to human health and ecological receptors and also serves as a secondary source for sediment and surface water contamination. Lead contamination in the sediment was identified in various areas in particular, areas near the seawall, and Area 2. The contaminated sediment poses risks to the ecological receptors and also serves as a secondary source for the surface water contamination. Contaminated and highly impacted soil and sediment above the remediation cleanup levels would be excavated and/or dredged and disposed of at appropriate off-site facilities.

A single unified cleanup goal was proposed for soil and sediment due to the nature of the site (comingling/relationship between soil and sediment in the intertidal zone areas). There is significant potential for re-contaminating soil or sediment if the two media were remediated to different cleanup

levels. Therefore, one unified remediation cleanup level is provided for soil and sediment. Additional details can be found in Section 2.3.3 of the FS for the Raritan Bay Slag Site.

Based on the RI results, surface water is contaminated with lead and other heavy metals from leaching of slag and battery casings and associated wastes, contaminated soil, and sediment. Although surface water is not a source, the contamination poses risks to the ecological receptors. The approach to surface water contamination at the site is to remove the slag and battery casings and associated wastes, contaminated soil and sediment that act as sources of contamination to the surface water. This will reduce the surface water contamination over time to acceptable levels. Monitoring will be implemented to assess the effectiveness of the approach by comparing the monitoring results to a set of cleanup goals.

Slag and battery casings were tested for leaching potential and were found to exceed the 5.0 mg/L RCRA regulatory limit for lead. The results of the Toxicity Characteristics Leaching Procedure (TCLP) test demonstrate that the slag and battery casings fail TCLP and are therefore a hazardous waste. In addition, lead concentrations in both composite and core slag samples were identified at levels ranging from 38,000 mg/kg to 91,000 mg/kg. As such, slag and battery casings are source materials that would present a significant risk to human health, or the environment should exposure occur.

The remedial action will remove slag and battery casings and associated wastes, contaminated soil, and sediment thus, eliminating incidental ingestion risk to residents and recreators utilizing the site. The Selected Remedy will remove the concentrations of lead above the cleanup levels in soil and sediment. Noncancer hazards identified in the risk assessment would be reduced below the remedy cleanup levels. In addition, the selected remedy will reduce the concentrations of COCs for surface water identified in the risk assessment to levels at or below the performance standards listed below and in **Table 2-1**. Ultimately, the selected remedy will restore the site to unrestricted use.

2.9 Summary of Threatened and Endangered Species/Sensitive Environments

Information regarding threatened and endangered species and ecologically sensitive environments that may exist at or in the vicinity of the site was compared against the RI Report. A copy of the letter received from NJDEP on March 17, 2016, for the Margaret's Creek can be found in **Appendix B**. Based on the review of the NJDEP Natural Heritage Database, the United States Fish and Wildlife Service (USFWS) iPaC web-based online project planning tool download, and the National Oceanic Atmospheric Administration (NOAA) Endangered Species Act (ESA) Section 7 Online Mapper, several threatened endangered and special concern species were identified at the site and within one mile of the site. A copy of the USFWS iPaC download can be found in **Appendix B**.

The following threatened, endangered, and special concern species are known to occur at or utilize the site:

- Black-crowned night heron (Nycticorax nycticorax) – Threatened species
- Glossy ibis (Plegadis falcinellus) – Special concern species
- Little blue heron (Egretta caerulea) – Special concern species
- Osprey (Pandion haliaetus) – Special concern species
- Snowy egret (Egretta thula) – Special concern species
- Atlantic loggerhead (Caretta caretta) – Endangered species

As part of NJDEP's record review, areas within one mile of the site were also included in their response when preparing for the Area 9 Margaret's Creek RD (CDM Smith, 2017). In addition to the above listed species, the following additional threatened, endangered, or special concern species are known to occur within one mile of the site:

- Pine Barrens Treefrog (Hyla andersonii) – Threatened species
- Bald eagle (Haliaeetus leucocephalus) – Endangered species

In addition, the review of the USFWS iPaC download identified additional species that may occur or could potentially be affected by the RA activities; these are listed below:

- Piping Plover (Charadrius melodus) – Threatened bird
- Red Knot (Calidris canutus rufa) – Threatened bird
- Seabeach Amaranth (Amaranthus pumilus) – Threatened flowering plant
- Swamp Pink (Helonias bullata) – Threatened flowering plant
- Northern Long-eared Bat (Myotis septentrionalis) – Threatened mammal

Finally, a review of the ESA Section 7 Mapper, NOAA Fisheries Greater Atlantic Region, was completed and the following ESA-listed species may be present in the project area:

- Atlantic sturgeon (adult and subadult)
- North Atlantic right whales (adult and juvenile)
- Fin whales (adult and juvenile)
- Green, loggerhead, leatherback, and Kemp's ridley sea turtles (adult and juvenile)

An in-depth review of on-site habitats during the RI indicated the following would be applicable during the RA construction activities:

- Suitable habitat is not present to support swamp pink.
- There is a potential for Indiana bats to utilize the Site during summer months in areas characterized by mature trees.
- There is a small back beach habitat area, east of the jetty, where seabeach amaranth could potentially be supported, however the species has not been observed on-site.
- During several site visits, piping plover, red knot, black-crowned night heron, glossy ibis, and snowy egret were not observed.
- On several occasions, an osprey was observed flying over and foraging on-site.

It should be noted that the list of species identified in the letter from NJDEP and the USFWS web-based online download includes several new species that were not identified during the search conducted during the RI in 2010 for the Raritan Bay Slag Superfund Site.

In preliminary discussions with NOAA during the summer of 2022, timing restrictions and/or mitigation and monitoring will not be required, however a formal consultation will be coordinated.

EPA will coordinate with NOAA's National Marine Fisheries Service (NMFS) since the work will occur within Essential Fish Habitat or is otherwise covered by the Magnuson Stevens Act, Coastal Zone Management Act, the Marine Mammal Protection Act, and the ESA. The coordination with the NOAA/NMFS/OHC will involve review of design documents and discussion regarding the remediation

work in the coastal zone including excavation of sediment in and adjacent to Raritan Bay, replacement of fill (backfill and riprap) in the intertidal zones and potential loss of habitat, and potential discharge of treated water to nearshore habitat. Similarly, coordination with the United States Army Corps of Engineers (USACE) is being conducted to confirm that substantive requirements are met for discharges of fill material into waters of the United States pursuant to Section 404 of the Clean Water Act.

Piping plovers breed in New Jersey, nesting on beaches between the high tide line and primary dune area. No pairs are known to nest in or near the study area and due to the narrow shores throughout most of the area, the species would not be expected to breed there. It is anticipated that any piping plovers observed within the study area would be limited to a small number of transients. However, if this species is identified as nesting within the study area, the USFWS and NJDEP Endangered, and Nongame Species Program (ENSP) will be notified. Correspondence with these agencies will determine the need and extent of protective fencing to be established around the nest, as well as limitations on project activities for the duration of the plovers' breeding season.

The final determination on the restrictions or conditions on the RA construction activities will be incorporated as part of the NJDEPDLRP Permit equivalency and RA work plan.

2.10 Summary of Pre-Design Investigation

The PDI was conducted in 2018 and 2019 by HDR (HDR, 2019), and Data Gap Investigation was conducted in June 2020 by Advanced GeoServices Corp., a Montrose Environmental Group company (AGC) (Montrose AGC, 2020). The results of these investigations are summarized in this section.

The PDI was conducted to further refine the remediation areas identified in the proposed plan and to obtain additional analytical and geotechnical data for use in the RD (HDR, 2018). The PDI also included sampling in areas outside of the remediation areas to confirm that the footprint of contamination delineated during the RI had not changed as a result of recent storm events (in particular, Superstorm Sandy).

The results of the PDI were used to refine the area and volume of excavation for the RD. Analytical results for soil/sediment samples collected during the PDI were evaluated against the Remediation Cleanup Level (RCL) of 400 mg/kg for lead. A summary of PDI analytical results is provided in **Table 2-2** and on **Figures 2-2A** through **2-2J** and are discussed below.

2.10.1 Soil and Sediment Analysis

Soil/sediment within the remediation area identified in the 2013 ROD was impacted by the source materials, as evidenced by the distribution of lead contamination. Both surface and subsurface soil/sediment samples show lead concentrations above the RCL of 400 mg/kg. Elevated levels of lead were generally detected in the following areas:

- Within Area 2, contamination was observed deeper than 8 feet below ground surface (bgs) between the PDI transects for A2-201 and A2-240. Contamination appeared to be shallow (2 to 3 feet bgs) in the upland portion of the beach, becoming deeper (approximately 7 to 8+ feet bgs) towards the middle of the beach and then shallow again (approximately 3 to 6 feet bgs) near the high tide water line. At three locations (A2-207,

A2-216, and A2-217), lead concentrations in the deepest sampling interval were slightly greater than 400 mg/kg, with concentrations decreasing with depth.

- Within the intertidal portion of the Area 1, lead contamination was observed at depths ranging from approximately 2 to 4 feet bgs. Data from the PDI and RI data were able to achieve horizontal as well as vertical delineation at all locations within the intertidal portion of Area 1.
- Within the upland portion of Areas 1 and 4, contamination was observed at depths ranging from approximately 3 to 5 feet bgs. Data from the PDI and RI were able to achieve horizontal delineation at all locations except at A1-108, A4-401, A1-166, A1-175, A1-183, A1-184, A1-189, and A1-190. The PDI was able to achieve vertical delineation at all locations except at A1-108, A1-166, and A1-182. At these three locations, lead concentrations in the deepest sampling interval are greater than 400 mg/kg and with concentrations decreasing with depth. At location, A1-182, lead was detected at a concentration of 3,700 mg/kg at depth 6 feet bgs.
- Within the intertidal portion of the Area 5 near the First Jetty, lead contamination was observed at depths ranging from approximately 1 to 3 feet bgs. Data from the PDI and RI were able to achieve horizontal as well as vertical delineation. RI locations SED148 and SED150 are isolated exceedances between the first and second jetty in Area 5, and lead was detected at concentrations less than 400 mg/kg at surrounding PDI locations.
- Existing Seawall: Analytical results for soil/sediment samples collected from the bottom of the existing seawall were also evaluated to determine the vertical extent of slag and battery casings and associated deeper contamination within the seawall area. Lead was detected at concentrations greater than 400 mg/kg in five out of eight soil boring locations conducted within the existing seawall area. At locations SEW-SB-01 and -02, lead was detected only in the surface (less than 1 feet bgs). At locations SEW-SB-03, -05, and -06, lead contamination was observed at depths ranging from approximately 5 to 8 feet bgs. Also, the approximate thickness of the seawall in the vicinity of each seawall boring location was recorded in the boring logs to estimate the quantity of slag materials/riprap requiring segregation and removal during the RA.

The PDI also confirmed that the remediation areas identified in the 2013 ROD for the Seawall Sector were not significantly changed since the RI by recent storm events (in particular, Superstorm Sandy). At most locations within the identified remediation areas in Area 1, 2, 4 and 5, the data collected from the PDI exhibited similar lead concentrations at locations where lead contamination was observed during the 2011 RI. Overall, the PDI analytical data compared favorably with the 2011 RI data.

Lead was detected at concentrations less than 400 mg/kg at locations in Area 5 west of the A5-528 transect (between the Second and Third Jetty) and in all of Area 6. Similar observations were made during the 2011 RI. The data collected from the PDI along with the existing RI data confirmed that the extent of the remediation areas estimated in the 2013 ROD remained unchanged, and the contamination has not been relocated in Area 5 (west of the A5-528 transect) and in Area 6. No remedial target areas were identified in Areas 3 and 6; therefore, no remedial action is required in these areas.

During the 2018 PDI, due to a malfunction of the hand-held Global Positioning System (GPS) unit on-site, samples A9-902 through A9-909 were not collected in the vicinity of the proposed locations near RI sample locations A9-GEOW and A9-GEOE, formerly identified as part of the Margaret's Creek

Sector. In October 2019, HDR returned to Margaret's Creek to perform a supplementary PDI sampling event. Eight additional sediment core locations (A9-910 through A9-917) were installed around A9-GEOW and A9-GEOE to two feet bgs to delineate historical contamination at A9-GEOW and A9-GEOE. No elevated lead levels were detected in samples from the 2019 sampling. Using the October 2019 PDI data, the horizontal extents of contamination around A9-GEOW and A9-GEOE were fully delineated.

2.10.2 Total and Toxicity Characteristic Leaching Procedure Metals Analyses

Total metals and TCLP analytical results for soil samples collected from the seawall boring locations were evaluated against the NJDEP Residential Direct Contact Soil Remediation Standard (NJRDCSRS), and TCLP analytical results were evaluated against RCRA hazardous waste toxicity TCLP criteria for seven metals, including arsenic, barium, cadmium, total chromium, lead, selenium, and silver. Total and TCLP metal analytical data (**Table 2-3**) are used for the RD to estimate the volume of hazardous material and specific handling and disposal procedures to be implemented during construction.

Only lead was detected at concentrations greater than the hazardous waste toxicity TCLP criteria of 5 milligrams per liter (mg/l). Out of the 22 samples collected, two samples from location SEW-SB-03 at depths ranging from 1 to 3 feet bgs and one sample from location SEW-SB-05 at depth interval 1-2 feet bgs exceeded the hazardous waste toxicity TCLP criteria for lead. Lead TCLP values ranged from 15.1 to 1050 mg/l, with the maximum concentration detected at 1-2 feet bgs at SEW-SB-03.

2.10.3 Geotechnical Analyses

A total of 17 soil samples were analyzed for geotechnical analyses, including moisture content (ASTM D2216), soil density (ASTM D7263), grain size distribution (ASTM D6913 and D7928), atterberg limits (ASTM D4318), and unconfined compressive strength (ASTM D2166). Continuous geological logging of soil borings and geotechnical analytical results for soil samples collected from the upland/beach area were evaluated to complete this RD.

2.10.4 Data Gap Investigation

A Data Gap Investigation was conducted by AGC in 2020 to further characterize the limits of lead greater than the RCL in an upland area of Margaret's Creek Sector (Area 9) (**Figure 2-3**) (Montrose AGC, 2020). Surface and subsurface soil samples were collected by AGC to address data gaps in delineation of the vertical and horizontal limits of contamination associated with sample location A9-03. Thirteen (13) borings were advanced to depths of 0-12 inches, 12-24 inches, 24-36 inches, and 36-48 inches using a track mounted direct push drill rig or hand auger. Soil samples were collected at each one-foot interval. Results of soil sampling in Area 9 indicated lead concentrations above the 400 mg/kg RCL for total lead are bounded on all sides except to the north, as shown on **Figure 2-3**. Further delineation to the north of the upland portion of Area 9 prior to initiating the remedial action is not required as post-excavation confirmatory sampling will be conducted to verify the removal. Please refer to AGC's Data Investigation Report (Montrose AGC, 2020) for detailed sampling results.

The potential for dissolved lead conditions in the beach (Area 2) was identified as a data gap by AGC. To understand the potential for the presence of dissolved lead during remedial activities, surface water, beach sand samples, and water within the pore space of the impacted beach sand, were collected for lead analysis. Lead was detected in all sediment samples collected in Area 2, with concentrations

ranging from 160 mg/kg to 330 mg/kg in the limited samples collected during the data gap investigation. Total lead was detected in all surface water samples with the maximum concentration of 29 ug/l.

Pore water samples were collected from the water within the in-situ sediment to better understand dissolved lead concentrations that might be encountered during excavation activities. Pore water samples were filtered at 10 microns to represent possible treatment via a filter bag or disc filter following collection. The highest total lead concentration noted following filtering through a 10-micron filter was 16 ug/l. Detailed information on the surface water and pore water sampling locations, sampling methodology and analytical results are provided in the AGC's Data Gap Investigation Report (Montrose AGC, 2020).

3 OVERALL STRATEGY FOR PROJECT DELIVERY

This section provides an overall strategy for the project delivery as presented in the Contract Documents, including the major design assumptions and rationale that were used to develop the key construction components of the RD and goals for conducting surface water monitoring. Remediation will consist of the excavation and removal of source materials (i.e., pieces of slag comingled with crushed battery casing materials and associated wastes that act as sources of contamination), and contaminated soil/sediment from the areas located in the Seawall Sector as well as an isolated upland area in Area 9. Source materials, contaminated soil/sediment, riprap/armored stone, and miscellaneous debris will be removed in stages, starting from the eastern end of the extent of riprap in Area 4, and proceeding westward along the seawall. The removal process will continue in Areas 1 and 4 along the seawall, then move to the beach Area 2, and finally conclude in Area 5 between the First and Second Jetty. Excavations in the vicinity of the seawall have been divided into eight seawall segments to facilitate discussion on the removal and handling of the aforementioned site materials. These seawall segments, labeled A through H, are each approximately 300 feet in length, and are depicted in the Design Drawings.

The major design components will include the following:

- Mobilization
- Topographic and bathymetric surveying
- Clearing and grubbing
- Site preparation
- Access road and temporary facilities installation
- Traffic control measures installation
- Soil erosion and sediment control measures installation
- Sheet pile wall installation
- Dewatering measures installation
- Temporary water treatment and discharge system installation and operation
- Removal of riprap and source materials and stockpiling
- Decontamination of riprap and armored stone
- Excavation of source materials and soil/sediment and stockpiling
- Post-excavation confirmatory sampling and analysis
- Surveying
- Waste characterization sampling and analysis
- Off-site treatment and disposal
- Backfilling and grading
- Wetland area construction
- Revetment construction
- Site restoration
- Sheet pile wall removal
- Wetland area planting
- Decontamination of personnel, tools, and equipment
- Demobilization

3.1 Major Design Considerations

The RD includes four major design considerations, for which detailed designs will be developed and submitted by the Contractor for an approval prior to initiating the RA. These major design considerations include:

- Off-site stabilization (Stabilization Plan; Waste Management and Disposal Plan)
- Excavation dewatering system using a sheet pile wall, collection trench, and/or well point dewatering system (Dewatering and Drainage Plan)
- Temporary water treatment (Dewatering and Drainage Plan)
- Temporary excavation slope stability systems (Excavation and Handling Plan)

The Contract Documents (Specifications and Design Drawings) are prepared to include concise design requirements, performance metrics, and responsibilities of the Contractor for the above-listed design components. The minimum design requirements for these four components have been developed based on industry standards and technical- and present-worth cost considerations specific to conditions at the site. Recommendations for these design components have been presented in **Section 4** and included in the design. However, it is the responsibility of the Contractor to submit detailed designs for these components, propose means and methods, obtain approvals, and implement these components of the remediation.

3.2 Procurement Method/Contract Strategy

The Specifications and Design Drawings will be used by EPA to obtain the services of a Contractor, either through a pre-placed contract mechanism or through the solicitation of proposals.

3.3 Implementation Schedule

A representative RA construction schedule, which illustrates the general time requirements and sequence for completion of work, is provided in **Figure 3-1**.

3.4 Review of Project Requirements

As indicated in **Section 2.4**, the project requirements have been reviewed and incorporated into the design. EPA will evaluate conformance with the project requirements as part of the review and comment process in consultation with the state, as appropriate. Review comments will be resolved and incorporated into the final design. EPA will approve the final design in consultation with the state, where appropriate.

During and prior to the RA construction, reviews will be required by EPA as part of the pre-construction project plans review and approval and construction QA/QC program to verify that the Contractor executes the RD in accordance with the Contract Documents. EPA will consult with the state during RA construction, where appropriate.

3.5 Surface Water Monitoring

Surface water monitoring will be conducted by the EPA and not by the Contractor involved in conducting the RA. Therefore, the pre-and post-RA surface water monitoring activities are not included in the Contract Documents. Surface water monitoring activities for dissolved lead and other TAL metals (as specified in **Table 2-1**) will be conducted both before and after the removal of contamination in the Seawall Sector.

To establish baseline conditions prior to initiating removal activities, surface water samples will be collected during ebbing high tide at 26 designated locations within the Seawall Sector, as shown in **Figures 3-2A and 3-2B**. The sample results will be compared to the action levels provided in **Table 2-1**.

Surface water monitoring post-remedial action will confirm the effectiveness of the remedy in achieving the goals outlined in **Table 2-1**. The first round of post-remedial action surface water monitoring activities will commence within a month after demobilization after the RA. Surface water samples will be collected from the same 26 locations depicted in **Figure 3-2A and 3-2B**. This initial round of post-remedial action monitoring will serve to assess the immediate impact of the remedy.

A second round of surface water sampling will be conducted approximately six months after the first round. This extended timeframe allows for a comprehensive evaluation of the longer-term effects of the RA on surface water quality. Post-remedial action surface water monitoring events will be repeated every six months until the remediation goals provided in **Table 2-1** have been achieved.

4 REMEDIAL DESIGN SUMMARY

This section summarizes key remedial design components of the excavation and removal of source materials (i.e., slag and associated waste material), and contaminated soils and sediments from the areas located in the Seawall Sector as well as isolated sub-areas located in Area 9.

4.1 Project Plans

Preparation and approval of project plans will be required prior to mobilization on the site. In addition to the site-specific work plans listed for the major design considerations components listed in Section 3.1, the Contractor will also develop the following general project plans in accordance with the Contract Documents:

4.1.1 Quality Assurance Project Plan

The sampling at the site conducted during the PDI phase of work was completed in accordance with the EPA-approved Quality Assurance Project Plan (QAPP), dated May 24, 2018. Additional sampling will be conducted during the construction phase. The QAPP, dated May 24, 2018, will require revision to include additional sampling requirements for the RA and submittal for an approval prior to sample collection. If any additional sampling requirements are identified during construction, the approved QAPP will be amended as appropriate.

The Contractor will prepare a QAPP consistent with the requirements of the contract Specification. In addition to the post-excavation confirmatory sampling, the sampling programs include but are not limited to investigation-derived waste (IDW) sampling, borrow and on-site fill characterization sampling, and waste characterization and disposal classification sampling. The QAPP will be prepared in accordance with EPA-505-B-04-900A/B and EM 200-1-3 and OSWER directive 9272.0-17 Implementation of the Uniform Federal Policy (UFP) for QAPP and other requirements of the Specifications. The QAPP will confirm the Contractor's understanding of the contract requirements for chemical data quality control and will describe procedures for sampling and sample chemical parameter measurement, data documentation, data assessment, and data reporting requirements.

4.1.2 Contractor Quality Control Plan (CQC)

The CQC Plan will manage the performance of the RA tasks through designed and documented (QA/QC methodologies applied in the field and in the lab). The CQC Plan provides a detailed description of the observation and testing activities that will be used to monitor construction quality and confirm that remedial construction is in conformance with the remediation objectives and Contract Documents (Design Drawings and Specifications). This CQC Plan includes the following:

- Responsibilities and authorities of the organizations and key personnel involved in the design and construction of the remedy.
- Observations and tests that shall be used to monitor construction and the frequency of performance of such activities.
- Sampling activities, sample size, sample locations, frequency of testing, acceptance, and rejection criteria, and plans for implementing corrective measures as addressed in the plans and Specifications.
- Requirements for project coordination meetings between the EPA, NJDEP, Construction Manager, Contractor, RD subcontractors, and other involved parties

- Description of the reporting requirements for quality assurance activities including such items as daily summary reports, schedule of data submissions, inspection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation.
- Description of the final documentation retention provisions.

4.1.3 Accident Prevention Plan & Site Safety and Health Plan

The responsibility for the development, implementation, and enforcement of the Accident Prevention Plan (APP) and Site Safety and Health Plan (SSHP) lies with the Contractor and its health and safety personnel. The APP/SSHP shall be developed by the Contractor including programs for accident prevention, personnel protection, medical surveillance, site control/decontamination, emergency response/contingency planning, and air monitoring. The Contractor's APP/SSHP will be submitted to the EPA's Representative for review prior to the commencement of any on-site activities.

The County and local law enforcement officials, emergency medical care units, local Fire Departments and utility emergency teams shall be contacted to ascertain the type of response required in an emergency situation and to coordinate the response of the various units. A standard operating procedure describing security force response to foreseeable contingencies will be developed in accordance with the Specifications and maintained at the site. A list of emergency points of contact, telephone numbers, radio frequencies and call signs will be posted and updated as necessary to maintain dependable responses.

4.1.4 Site Security Plan

A security plan will be developed for the site outlining the procedures and protocols for protecting the work site and the general public by limiting site access to authorized personnel and equipment only. The Contractor will be required to secure the site 24 hours a day, seven days a week including holidays, and days when no activities are in progress. Security will be established upon the Contractor's mobilization to the site. Site security personnel will provide control of all persons, equipment, and vehicles entering and leaving the site. Site security personnel will require all personnel and visitors to sign in and out and will maintain a log of all site access.

Uniformed guard service will be required for the project 24 hours a day, seven days a week including holidays, and days when no activities are in progress. Steps should be taken to confirm that lights left on overnight for security purposes do not impact local residents.

4.1.5 Soil Erosion and Sediment Control Plan (SESC)

The Contractor will adhere to the SESC plan certified by the Freehold Soil Conservation District (FSCD) that serves Middlesex County. The SESC plan will be provided to the Contractor prior to start of construction activities.

SESCs will be installed prior to the disturbance of impacted soil/sediment at the site. Erosion controls will include installation of a silt fence along the entire downgradient portion of the area disturbed by the construction (area of disturbance), as well as turbidity barriers installed in the bayside along the perimeter of the sheet pile wall to prevent sediment, if any, from entering clean bodies of water. Turbidity barriers will be used as a secondary control along the perimeter of open excavation area and installed as part of the erosion and sediment control requirements. Silt fence will also be installed

within the excavation area to separate completed work zones from active work. Silt fencing will be supplemented with hay bales and/or diversion berms/swales as necessary to prevent migration of sediment from the construction disturbance. Silt fence will also be installed between the sheet pile wall and areas of active excavation to prevent sediment from entering clean bodies of water.

Gravel access roads will be used for the movement of vehicles, equipment, and material throughout the site. A stone construction entrance will be installed at the site entrance to prevent tracking of soils on the public street. Multiple decontamination pads as shown on the Design Drawings will prevent sediment tracking from the site onto the public street. No soil or sediment shall be spilled, dropped, washed, or tracked onto the public streets. The SESC plan shall include daily inspections and sweeping of surrounding roads to be conducted immediately by the Contractor if any sediment is observed on the roadways. The SESC plan will include the installation of filter fabric in all storm drains surrounding the active site and along the haul route through the Margaret's Creek area. Soil stockpiles will be constructed with perimeter silt fencing. Example details of soil erosion and sedimentation measures are provided in the Design Drawings.

Silt fencing will be inspected on a daily basis or after significant rain or storm events. Turbidity barriers and other erosion control measures will be inspected on a weekly basis or after significant rain or storm events. Sediment will be removed from the silt fence once the height of the sediment is 1/3 the height of the silt fence. Erosion control features observed to be damaged or in need of repair will be repaired immediately.

All SESC measures will be constructed and maintained in accordance with the FSCD's Standards and Requirements. Temporary control devices to be used for erosion and sedimentation control will be installed and maintained by the Contractor until permanent protection is established at project completion and upon acceptance by the EPA's Representative.

4.1.6 Perimeter Air-Monitoring Plan

The Contractor will develop Perimeter Air-Monitoring Plan (PAMP) and implement a perimeter air-monitoring program that requires real-time monitoring for particulates (i.e., dust) at the downwind perimeter of the active work area when excavation is in progress at the site. The PAMP will require approval from the EPA prior to any work commencing on the site. The purpose of the PAMP is to provide a measure of protection for the downwind community (i.e., off-site receptors, including residents, occupants of businesses, and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities.

Particulate monitoring shall be performed using real-time monitoring equipment capable of measuring particulate matter (PM) less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. Monitoring should occur in at least all four ordinal directions since wind direction may vary throughout the course of the cleanup and throughout any given day. Monitoring locations will be positioned at three ordinal directions on the landward perimeter of work and one ordinal direction at the bayside perimeter at end of the First Jetty. In addition, fugitive dust migration shall be visually assessed during all work activities. The Contractor will retain all air monitoring data in accordance with the requirements set forth in

Occupational Safety and Health Administration (OSHA), Subpart C of 29 CFR 1910.120. The Contractor will follow all other pertinent provisions of this regulation.

Additionally, the PAMP will involve conducting air sampling and analysis to measure the quantity of particulate matter and lead in the air produced by on-site work activities. The purpose is to confirm that the airborne dust and contaminants resulting from site operations remain below the applicable allowable levels established by the EPA and NJDEP for the general public exposure to ambient air.

4.1.7 Dust and Odor Control Plan

Earthwork operations, including managing stockpiled soil, conducting excavation, and loading operations will be conducted in a manner that will minimize the potential for odor, dust, and noise. Excavations, backfill areas, stockpiles, haul roads, and all other work areas within or outside the project boundaries will be maintained free from excess dust or odor to avoid causing a hazard or nuisance to others.

Since excavated soil/sediments contain varying concentrations of metals, dust emanating from the soils on-site may also contain these contaminants. In addition, soils may generate odors. Dust suppression and odor control techniques will be employed throughout this project at locations and in such quantities and frequencies to prevent dust and odor from becoming a hazard or nuisance on the work site or to the surrounding area. A Dust and Odor Control Plan will be prepared (as part of the SSHP) to present the Contractor's procedures for control of dust and odor generation and entrainment in the site air. The plan will outline measures to be taken by the Contractor to control dust and odor resulting from the project work. Approved temporary methods consisting of sprinkling, approved chemical treatment, or similar methods will be employed by the Contractor to control dust. Source materials and contaminated soil/sediment stockpile will be covered with tarp to control dust. Odor control management techniques such as spray-on foam blankets or similar will also be utilized when necessary. Dust and odor control measures will be employed whenever a dust nuisance or hazard occurs. The dust and odor control plan will identify the means for monitoring those levels and the techniques and products to be utilized to respond and mitigate such conditions, and actions to be taken to prevent future reoccurrences.

4.1.8 Noise Control Plan

The Contractor will develop and implement noise control plan as part of their Community Health and Safety Plan. The Contractor will keep construction activities under surveillance and control to minimize environmental damage by noise. The Contractor will comply with the provisions of the State of New Jersey and local rules. Efforts will be undertaken to control noise levels during the allowable working hours (7:00 a.m. to 6:00 p.m.) to minimize impacts to the surrounding residential properties. The Old Bridge Township ordinance for noise is 90 dBA, when measured at any location outside of the lot on which the use or source of sound is located.

4.1.9 Decontamination Plan

A decontamination plan will be prepared by the Contractor in accordance with the Specifications. The decontamination plan will include decontamination procedures for the post-Sandy and weathered riprap to be removed from the existing seawall and the armor stone from the First Jetty, excavation/transportation equipment and personnel working on-site and reference the detailed

decontamination procedures for sampling equipment and containers included as part of the Contractor QAPP.

All equipment/vehicles that come in contact with the contaminated materials will be decontaminated prior to leaving the site. Separate stations for equipment decontamination for removing impacted soil/sediments from vehicles and equipment leaving the working area and riprap decontamination for removing impacted soil/sediments from the riprap to be reused for seawall reconstruction will be constructed within the contamination reduction zone. These stations will include necessary equipment such as a high-pressure water wash area for equipment and vehicles. The decontamination pad will be lined and sloped to drain towards a collection sump.

A detail of the decontamination pad is provided in the Design Drawings. Wastewater generated from decontamination will be collected and treated on-site prior to discharge as discussed in Section 4.7.

A contamination reduction zone shall be provided for workers exiting from the exclusion zone. The contamination reduction zone for workers will include a bench to facilitate removal of personal protective equipment (PPE), containers for spent PPE, and a boot wash with stiff bristle brushes.

4.1.10 Spill and Discharge Control Plan

The Contractor will develop, implement, maintain, supervise, and be responsible for a Spill and Discharge Control Plan. This plan will provide contingency measures for potential accidental spills and/or discharges including, but not limited to spills during remediation activities such as diesel fuel or contaminated soil from a contaminated area onto clean areas during loading and transportation and discharges from construction water management facilities.

4.1.11 Traffic Control Plan

Construction-related traffic will access the site via the existing Margaret's Creek access road, which has an entrance and exit on Route 35 (see **Sheet 0C2-04**). The portions of the Margaret's Creek access road proposed for construction-related traffic will be improved if required. In addition, the existing gravel path connecting the Margaret's Creek area's access road will be constructed to accommodate one-way traffic except for the section over the Margaret's Creek (also referred to as Marcus Creek) crossing, where the access road will be constructed to accommodate two-way traffic. A temporary culvert will be constructed to cross Margaret's Creek and connect to the Seawall Sector access road. Site access from Laurence Parkway via a new access road will be constructed and will only be used during emergencies. The site entrance via an existing park road from the Bayview Drive can be used by personal vehicles if required.

A Traffic Control Plan involving site access through both entrances will be developed for the site and will outline the proposed truck route, signage, and other traffic control devices to be implemented. The Traffic Control Plan will be provided to the townships of Old Bridge and Sayreville for a review. The entrance from Route 35 is not expected to be blocked during on-site operations, but if it is necessary to block the entrance periodically, the Contractor will make every effort to limit the number and duration of closures. Above all, the Traffic Control Plan will emphasize safety for the public, construction workers, and traffic control.

4.1.12 Community Involvement Plan

EPA is implementing an on-going Community Involvement Plan (January 2011) including periodic meetings, site visits, and local briefings throughout the course of the project. A public meeting will be held prior to the start of construction to outline the proposed plan for the Seawall Sector. A second public meeting may be held to explain to the public the project scope and activities and introduce the Contractor's project manager to the public. The Contractor will be required to attend these meetings and will present and discuss technical activities involved in the construction project to a lay audience. In addition, the community relations activities may include preparation of fact sheets, site tours and/or local briefings, public information sessions and/or public meetings, and responding to information requests.

4.2 Activities within the Coastal Floodplain

To confirm the excavation work is executed completely, efficiently, and to provide flood protection for the site, temporary sheet piling will be installed along the shoreline to minimize tidal water entering the work area (see **Section 4.8.1)**. Approximately 16,100 cubic yards of contaminated sediment will be removed from the coastal floodplain, from an area of approximately 177,000 square feet. In addition, approximately 3,500 cubic yards of source materials including slag and battery casings, and associated waste will be removed from the vicinity of the seawall within the intertidal zone. A temporary sheet pile wall will be installed to isolate excavation areas from tidal cycles, thereby:

- Limiting the potential for contaminated sediments from becoming suspended in water,
- Preventing the migration of contaminated sediments due to tide cycles and reducing the risk of sediment migration during storm events outside of the work area,
- Facilitating post-excavation sampling of the excavation area by preventing the movement of sediment due to tides, and
- Allowing for excavation to occur within tidally influenced areas without standing water due to tide cycles.

Further discussion on the installation of the sheet pile wall can be found in **Section 4.8.1**. The temporary pilings will be installed and removed from the bay side using a vessel and supporting floating barges. It is assumed the driving of sheet piles will last approximately 60 days with two installation/equipment crews, and approximately 40 days with two removal/equipment crews. The installation and removal time frames will be increased by the use of only one installation crew/equipment. The temporary sheet piles will remain in place during excavation activities, the placement of clean fill to restore existing grades, and new revetment construction.

In the execution of the remediation action, approximately 20,000 square feet of existing fragmented low tidal marsh will be removed. The existing marsh shows signs of deterioration and stress typical of coastal wetlands throughout the northeast due to changes in water elevations, increased storm intensities, and other environmental stressors. The low marsh habitat, consisting of smooth cordgrass (Spartina alterniflorus) will be replaced with wetland areas located at the upper tidal range for a low marsh. The restoration area will be protected with a rock berm, to limit erosion of clean sand fill during storm events and protect the new tidal wetland. The rock berm will be constructed using the bedding stone proposed for the new revetment construction. The rock berm and fill may be installed while the sheet piling is in place and the tidal wetland mitigation planting will be completed following its removal. During the mitigation planting, a turbidity barrier will be installed around the work area. Upland seeding

will occur between March 15th and May 15th or September 1st to October 15th. Planting of the tidal wetland will occur between May 15th and July 15th, unless otherwise approved by the EPA's Representative.

4.3 Effects of Remedial Action within Coastal Floodplain and Mitigation Measures

The remedial action area in total is estimated to be 8.6 acres, with approximately 4 acres below mean high water. The work is anticipated to take as long as a total of approximately 2 years, including site restoration, although the timeframe may be considerably shorter depending on the construction approach. Consultation is on-going with NOAA and USFWS, and any alterations to the remedial design required by these agencies will be discussed and implemented as appropriate.

Noise from Sheet Pile Driving: Sheet piles will be expertly driven into the sand/sediment using a vibratory hammer, thereby ensuring the generation of noise levels notably lower when compared to traditional pile driving methods (impact drivers) into bedrock. As an example, the attenuated sound pressure level (RMS) was calculated to be 165 dB at a distance of 10 meters from the source during the vibratory driving of 24-inch sheet piles. In contrast, the impact driving of 24-inch sheet piles was calculated at 190 dB. During sheet pile installation, there will be periods at low tide during which the piling will be outside the water column, thus reducing noise impacts to aquatic species. Sheet pile installation will also be of a shorter duration than driving piles for a pier or a similar structure. Noise control measures, such as bubble curtains, are usually installed to reduce the noise level when driving the deeper piles; however, the water depth is fairly shallow in the intertidal zone and installing bubble curtains will not be feasible, as they will become clogged as water recedes and returns during the tide cycle. The bubble curtains will also be exposed at low tides and provide no control during those periods. Installation equipment will need to be repositioned at high tide, reducing the amount of pile installation during high tide through the water column.

Extent of Sediment Disturbance Installation and Removal: The sheet pile wall alignment is outside the limit of the lead-impacted sediment greater than the cleanup criteria, minimizing the risk of migration of lead contamination. The sheet pile wall alignment is above the low tide level and its installation constitutes a low disturbance activity, which is not anticipated to generate significant turbidity during installation. In addition, sheet piles are typically removed slowly, which limits turbidity production upon removal. Turbidity barriers (silt curtains) will be installed on the bay side along the sheet pile wall alignment to prevent sediment migrations during the project duration.

Dewatering: Non-contact water generated during the remedial action will be directed to low lying areas adjacent to the sheet pile wall, where it will be pumped out only to the extent required to facilitate work. Water will be pumped over the sheet pile wall but inside the turbidity barriers. Given that groundwater at the site has not historically been an issue, there is minimal risk of the remedial activities negatively impacting groundwater at the site. Once the dewatering system is place, the amount of water coming in contact with impacted material will be greatly reduced. The Contractor will implement additional dewatering measures as required to establish excavation in-dry conditions (i.e., no standing water within the excavation). During the excavation, any standing water in contact with the contaminated material that is removed will be collected, stored, tested, and treated if required.

Excavation & Removal: Excavators will remove sediment from the impacted area, stockpile it within the exclusion zone above the intertidal zone, and then load it onto trucks. The designated truck route

is located within the support zone where soil and erosion control measures, such as silt fence, straw bales, and construction entrances, will be utilized to limit the migration of sediments. On the water side of the sheet pile wall, turbidity barriers will be utilized to reduce any suspended solids or turbidity that does enter the water.

Disposal: The Contractor will determine the disposal location, per the Contract Documents. As per the Traffic Control Plan, traffic will follow truck routes to and from the site. The trucks will be loaded from an upland area, with sediment and erosion controls in place to limit the migration of material from upland areas to waterways. The upland area is an existing lawn, utilized for passive recreation, and has low habitat value. No adverse effects are anticipated to the site, and the area will be seeded and restored to existing conditions following the completion of the work.

Vessel Traffic: Two vessels are assumed, a barge to conduct work from, and a smaller vessel to transfer crew and staff to and from the barge. It is anticipated that the barge will be moored on-site during installation and removal, thereby limiting the number of trips to and from the site. Given the relatively short duration of the sheet piling installation and removal, along with the work being confined to the intertidal zone, it is not expected to result in significant environmental impacts caused by vessel traffic.

Placement of Backfill: The sediment removal, placement of fill within the intertidal zone to backfill excavations and to elevate the tidal wetland restoration areas, and subsequent bathymetric survey will occur while the sheet pile is in place, limiting the potential to generate suspended solids.

4.4 General Sequence of Construction

The general sequence of construction anticipated during the RA at the site is summarized below.

- Prepare all project plans and applicable permits and approvals required for the remedial construction activities.
- Conduct pre-construction conferences.
- Prepare the site as follows:
- Perform utility mark outs and clearances and coordinate with appropriate utility authorities.
- Mobilize equipment and personal necessary to complete the remedial action.
- Conduct pre-construction topographic and bathymetric surveys. Conduct tree and shrub inventory and wetland delineation.
- Perform pre-construction photographic and video documentation.
- Perform site clearing within the limits identified.
- Remove and reuse or recycle of existing chain link fence.
- Install site security fencing and signs
- Remove and store park facilities including but not limited to the playground, gazebo, and light poles and benches within the work area.
- Implement soil and sediment control measures, including silt fences and turbidity barriers.
- Initiate perimeter air monitoring/sampling in accordance with the perimeter air monitoring plan.
- Construct staging area.
- Construct primary and emergency contingency access roads.

- Construct temporary Margaret's Creek crossing/culvert and bypass.
- Establish temporary facilities.
- Construct decontamination facilities.
- Decommission monitoring wells
- Initiate excavation and backfilling in the upland portion of Areas 4 and 9.
- Install sheet pile wall prior to initiating excavation in Areas 1, 2, and 5, and the rest of Area 4.
- Install dewatering system to establish in-dry conditions for contaminated material removal/excavation.
- Mobilize and establish temporary water treatment system.
- Construct riprap and armor stone decontamination facilities and stage frac tanks.
- Handling of riprap and source materials - Removal of source materials and riprap to be conducted in stages starting from the eastern end of the extent of riprap (in Areas 4 and 9), proceeding to the west as follows:
- Remove and decontaminate post-sandy riprap and stage the clean riprap in the support zone for possible reuse in the proposed revetment during site restoration.
- Next remove large slag pieces, weathered riprap, and debris from the footprint of seawall.
- Segregate large slag pieces and debris visually and stage within the exclusion zone for an off-site treatment and disposal. Stage large, weathered riprap separately within the exclusion zone for decontamination.
- Lastly, scrape the top six inches of soil/sediment commingled with small pieces of slag/riprap material beneath (the large slag piece and debris) and at the toe of the footprint of seawall and temporarily place in a separate stockpile within the exclusion zone.
- Segregate any smaller pieces of slag /riprap that are buried within or commingled with the soil/sediment media requiring off-site treatment and disposal.
- Conduct waste characterization sampling and slag/debris/source materials load out activities concurrently with the removal activity.
- Soil/sediment excavation:
- Implement dewatering measures, as necessary. Collect, store, and treat contact water from excavation areas and from decontamination and discharge to surface water.
- Perform soil/sediment excavations starting from the eastern end of excavations (in Area 4), proceeding to the west. Excavate each seawall segment beginning from the seaward edge of excavations moving toward the landward edge.
- Stockpile contaminated soil/sediment within the exclusion zone.
- Excavate contaminated soil/sediment at minimum to the excavation depths as shown on the design drawings.
- Perform removal of contamination around the First Jetty.
- Inspect the excavation bottom and side slope for visual contamination, slag, and battery casings and remove as required.
- Perform post-excavation confirmatory sampling to confirm that the site remediation cleanup levels are achieved.
- Conduct waste disposal sampling and soil/sediment load out activities concurrently with the excavation activity.

- Perform secondary excavation of contaminated material based on the results of post-excavation confirmatory sample analysis and/or field observations.
- Backfill, compaction, and grading.
- Perform transportation and disposal of source materials including slag and battery casings and associated waste, debris, and contaminated soil/sediment.
- Conduct off-site stabilization of source materials and hazardous soil.
- Restore the site, including the construction of new revetment and tidal wetland areas and restoration of active work area, transition and freshwater wetland areas, and the park. Refer to sheet 0D9-03 for Sequencing of Wetland Restoration Areas.
- Remove sheet pile wall.
- Conduct planting in tidal wetland areas.
- Conduct final inspection.
- Demobilize.
- Conduct post-construction topographic and bathymetric surveys.
- Perform post-construction photographic and video documentation.

4.5 Pre-Construction Meeting

A pre-construction meeting will be conducted with the EPA and all Contractors prior to mobilization. EPA will include the state, where appropriate, for all the construction progress and pre-construction meetings/conferences.

4.6 Site Preparation

4.6.1 Mobilization

Site access will be coordinated through EPA. Equipment and personnel necessary to complete the RA will be mobilized to the site. The Contractor will mobilize a support zone in the southern park boundary outside of the exclusion zone in the upland area as shown on the Design Drawings. The support zone will house the Contractor's on-site personnel, EPA, and EPA's Representative as appropriate. Materials necessary to commence construction activities will also be transported to the Site. Additional materials will be mobilized to the Site over the course of construction as needed.

EPA-approved project signs will be erected at the project entrances and remain in place during all phases of the RA.

4.6.1 Clearing and Grubbing

Clearing will be conducted as necessary for construction. All trees, hedges, shrubs, and bushes within the excavation limits, the designated support zones, and along the seawall will be removed. The Contractor will take steps necessary, where possible, to retain well established vegetation (trees and shrubs) within the support zones. EPA will approve in consultation with the state if any of the trees are worth saving based on the restoration development of the support zone. Based on the excavation extents, the approximate areal extent for clearing is estimated to be about an acre. Cleared vegetation will be transported off-site for disposal at an approved facility. Grubbing will not be completed as part of the clearing activities. Stump removal and grubbing of vegetation will be completed as part of the impacted soil removal. Grubbed material including stumps shall be transported off-site for disposal at

an approved facility. As part of the RA, scattered debris and/or visual battery casings from Areas 5 and 6 will be collected and staged on-site for off-site disposal.

Existing chain link fence in the Seawall and Margaret's Creek Sector erected to exclude public access will be removed and shall either be reused at the site for temporary fencing or transported off-site for recycling. Park facilities to be removed include the playground, gazebo, and select light poles and benches. The children's playground located within the Area 3 and a gazebo located in Area 4 as well as light poles/benches obstructing the construction of staging area and temporary access road will be dismantled, stored within the designated staging area prior to construction and reconstructed back to their original locations during site restoration. Prior to removing any park facilities, the Contractor shall coordinate with the County of Middlesex and Old Bridge Township since the Old Bridge Waterfront Park is a cooperative project between them. The Contractor will provide protection of the remaining light poles, park pathways, and miscellaneous features in Area 3 and 4, as necessary.

4.6.2 Utilities

Approximate locations of on-site utilities are provided on the Design Drawings and are featured in Utility Locations Map sheets 0C1-04 through 0C1-06. The Contractor will be responsible for utilizing the appropriate New Jersey One-Call utility service and independently performing a geophysical investigation at the site prior to commencement of subsurface activities. Prior to mobilization, the Contractor will be required to coordinate work around existing utilities with the utility owners, which include OBMUA and the Old Bridge Township. The Contractor will be required to field-verify and mark the locations of all utilities within the work area prior to mobilizing heavy construction equipment, supplies, and facilities and to protect all existing utilities for the duration of construction in accordance with the Specifications and Design Drawings.

Site utilities will include but may not be limited to water, electric, force main, stormwater drainpipe, sanitary, gas, and communications. In addition to the water, electric, gas, and communications lines, a 20-inch ductile iron pipe force main (force main) owned by the OBMUA and storm sewer system owned by the Old Bridge Township are critical underground utilities at the site. The storm sewer system consists of storm sewer inlets, piping, and manholes north of Laurence Parkway, and discharges seaward of the First Jetty. Several existing manholes are located near the remediation area. Manholes along the active 30-inch sewer pipe have been surveyed and were used to identify the approximate location of the sewer pipe. Below is a summary of utilities identified within the support and exclusion zone, as shown in the Design Drawings:

- The force main alignment crosses the site in an east-west direction, running under the Area 5 boardwalk, Area 5 and Area 2 beaches, and the upland portions of Areas 3, 2, 4, and 9. A 20-feet easement is centered on the length of the alignment (10 feet to either side of the force main). The force main passes through proposed excavations in Area 5 (excavation areas 1E and 3I), Area 2 (excavation area 2E), and Area 9 (excavation areas 3J and 5F). On average, the force main conveys approximately 2.5 million gallons per day raw sewage to the treatment facility located at the northeastern end of Margaret's Creek area. It is critical that all necessary precautions are taken during the RA to ensure no damages occur to the existing force main.
- A storm sewer runs along the southern edge of Area 2 near the main park parking lot, connecting to a storm sewer inlet in the park lot. This line connects to a 42-inch reinforced concrete pipe (RCP) through the core of the First Jetty, emptying into the bay.

The 42-inch RCP stormwater sewer running through the First Jetty enters proposed excavations in Area 2 (excavation areas 2E, 3G, 5D, 5E 9A, and 6D) and Area 5 (excavation areas 1E and 3H).

- A 4-inch PVC storm sewer line runs from the Area 4 east parking lot to an inlet grate to the west, and discharges at an unknown point in the seawall in Area 1 via a 12-inch RCP pipe. The 12-inch RCP stormwater sewer runs through proposed excavations in Areas 4 and Area 1 (excavation area 6B).
- A 48-inch storm sewer runs from Bayview Drive, between the path park roundabout and playground, to the Area 1 seawall. The storm sewer runs through proposed excavations in Area 1 (excavation areas 1D and 2D).
- Four stormwater drains with unknown size lead from the Area 3 playground to the seawall. The drain lines run into proposed excavations in Area 1 (excavation areas 2E and 5B).
- An unknown object was identified by ground penetrating radar by Ground Penetrating Radar Systems, Inc. (GPRS) at 3 feet bgs on the Area 2 beach within the proposed excavations (excavation area 5E) (HDR, 2019).
- Underground electrical runs between the park path lights from the northern edge of the main parking lot in Area 2 to the Area 4 gazebo. The electrical line also branches to a transformer near the park's east parking lot in Area 1. The line is buried at approximately three feet bgs. The electrical line may run through the southern edge of proposed excavations in Area 4 near the east parking lot (excavation areas 3D and 4B). Electric supply to light poles in the park will need to be located by the Contractor prior to disturbing the areas. Protection or de-energizing of electrical utilities will be required.
- Overhead electrical utilities run along the southern edge of Bayview Drive, over Wilson Ave, the community center near the Area 2 beach and the main park parking lot. The electrical then continues up the western edge of Laurence Parkway and the southern edge of Shoreland Circle. This utility will not be impacted by the remedial construction activities.

4.6.2.1 Force Main

The force main will be a critical utility to protect when conducting the following activities during the RA.

- Excavating near and along the force main.
- Installing access road and providing a crossing of heavy equipment traffic across the force main.
- Restoring the existing boardwalk in Areas 2 and 5 near the force main if it was required to be removed during the excavation.

The Contractor will be responsible for coordinating with OBMUA and developing a workplan that includes measures for protecting the force main and emergency responses. The workplan will need to include precautionary steps and procedures for the Contractor to follow during the RA. Based on the coordination with the OBMUA, the Contractor will need to include additional requirements in the workplan when working within the 20-foot OBMUA force main easement. The 1989 as-builts and 2009 record drawings of the Laurence Harbor Interceptor construction completed by the OBMUA are provided in **Appendix C** for the reference. The as-builts show that the force main was installed at approximately 10 feet bgs. However, OBMUA indicated that the current depth of the main at the site

is uncertain due to storm events in the intervening years and could range from 6 to 9 feet bgs. OBMUA may install test borings along the force main and inspect manholes to confirm the utility's depth; however, it is the Contractor's responsibility to field-verify the location and depth of the force main prior to the mobilization of heavy equipment at the site.

Access road crossings over the force main will require protective matting to distribute the weight of heavy construction vehicles/equipment. Heavy equipment and materials cannot be staged above the force main. After site preparing and staging is complete, the Contractor will need to coordinate with the OBMUA so that they can inspect the Contractor's protective measures for the force main (e.g., protective matting for the access road).

OBMUA must be present for all excavation work to be conducted within the 20-foot OBMUA force main easement. The Contractor will need to coordinate with the OBMUA so that OBMUA is present for all excavation work within the 20-foot OBMUA force main easement. Excavations below 1 feet bgs within the 20-foot OBMUA force main easement will need to be soft dug. The Contractor shall provide vibration monitoring along the force main during construction activities.

4.6.2.2 Existing Storm Sewer System

The Contractor will be responsible for coordinating with the Old Bridge Township for disruption to any existing storm sewer systems. Old Bridge Township was contacted during the RD, and an Open Public Records Act (OPRA) request was submitted for acquiring as-builts of the storm sewer systems, but no response from the Old Bridge Township was received. Available information regarding the existing storm sewer system is based on the site survey and as listed below:

- A 42-inch RCP through the core of the First Jetty in Areas 2 and 5.
- A 12-inch RCP 4-inch discharging at an unknown point in the seawall in Area 1.
- A 48-inch storm sewer running from Bayview Drive and discharging through the Area 1 seawall.
- Four stormwater drains with unknown size leading from the playground to the seawall.

The Contractor is required to field-verify and mark the locations of all utilities within the work area prior to mobilizing heavy construction equipment, supplies, and facilities and to protect all existing storm sewer system during the RA.

4.6.3 Site Entrance and Access Road

The primary entrance to the site will be accessed via New Jersey Route 35 through Margaret's Creek, as indicated in the Design Drawings. Currently, there is an existing gravel access road connecting New Jersey Route 35 and the OBMUA building on Boulevard West, passing through Margaret's Creek. This existing gravel access road in Margaret's Creek will be utilized for construction-related traffic to and from the site, and improvements will be made if deemed necessary.

A gravel path already exists along Raritan Bay and connects the access road in Margaret's Creek to the eastern end of Old Bridge Waterfront Park, via a pedestrian boardwalk at the creek crossing. This path will require improvements to accommodate one-way construction traffic. In addition, a temporary culvert will be constructed across Margaret's Creek, connecting the Margaret's Creek access road to the entrance to the Seawall Sector. The culvert will be constructed to allow for two-way traffic.

In case of emergencies, such as major storm events causing flooding and restricting access through Margaret's Creek, a secondary site entrance will be constructed. This secondary entrance will enable access to the site from Laurence Parkway utilizing the parking lot near the beach in Area 2.

Within the work area, an access road will be constructed starting from the Laurence Parkway site entrance to the eastern end of the park connecting the primary entrance road through the Margaret's Creek area. A turnaround will be constructed as part of the access road network for easy maneuvering of the trucks during loading and unloading processes. The access road/turnaround will be constructed of stone underlain by a geotextile. The Contractor will maintain all access roads/turnaround during the construction. Construction entrances/exits, and site access roads will be evaluated during construction and stabilized as needed.

During site preparation in Area 4, it will be necessary to relocate a small volume of post-Sandy riprap located in the eastern end to construct a portion of access road for providing access through Margaret's Creek. This post-Sandy riprap was placed post-Sandy and overlays an area with no historical samples with lead concentrations greater than the RCL. To accommodate the portion of the access road in Area 4, approximately 50 cubic yards of post-Sandy riprap will be relocated within the exclusion zone until it is addressed during the RA.

A supersack wall will be positioned in Area 4 to provide protection from floodwater while maintaining access to the toe of the seawall during RA construction. The supersack wall will be positioned from the east end of the sheet pile wall up to an elevation of approximately 10 feet above mean sea level (amsl) as shown in the Design Drawings. To accommodate the path of this supersack wall, post-Sandy riprap will have to first be relocated within the exclusion zone.

In order to access Areas 2 and 5 during RA construction and reduce heavy construction traffic over the force main, a phasing construction approach, as shown on the Design Drawings, will be followed to facilitate excavation and loadout of the Area 2 and 5 excavations.

4.6.4 Temporary Construction Facilities

The Contractor will be responsible for providing temporary facilities at the site to support on-site personnel, field supplies, and equipment, including a trailer compound and parking area. The temporary facilities shall include a field office having electricity, lighting, water, sanitary, and telecommunication services including internet service. Access roads and parking areas will also be provided.

Approximately three field offices are anticipated to support EPA, the EPA's Representative, as deemed appropriate, and the Contractor. All trailers will be equipped with electricity and internet and telephone services. The EPA and EPA's Representative trailer will be also equipped with sanitary utilities as well as including an air purifying system. Trailers equipped with hand washing capabilities will be provided as part of the sanitary utilities. The Contractor is responsible for all utility hook-ups, sanitary services, and maintenance.

A construction trailer designated as the security office shall be provided and clearly marked where visitors can sign in and receive the required health and safety training prior to entering the construction site.

4.6.5 Decontamination Facilities

Remedial work activities shall be performed in the contaminated exclusion zone and construction support activities shall be conducted in non-contaminated support zones. All personnel and equipment leaving the exclusion zone will be decontaminated in designated contamination reduction zones prior to entering the support zone. All contaminated vehicles and equipment will be cleaned and decontaminated prior to entering the support zone and leaving the site. The Contractor will submit a decontamination plan with specific details and procedures for decontamination activities prior to start of work.

The Contractor will construct decontamination pads as shown on the Design Drawings and in accordance with the Decontamination Plan. The decontamination pads located near the eastern end of the Seawall Sector will be used for decontamination of equipment and vehicles in accordance with the Contract Documents. Decontamination stations located throughout the site will be used for decontamination of post-Sandy and weathered riprap as well as for equipment/vehicle/personnel leaving the exclusion zone. All decontamination water will be collected and, pending test results, treated on-site at the water treatment plant prior to discharge. Refer to **Section 4.8.4** for details on decontamination water collection, storage, and treatment prior to discharge.

4.6.6 Stockpile/Loadout Area

Removed source materials and excavated soil/sediment will be stockpiled in the stockpile/loadout area prior to off-site transportation. The Contractor will maintain a soil stockpile/loadout area within the exclusion zone (i.e., the extent of impacts) during the excavation period in accordance with the Contract Documents. The stockpile area will be located along the temporary access road to facilitate loadout. Weather permitting, stockpiles can air dry during the day but must be covered at the end of each day with plastic sheeting (i.e., tarp) or equivalent material to prevent rain infiltration and erosion (water or wind) of the stockpile. Source materials will be transported to off-site for treatment and disposal. Excavated soil/sediments will be disposed of in accordance with waste characterization sample results.

The Contractor will load the source materials and excavated soil/sediment from the stockpile(s) into haul trucks. The haul trucks will have liners to prevent leakage and loaded material will be covered prior to transport to the disposal facility. Haul trucks can be positioned on the access road alongside the exclusion zone, allowing for direct loading of materials into the trucks from the exclusion zone. Precautions will be taken during the loading process, including the placement of poly sheeting around the truck's base to collect any potential spillage. It is not expected that the haul trucks will require decontamination prior to leaving the site. However, if necessary, decontamination can be carried out on one of the several decontamination pads located along the access road, as indicated in the Design Drawings.

The excavation-in-dry approach (i.e., installation of the sheet pile wall and dewatering measures) will minimize excavation in standing water so that sediment does not migrate within the excavation area during removal. Excavated material will be sediment with little or no free water although the sediment may be wet and contain pore water within the sediment. Where applicable or necessary, additional measures, such as well point dewatering, will be implemented to keep the excavations free of standing water during removal, post-excavation confirmatory sampling, backfill and revetment construction. However, the excavated material may be wet, given that the excavation will be conducted beneath the

water table and adjacent to a large surface water body. Given that the existing conditions are not resulting in groundwater issues, it is very unlikely that the approach of stockpiling the material on the top of the slope and covering the stockpiles daily would result in further degradation of groundwater quality. Relative to the current conditions, the amount of pore water that may drain from the stockpiles will be a small fraction (potentially less than 1%) of the water currently infiltrating through contaminated materials under existing conditions. It is not anticipated that lining of the soil/sediment stockpiles will be required. If it is determined by EPA's Representative that the amount of drainage water requires a liner or collection system beneath the stockpile, a contingency detail is provided on the drawings for lining the stockpiles.

The Contractor will not stockpile any impacted material outside of the exclusion zone or beyond the areas to be remediated. However, in cases where it is necessary, the Contractor may request permission from the EPA to allow for stockpiling of impacted material outside of the exclusion zone, but still within the support zone. In such cases, adjustments shall be made to expand the demarcation of exclusion zone to incorporate these additional designated stockpiling areas. If any stockpiling occurs outside the limits of excavation boundary, appropriate measures must be taken as per the Contract Documents. This includes the collection of drainage water, if any, for storage and treatment, as well as the collection of confirmatory samples from beneath the stockpile area(s) once all stockpiled material has been removed.

All stockpiles will be inspected and maintained daily.

4.6.7 Monitoring Well Decommissioning

Eight monitoring wells as listed below are located within or near the proposed excavation areas that will be decommissioned:

- Area 1: MW-05S, MW-05D, MW-06S, MW-06D, MW-10S, MW-10D
- Area 4: MW-09S
- Area 9: MW-12S

Five monitoring wells as listed below are located within or near the support zone that will be protected to the extent practicable with a contingency for removal:

- Area 4: MW-04S, MW-04D, MW-08S, MW-08D, MW-07S

Three monitoring wells as listed below are located near the Margaret's Creek access road that will be protected during the construction:

- Area 9: OBMUA-MW-1, OBMUA-MW-2, MW-15S

These monitoring wells installed as part of the RI are expected to be impacted by the remediation. Given that groundwater at the site has not historically been an issue, it is be expected that groundwater sampling will not be conducted prior to decommissioning and post RA. The remedy will prevent future migration of contaminants into the Seawall Sector groundwater. Therefore, the existing groundwater monitoring wells within the excavation areas and/or support zone that will require decommissioning will not be replaced after RA completion. The Contractor will submit a completed well decommissioning report and any relevant attachments, via the NJDEP's electronic permitting system.

4.6.8 Soil Erosion and Sediment Control

The Contractor will adhere to the SESC Plan certified by the FSCD that serves Middlesex County. The certified plan will be provided to the Contractor prior to start of construction activities. Erosion and sedimentation controls shall be installed at the site where necessary to prevent the migration of sediment off-site during mobilization/demobilization and remedial activities in accordance with the SESC Plan.

4.6.9 Site Security

A temporary security fence will be installed around the perimeter of the active work area as shown on the Design Drawings in order to prohibit unauthorized access to the site during the construction activities. The Contractor will be required to secure the construction area to prevent unauthorized entry during the remedial construction as per the Site Security Plan.

4.6.10 Stormwater Control

Diversion of stormwater flows around the entire work site is not required; however, the Contractor is required to manage stormwater flows within the excavation areas and not allow un-managed flows of storm water into the active excavation segment consistent with the SESC Plan and the Contract Documents. The Contractor is required to manage or divert storm water away or around the active impact material removal. This will involve conveying the stormwater that discharges at the top of the sea wall slope to the bottom of the slope beach area and directing flow to the proposed dewatering system. Given the increased slope of the sea wall, extending the discharge pipe with the same diameter storm sewer pipe will provide ample capacity to convey the flow. For the larger diameter storm sewer pipes, pumps will be utilized to transfer flow to the base of the beach area. This type of diversion system will be used during small rain events and is not intended to convey flow from larger storm events.

The Contractor is also required to construct and maintain erosion control features throughout the duration of construction.

The Contractor will prepare a Severe Storm Plan for handling a large storm event (Category 1 or higher hurricane, tropical storm, or a nor’easter) during the remedial action. The Atlantic hurricane season lasts from June 1st to November 30th. New Jersey's tropical storm activity is typically between August and late October. Typically, a storm resulting in more than 1.0 inches of rainfall in 1-hour period and 3.0 inches of rainfall in 24-hour period are considered large storm events. The plan will need to include stormwater control during hurricane, tropical storm, or nor’easter conditions, and focus on preserving any exposed work areas or stockpiles that are vulnerable to re-contamination or spreading to un-contaminated areas. The plan would also focus on mitigating exposure to impacted material for workers and the public in the event storm surge or wave action impacts the site during the remedial action. It is anticipated that the work will be suspended and prepared for the storm event including the removal of all equipment from flood zones and suspension of the dewatering system.

4.7 Surveys

A topographic and bathymetric surveys will be completed by a New Jersey-Licensed Land Surveyor, prior to beginning the remedial activities. The Contractor will retain the services of a New Jersey-licensed surveyor to provide a pre-excavation topographic and bathymetric survey to estimate final

earthwork quantities, during excavation, and provide final as-built surveys indicating the finished grades and all restoration features within the remediation area.

4.8 Dewatering

Dewatering will be required for the following excavation areas:

- Within the intertidal zone in Areas 1 and 2 where excavations are expected to extend below the mean high tide water level (+2.39 feet amsl).
- Deeper excavations outside the intertidal zone that will be excavated to an elevation below the mean high tide elevation will also require dewatering, as these areas would be inundated during high tide.
- Secondary excavations, if required based on post-excavation confirmatory sample results, may expand excavations horizontally and vertically and may require dewatering measures.

The excavations described above will require a combination of dewatering measures to help maintain an integrity of excavation cutlines through the tide cycles and will allow for additional excavation if required during removal.

Multiple alternative approaches for dewatering during the excavation work were evaluated to:

- Maintain excavations that are free of standing water during removal.
- Confirm that all impacted material is removed while being more protective of the environment.
- Provide greater control and accuracy when conducting post-excavation confirmatory sampling.

A traditional way of dewatering a small excavation area by pumping contact water (i.e., water within open excavations that contains high concentrations of contaminated suspended soils) from open sumps at the bottom of the excavation was the first approach evaluated. Because of the highly conductive shallow subsurface geology and proximity to the bay's tides, pumping alone was determined to be ineffective in isolating areas from tidal cycles and pre-draining opened excavations completely. Dewatering by sump pumping alone would allow tidal water to continue flowing into open excavations, making it difficult to control the water during construction. Pumping alone would also be ineffective in maintaining a dry condition across the entire bottom of the excavations while the confirmatory sampling is completed, resulting in less accuracy when verifying contamination removal.

Adding a temporary cofferdam, such as water bladders or super sacks, to reduce tidal wave action influences, combined with pumping was the second approach evaluated. A cofferdam using water bladders is a temporary means of holding surface water far from the place of excavation. While a cofferdam would reduce the amount of tidal wave influence on the excavations, it would not prevent the flow of water beneath the cofferdam through the highly conductive subsurface lithology at the Site. A cofferdam would not remove water from the excavations completely, as it would not prevent water beneath the ground surface from seeping into the excavations via their sidewalls and bottoms. A temporary cofferdam approach would therefore require multiple large sump pumps within the excavations, resulting in unmanageable volumes of contact water. In addition, during even minor storm events, strong wave action will flood the excavations and result in further unmanageable volumes of contact water requiring treatment and discharge.

After screening out the two above dewatering approaches, a third approach was selected; this approach consists of a combination of robust dewatering measures, including a sheet pile wall, dewatering trench, and dewatering wells to maintain dry conditions and reduce the anticipated volume of contact water requiring treatment and discharge. The dewatering measures and temporary water treatment system will be fully operational prior to the commencement of excavations in Area 1 intertidal zone.

The following dewatering measures shall be implemented to minimize the handling of contact water during the remedial construction.

- Temporary Sheet Pile Wall: A temporary sheet pile wall will be installed to isolate excavation areas in Areas 1, 2, and 5 from tidal cycles. The sheet pile wall will be installed surrounding the entire bayside limit of excavation, providing flexibility in the RA construction sequence: removing post-Sandy riprap and source materials, excavating impacted soil/sediments, backfilling, and constructing the new revetment and coastal wetland. The sheet pile wall will help minimize the effects of the tide cycle and block wave action from entering the work area.
- Collection Trench: Dewatering of non-contact water (i.e., water collected outside the footprint of contaminated soil/sediment) will be conducted via a collection trench along the interior of the sheet pile wall. The trench will be installed at a surface elevation of approximately -2 feet amsl, with pump intakes within the sumps at approximately -5 feet amsl. A perforated pipe installed in the trench will help dewater the excavation area. Non-contact water from each sump will be pumped and discharged to surface water over the sheet pile wall as shown in Design Drawings. Based on the site topography and estimated horizontal and vertical extents of excavation, it is anticipated that the proposed collection trench will be able to dewater up to a 300-feet-wide excavation area with bottoms higher than -5 feet amsl (for example, excavation polygon 3A).
- Well Point Dewatering System: Excavations with bottoms deeper than -5 feet amsl will require additional dewatering measures due to the depth limitations of the trench system. The Contractor will consult with EPA before implementing dewatering measures for all areas requiring excavations deeper than 5 feet below ground surface. An evaluation to determine the need for a well point dewatering system shall be conducted by the Contractor. If removal of the contact water using sumps within the excavation is determined to be sufficient in keeping the excavation free of water, then the Contractor can continue removal operations. If a well point dewatering system is deemed necessary, it will consist of multiple well points surrounding deeper excavations and pumping out the non-contact water with either multiple submersible pumps or header pipe connected to vacuum pump as shown on the Design Drawings.
- Contact Water Dewatering: If the non-contact dewatering system is insufficient in keeping the excavation area free of water, then a contact water dewatering system will be implemented. The Contractor will construct sumps within the excavation area that will handle contact water, which will be pumped to a frac tank located on-site. All contact water will be containerized in frac tanks and tested to determine whether treatment is required prior to discharge to surface water.

4.8.1 Sheet Pile Wall Installation

A temporary sheet pile wall will be installed to isolate excavation areas from tidal waters. Prior to excavation, 50-foot-long interlocking sheet piles with waterproofing (if required) will be installed to a depth of approximately -40 feet amsl to create a barrier against tidal water entering the intertidal zone. Excavations in the intertidal zone extend approximately 3,700 feet from the eastern end of the seawall in Area 1 to the Area 2 and 5 beaches. The RD includes sheet pile wall installation around the bay side extents of excavation, as well as around the First Jetty, where deeper excavation closer to the jetty armor stone is anticipated. The sheet pile wall will extend around the First Jetty, allowing for work to proceed without the presence of standing water, while excavating as close to the jetty structure possible and keeping the structure intact.

The planned alignment of the sheet pile wall is dictated by the extent of contamination in the beach areas and seaward side of the seawall. In general, the lateral wall alignment will be positioned approximately 30 feet towards the bay beyond the lateral extent of the contamination and approximately aligns with the -3 feet amsl contour, as shown in the Design Drawings (SECS Plan sheets). The alignment allows for a “clean buffer” of soil between the contaminated zone and the wall. The wall alignment begins in Area 9 at the eastern end of the seawall at an elevation of +10 feet amsl and ends on the west side of the First Jetty at the western edge of the excavation area (1E) in Area 5.

For the portion of sheet pile wall parallel to the bay (i.e., not including tie-ins angling back to the bank), the top of wall elevation is set at approximately +10 feet amsl (as high as the top of the existing seawall) utilizing, for the most part. Based on the geotechnical soil boring (GT-105) conducted during the 2018 PDI, as well as the hydraulic conductivity estimated based on the grain size analysis of the sample collected from the low permeable silty clay layer at 20 to 23.5 feet bgs, the ~40-ft pile drive depth will penetrate the low permeable silty clay layer and withstand the expected loading due to wave action during the RA.

The sheet pile wall will be a specific design component that will be completed by the Contractor. The Contractor will submit a Dewatering Plan for approval, which will include detailed design of the sheet pile wall and means and methods for dewatering and controlling the water during excavation activities.

4.8.2 Collection Trench with Sumps

The Contractor will construct a long trench between the bayside limit of excavation and the sheet pile wall to dewater the excavation areas within the intertidal zone. Trenches will be excavated 3 feet wide, and at least 3 feet deep, and sloped to collection sumps. Concrete sumps will be positioned approximately every 200 feet along the trench alignment as shown in the Design Drawings. The trench will be constructed of using gravel and perforated corrugated high-density polyethylene (HDPE) pipe terminating in the concrete sumps. Non-contact water from each sump will be pumped out using dry prime pumps, and the water will be discharged to surface water over the sheet pile wall using a diffuser tee pipe with a perforated end pipe connection as shown in Design Drawings.

An estimated dewatering flow rate during the initial draining of the excavation areas and using the collection trench/sumps are included in **Appendix D.** As mentioned before, non-contact water generated from initial draining of the excavation area will be pumped and directly discharged to the surface water (i.e., bay).

4.8.3 Conceptual Design for Well Point Dewatering System

If a significant volume of water is encountered within the excavation areas deeper than 4 feet or with the excavation bottom deeper than -5 feet amsl, a well point dewatering system will be constructed around the perimeter of the deeper excavation to lower the water table at least 2 feet below the anticipated excavation bottom. The Contractor will include the design of the well point dewatering system, including inter-well spacing, a cumulative drawdown expected at locations between the wells, and a total number of dewatering wells required for the worst-case scenario based on the excavation depths provided in the Design Drawings. The Contractor will also include the size of individual pumps and/or one large pump in their Dewatering Plan. A schematic diagram showing a typical dewatering well considered appropriate for conditions at this site is provided in the Design Drawings. Each of the headers shown will draw water from well points that are typically 6-in. diameter that may be drilled or driven if conditions allow. Each well will need its own submersible pump. Individual pumps will need to be sized based on conditions encountered and the length of each header to the collection trench. Water generated from the well point dewatering system will be directly discharged into the collection trench sumps. Alternatively, vacuum-based system with a header pipe connected to vacuum pump can also be utilized for constructing the well point dewatering system.

4.8.4 Temporary Water Treatment

Over the course of the remediation, impacted material will be removed from the intertidal zone, stored in covered stockpiles, and finally transported off-site. Given that groundwater at the site has not historically been an issue, there is minimal risk of the remedial activities negatively impacting groundwater at the site. Once the dewatering system for non-contact water is in place, the amount of water coming in contact with impacted material will be greatly reduced. There is some potential that contaminated water could result in contact water collected from the dewatering measures and/or in the water from decontamination activities. It is anticipated that any contamination would be in the form of suspended solids, which will settle out of the water in the frac tanks. All contact water will be collected and directed to frac tanks and sampled.

Frac tank water samples will be analyzed for suspended- (non-filtered) and dissolved- (filtered) phase lead and other contaminants if required based on the permit equivalency. The Contractor will furnish multiple frac tanks conceptually shown on the Design Drawings to store all potentially contaminated water, which will result from the following activities: water coming into contact with contaminated material (i.e., contact water), general decontamination water, and riprap decontamination water. If, based on test results, the water meets the standards acceptable for discharge to the bay, it will be directed to the dewatering system for discharge to the bay. If, based on testing, contamination from suspended solids is present in the water, then the water will be treated via filtration and/or settling and re-tested. If, based on analytical testing, contamination is present in the water in the dissolved phase, then the water will be treated via ion exchange units. The specific water treatment setup will be proposed and submitted by the Contractor.

It is anticipated that at minimum, the water treatment will consist of frac tanks and a filtration system. The filtration system followed by treatment equipment, including but not limited to cation exchanger for metal treatment are included as contingency treatments that shall be implemented, as necessary. The temporary water treatment will be designed for a maximum capacity of approximately 260 gallons per minute.

Water from the treatment will be pumped into the collection trench sumps, and then discharged to surface water (i.e., bay) in accordance with the applicable approved permit/permit equivalency.

If the frac tank water requires further treatment, then the collected water will run through a series of treatment as needed. The contingency treatment components will be a mobile system that can be easily moved near the frac tank for ease of treatment operations.

Treated water will be discharged to the surface water in the bay as necessary to meet discharge criteria requirements. Surface water is identified as the primary discharge location. Multiple surface water discharge locations will be identified by the Contractor with agreement from EPA as part of the New Jersey Pollutant Discharge Elimination System (NJPDES) discharge to surface water (DSW) permit.

The treated water will be discharged to the surface water in compliance with the NJPDES DSW permit requirements. Treated effluent will be sampled during treatment system operation in accordance with the NJPDES DSW permit. The estimated influent concentrations for surface water and groundwater and effluent discharge limits for NJPDES surface water discharge are provided in **Table 4-1**. The permit requirements are discussed in **Section 6.0**. The Design Drawings include a preliminary schematic of the treatment plant layout and minimum process and instrumentation details.

4.9 Riprap and Source Material Handling

Source material including slag and battery casings, impacted soil/sediments, as well as non-impacted post-Sandy riprap, weathered riprap, and construction debris, will be removed in stages in accordance with the Contract Documents.

The total volume of the slag/riprap was estimated by dividing the Footprint of Seawall and the Extent of Riprap into eight segments corresponding to the eight-seawall soil boring locations conducted during the 2018 PDI, as well as evaluation conducted during the FS (CDM Smith, 2012). Each segment is approximately the same size, but the percentage of slag pieces vary based on the field observations. The thickness of slag/riprap in each segment was estimated based on measurements collected during the soil boring drilling. The volume of slag/riprap of each segment was calculated by projecting the surface area of the segment onto a horizontal plane and multiplying the projected area by the thickness of the segment. The total volume of the slag/riprap (including post-Sandy riprap and weathered riprap comingled with slag and debris) was estimated by summing the volume of each segment. The total volume of post-Sandy riprap (3,500 cubic yards) was estimated by subtracting the total volume of slag/weathered riprap (estimated based on the Footprint of Seawall) from the volume estimated based on the Extent of Riprap.

The percentage of slag (i.e., source materials) in each segment was then estimated based on field observations and a visual analysis of field photographs. The total volume of seawall source materials (3,500 cubic yards) was estimated by first multiplying the volume of each Footprint of Seawall segment by the estimated percentage of slag and then summing the resulting volumes of seawall source materials in each segment. Finally, the total volume of weathered riprap (2,400 cubic yards) was estimated by subtracting the volume of source materials from the total volume of the Footprint of Seawall and estimated volume of debris (approximately 300 cubic yards).

4.9.1 Post-Sandy Riprap

The Extent of Riprap consists of the Footprint of Seawall plus riprap placed post-Sandy along the Old Bridge Waterfront Park. This post-Sandy riprap is distinctively different in color and size when compared to the weathered riprap comingled with large slag pieces present within the Footprint of Seawall. Most of the post-Sandy riprap appears to be larger than 18 to 24 inches and in light gray color. The Contractor will remove this post-Sandy riprap first before removing large slag pieces, weathered riprap, and debris from the seawall. Based on the Footprint of Seawall and the existing Extent of Riprap, approximately 3,500 cubic yards of post-Sandy riprap stones are estimated to be present at the site. Approximately 1/3 of the post-Sandy riprap is located within the Segment A in the eastern corner of the seawall. The Contractor will deconstruct approximate 300-foot segments of the seawall in sequence from eastern end of the seawall, working west towards the western end of the seawall adjacent to Area 2.

4.9.2 Removal and Decontamination of Riprap

The Contractor will remove post-Sandy riprap first and stage it along the top of the seawall slope within the exclusion zone. The post-Sandy riprap will then be placed on the temporary decontamination pads located in the contamination reduction zone designated for each segment and washed thoroughly as per the Decontamination Plan. Details for the temporary decontamination pads are provided on Design Drawings; however, alternatively, the Contractor can propose to utilize a customized dewatering box, or movable flatbed trailer with steel reinforcement to protect against the weight of the riprap. The Contractor can propose alternate locations and sizes for the decon pads based on the production schedule. The total working area designated for riprap decontamination will be properly sized to provide temporary storage for at least 50 cubic yards. The temporary decontamination pads for cleaning the riprap will be located and sized properly to minimize the time required for transportation and decontamination of the riprap.

The Contractor will decontaminate the riprap in accordance with the Decontamination Plan. The riprap will be visually inspected to confirm all particulate material which may contain lead has been removed. A field screening method, such as utilizing handheld x-ray fluorescence (XRF), in conjunction with startup pilot testing will be included in the Contractor's workplan to verify the effectiveness of the decontamination method proposed in the workplan. Once it is confirmed that each rock is free of soil/sediment visually, then they can be moved in the clean stockpile areas located within the support zone. The post-Sandy riprap will be reused to re-construct seawall during the site restoration. If all contaminated soil/sediment cannot be removed, the riprap will be disposed of off-site.

Water generated from decontaminating the riprap will be collected using the sump located in the corner of the decontamination pad and pumped into on-site frac tanks before sampling and subsequent treatment (if required based on test results) and discharging into a dewatering trench sump. Soil/sediment with lead particulates collected on the liner within the decontamination pad will be disposed of off-site with contaminated soil/sediment.

4.9.3 Source Materials Handling

Source materials, including slag and battery casings and associated waste, comingled with weathered riprap and construction debris will be removed in stages. Source materials are located within the Footprint of Seawall.

The slag pieces are boulder-sized, approximately 10 to 36 inches in diameter, and are mostly present on the surface of the Footprint of Seawall comingled with weathered riprap. For the ease of identifying an approximate percentage of slag within the seawall, the footprint of seawall was divided into eight segments (A through H). Based on the field observations and PDI photographs, percentages of slag within each segment of the seawall were estimated to determine the total volume of the slag pieces required to be removed and dispose of off-site. Approximately 3,500 cubic yards of slag pieces are estimated within the Footprint of Seawall. Slag pieces measuring larger than approximately 6 to 8 inches in size can be individually identified, picked, removed, and staged on-site within the exclusion zone for off-site treatment and disposal. Construction debris comingled with the slag and weathered riprap will also be removed and staged on-site for off-site disposal. Approximately 300 cubic yards of debris is estimated based on the visual observations. Weathered riprap comingled with the slag pieces and debris will be visually segregated and staged on-site for decontamination. Approximately 2,400 cubic yards of weathered riprap will be decontaminated using the same procedure outlined in **Section 4.9.1** for the post-Sandy riprap.

Excavation of source materials that are buried in the soil/sediment will be addressed as part of the excavation of soil/sediment. The soil immediately beneath the seawall (approximately first six inches) is expected to be hazardous and will need to be scraped and stockpiled separately along the top of the seawall slope within the exclusion zone. The hazardous comingled small slag/riprap excavation may extend beyond 6 inches (below the large slag/riprap) if field observations indicate the presence of additional source material. In addition, soil/sediment at the toe of seawall where scoured small slag and riprap stones were observed will be managed as hazardous soil/sediment and will be segregated from potentially non-hazardous stockpiles to minimize the total tonnage requiring hazardous waste disposal. The small slag/riprap pieces appear to be intermingled with the soil/sediment which will be efficient to scrape using excavator, then by individually picking and identifying each piece for segregation. The extent of soil/sediment with small slag/riprap pieces was estimated based on visual observations, along with the respective boring locations and surface soil sampling results. The extent and approximate volume of hazardous soil/sediment with slag/riprap pieces are provided in the Design Drawings. Since the excavation of source materials that are buried in the soil or sediment is being addressed as part of the excavation of soil/sediment, the estimated total volume of soil/sediment with small slag/riprap is included in **Section 4.9.3**. The stockpiles containing large slag pieces, weathered riprap and soil/sediment containing small slag/riprap pieces will be separated and marked clearly, confirming the hazardous stockpile does not contaminate the surrounding stockpile area. The approximate locations of stockpile areas for each segment are shown on the Design Drawings.

4.10 Excavation

The site excavation plan was developed based on analytical results of the soil and sediment samples collected during the historical investigations, PDI conducted in 2018/2019, and Data Gap Investigation conducted in 2020.

4.10.1 Excavation Sequencing

The RA excavation will be conducted using a phased approach. The purpose of this phased approach is to effectively coordinate the various aspects of the remedial activities.

In general, excavation will be conducted in the upland portion of Area 9 first and then, in stages starting from eastern side of the seawall, working west towards the beach area located in Area 2. Although Area 9 is part of the Margaret's Creek Sector, this upland area of Area 9 can most easily be accessed from the Old Bridge Waterfront Park and is therefore being addressed as part of the Seawall Sector activities. Once, the excavation in Area 9 is completed, the excavation will proceed from east to west or in accordance with the Contractor's approved Excavation and Handling Plan.

Dewatering and riprap/slag removal followed by soil/sediment excavation will start in Areas 1 and 4 near the eastern end of the seawall and will progress west towards Areas 2 and 3, followed with soil/sediment excavation of the beach area in Area 2, and ending with contamination removal around the First Jetty and soil/sediment excavation in Area 5. At minimum, the site will be remediated to the excavation limits shown on the Design Drawings. Dewatering measures will be implemented as per the approved Dewatering Plan.

The RA excavation will be conducted subsequent to the source materials removal which will begin in Areas 1 and 4 from the eastern end of the seawall. The Contractor will remove the seawall first and then start soil/sediment excavation in the seaward area to upland area and transfer material on the slope where it will be stockpiled within the exclusion zone. Since the site access is through the Margaret's Creek area, the truck carrying impacted material will likely traverse previously remediated portions of Area 4 near the gazebo and/or the upland portion of Area 9. The Contractor will implement soil erosion and sediment control and decontamination measures when exiting the support zone and before entering the Margaret's Creek area.

Post-excavation confirmatory sampling will be performed, and any required secondary excavation will be conducted prior to backfill. Post-excavation confirmatory samples will be analyzed within 48 hours to minimize downtime during excavation and backfilling activities.

4.10.2 Soil/Sediment Excavation Volume Estimation

The primary excavation volume is estimated to be approximately 46,090 cubic yards of soil/sediment which includes volumes of soil/sediment with small slag/riprap (i.e., assumed to be hazardous and classified as source materials), potentially hazardous and non-hazardous soil/sediment. The volume estimate was calculated using a combination of Civil 3D Version 2018 and calculations based on the proposed excavation area depths. An Excel spreadsheet was created to calculate and sum each of these volume calculations and is included in **Appendix D**.

In general, the proposed excavation areas are uniform, have a readily defined area, and have a known depth. Soil/sediment volume estimates for each of these areas was calculated by projecting the surface area of each area onto a horizontal plane and multiplying the projected area by the proposed excavation depth for that area. The total excavation volume is the sum of the individual excavation area volumes. The excavation depth to estimate the volume of soil/sediment with slag/riprap less than six inches was assumed to be the top 6 inches of the area identified along the toe of the seawall.

The percentage of soil/sediment that is expected to be classified as hazardous was estimated at 25% based on the estimation that soil/sediment up to 30 feet from the seaward edge of the seawall will be hazardous identified based on the visual observations along with the respective boring locations and surface soil sampling results. Using Civil 3D Version 2018, the composite method calculation was used to determine the volume of impacted soil/sediment. The existing conditions digital terrain model (DTM) is based on a survey performed by Kennon Surveying Services, Inc. (Kennon), June 2019. All elevations are based on NAVD 1988 datum, and the horizontal datum is based on the New Jersey State Plane Coordinate System, NAD83. The surveyor provided existing contours at 1-foot intervals, which were used to generate an existing DTM. The first step in the calculations was to create DTMs of the ground surface condition prior to and after excavation. In this instance, the condition prior to excavation is the existing surveyed surface, and the condition after excavation is the excavation areas dug to the proposed depths and then tied into the surrounding grade via 2:1 horizontal to vertical side slopes at the excavation perimeter for excavation areas 4 feet or deeper. Interior sidewalls (i.e., boundaries separating excavation areas) and sidewalls for excavations shallower than 4 feet are assumed to be vertical for the purposes of generating the excavated DTM, as the Contractor is anticipated to use shoring methods to stabilize the excavation sidewalls. The requirements for the shoring methods to stabilize the excavation sidewalls are provided in **Section 4.10.7** and specific approach will be proposed by the Contractor in their work plan. The excavated DTM combined the excavated contours for all excavation areas and the surrounding existing surface. Cut/fill analysis was performed with the existing DTM and excavated DTM. Once these two DTMs were completed, the volume between the DTMs (excavated volume) was also calculated and provided in **Appendix D**.

In general, the composite method re-triangulates a new DTM surface based on points from both DTM surfaces. It uses the points from both DTM surfaces as well as any location where the triangle edges between the two surfaces cross. The method then calculates the new composite surface elevations based on the difference between the elevations of the two surfaces. This method provides a more accurate volume estimate by calculating the volume between the two surface definitions.

4.10.3 Primary Excavation

The primary excavation areas include areas where slag material was visually identified and/or soil/sediment sample results confirmed the presence of lead impacts above the remediation cleanup level. The Contractor will be required to excavate to the horizontal and vertical limits shown on the Design Drawings.

In total, 41 primary excavation areas have been designed to remove the contamination. These excavations are labeled on the excavation plan with a letter designation for reference identification. For example, excavation polygon labeled as 1A refers to an area A with 1 foot excavation.

Each excavation area has been assigned the depth of excavation given in feet bgs. The total excavation volume of soil/sediment with small slag/riprap, potentially hazardous and non-hazardous soil/sediment are provided below.

Type of Excavated Material	Material Definition	Excavation Volume Estimate (cubic yards)
Hazardous Soil/Sediment with small Slag/Riprap	RCRA characteristically hazardous waste which includes soil/sediment with small slag/riprap, fail TCLP criteria of 5 mg/l and require off-site treatment.	1,910
Potentially Hazardous Soil/Sediment	Potentially RCRA characteristically hazardous soil and sediments that may fail TCLP criteria of 5 mg/l and may require off-site treatment.	8,930
Non-Hazardous Soil/Sediment	Non-hazardous soil and sediment disposed to Subtitle D landfill.	35,250

Primary excavation limits were developed as follows:

- First, the analytical results of the collected soil and sediment samples (from PDI, Data Gap Investigation and RI) were compared with the cleanup goal specified in the ROD to determine whether contamination was present. Soil and sediment samples were considered contaminated if lead was present in concentrations exceeding the cleanup goal of 400 mg/kg.
- The horizontal extents of primary excavation areas were established to remove all impacted material based on sampling. Cut lines were set through clean borings based on location-specific condition and as long as the clean boring was less than approximately 35 to 40 feet (determined based on the average distance between the boring location along the transect) to the adjacent contaminated borings and 90 feet along the length of excavation area. For most of the locations, the clean boring locations were less than 40 feet from the adjacent contaminated boring locations. Where the distance was greater than 40 feet, the primary excavation limits were established in between the clean and contaminated boring at a distance of approximately 25 feet outward from the contaminated boring location based on the lead concentrations detected. This methodology was developed to target all known impacted material, while limiting over excavation of likely clean material. Primary excavation boundaries were established through delineating sample locations (i.e., clean samples at the proposed excavation depth). However, if a delineating boring is located greater than 35-40 feet from the nearest contaminated boring, then it is likely, based on other contaminated areas, that contamination declines well before the delineating boring. In these instances, the primary excavation boundary is biased inward from the delineating sample. This approach decreases the volume of clean material that will be excavated and coupled with post-excavation sampling and secondary excavations (as per **Section 4.10.6**), will still confirm that all target contaminated material is removed, in accordance with the ROD.
- At locations where lead was delineated vertically, the vertical extent of excavation was extended to the top of the delineating sample. At locations where lead was not vertically delineated below the cleanup level, the vertical extent of excavation was established 1 foot below the non-delineated sample. One-foot increments of excavation is the smallest lift that can reasonably be excavated. If field conditions allow for 6-inch lifts, the

Contractor can proceed with that increment. However, the initial proposed excavation assumes an increment is 1 foot. This approach for establishing primary excavation depths decreases the volume of clean material that will be excavated and coupled with post-excavation sampling and secondary excavations, will still confirm that all target contaminated material is removed.

- After the overall excavation perimeter was established for areas throughout the site, excavations were further identified into individual interior excavation polygons based on the depth of contamination identified in adjacent areas with shallower or deeper vertical delineation. In general, adjacent soil borings with contamination depth differential of approximately 1 foot were typically grouped into a single excavation area. Once a cluster of borings defining a distinct excavation area polygon was determined, the vertical extent of the excavation was established based on the elevation of the deepest contaminated soil or sediment sample collected from the borings included in that cluster.

4.10.4 First Jetty

A jetty (First Jetty) is located within the remediation areas identified Areas 2 and 5. The jetty construction is assumed to consist of a base gravel overlain with core 6-inch riprap with progressively larger stone toward the outer edge with the final armor stone approximately 12 to 18 inches in diameter. A 42-inch RCP stormwater outfall pipe is located within the core and extends the length of the jetty (permit file[1]). A concrete walkway is located on the top of the jetty. There are no indications that the jetty contains any slag material, as the jetty was constructed after the seawall. The jetty is estimated to be 400 feet in length based on historical aerial photographs and survey data. Preliminary limits of excavation run adjacent to approximately 190 feet of the jetty on the Area 2 side and approximately 85 feet on the Area 5 side.

The area adjacent to the jetty will be dewatered to facilitate excavation of impacted soil/sediment in Areas 2 and 5. Excavations will be performed in areas 5E, 6D, 9A, 5D, 3G, and 3H as close to the jetty structure as possible and post-excavation samples will be collected. If post excavation samples indicate that contamination extends beyond the limits of the excavation side wall in the direction of the jetty, then the outer armor stone will be removed from portions of the jetty in order to continue the excavation. The jetty armor stone will be decontaminated and stockpiled until excavations in the vicinity are complete and the stones can be returned to the jetty. Additional excavation will be completed, and post-excavation samples will be collected.

If it is determined that impacted soils/sediments extend beneath a portion of the First Jetty or may have migrated into the voids within the jetty structure, EPA will conduct an evaluation of the data and/or any existing information to determine if additional information is needed or if a modification of the RD is required to complete the remediation of the First Jetty. The Contractor will not remove any armor stone or implement other deconstruction that will jeopardize the engineered structure of the First Jetty without first obtaining approval and direction from EPA's Representative.

[1] Repair Permit File No 2001-00307, issued by Department of Army to New Jersey Coastal Engineering, April 24, 2001 (Montrose AGC, 2021).

4.10.5 Post-Excavation Sampling

All excavations require verification in accordance with the NJDEP post-RA requirements defined in the ROD. According to those criteria and the Technical Guidance for Site Investigation of Soil, Remedial Investigation of Soil, and Remedial Action Verification Sampling for Soil (NJDEP, 2015), excavation at the site requires post-excavation verification or closure samples, along the excavation bottoms and sidewalls, according to the following frequency:

For soils and sediments, post-excavation confirmatory sampling will be conducted prior to backfill at excavated areas to verify achievement of the cleanup levels. Sampling frequency will be one soil sample per every 900 square feet of excavation floor. The post-excavation bottom samples within each 900 square feet of bottom area should be biased to the highest concentration based on the data from RI and PDI sample locations and visual indicators of potential contamination. Two samples (one at the top and one at the bottom) per 30 linear feet of each excavation sidewall will be collected when the sidewall is more than 2 feet deep. If the sidewall is less than 2 feet deep, one sample will be collected along the sidewall. A minimum of one sample will be located on each sidewall. At minimum, two samples (one at the top and one at the bottom) per 30 linear feet of exposed excavation wall along the First Jetty will be collected to facilitate a data evaluation if it is determined that impacted soils/sediments extend beneath a portion of the First Jetty or may have migrated into the voids within the jetty structure.

Excavation sidewalls to be sampled include the overall perimeter sidewalls and interior sidewalls between adjoining excavations.

The post-excavation samples required along the excavation bottoms and sidewalls are shown on Design Drawings. Final closure samples data (post-excavation samples) will be documented in the subsequent RA completion report at the end of the remediation.

4.10.6 Secondary Excavation

The performance of secondary excavation during RA will be based on the results of the post-excavation samples for primary excavation and/or visual observation of additional source materials warranting removal. The Contractor may use pre-confirmatory XRF screening to aid in determining the extent of contamination for secondary excavation in an area, prior to collecting confirmatory sampling. The secondary excavation (see below) and/or source materials removal and post-excavation sampling will be performed iteratively until clean post-excavation samples have been obtained. All secondary excavation will require prior approval from the EPA's Representative.

Vertical Secondary Excavation. For any post-excavation bottom samples that fail the cleanup criteria, the Contractor will perform secondary excavation in 1-foot vertical increments within that grid. The Contractor will then collect a new bottom sample for that grid at the deeper elevation to compare to the cleanup criteria. This process will be repeated iteratively until the site remediation goals are met, or as otherwise directed by the EPA's Representative.

The resulting 1-foot deeper excavation will create new sidewalls within that grid that will also require sidewall sampling at the frequency of one sample for every 30 linear feet of exposed sidewall, with a minimum of one sample in each direction. Sidewall samples will be recollected each time the excavation extends 2 feet deeper until the vertical excavation limit is complete.

Horizontal Secondary Excavation. For any of the post-excavation sidewall samples that fail the cleanup criteria, the Contractor will perform secondary excavation in 1-foot horizontal increments across the length of the entire sidewall represented by the exceeding sample. The Contractor will then collect a new sidewall sample along the newly exposed sidewall, with a minimum of one sidewall sample for every 30 linear feet, to compare to the cleanup criteria. This process will be repeated iteratively until the site remediation goals are met, or as otherwise directed by the EPA's Representative.

As the horizontal secondary excavation widens any excavation area, the Contractor will monitor the excavation floor area and check the quantity of bottom closure samples available to ensure that there are sufficient samples to account for the additional excavation floor exposed. If required, additional bottom samples will be collected to ensure there is one sample for every 900 square feet of exposed excavation floor. Approximately 4,190 cubic yards (10% of total soil/sediment volume) of soil/sediment are assumed as secondary excavation for the purpose of cost-estimate.

4.10.7 Excavation Protection/Slope

The excavation support system, including slope stability, is one of the specific design components identified for development by the Contractor, based on their experience and added value with this construction component. The Contractor will include the recommendation for excavation support system/procedures in their Excavation and Handling Plan submittal for EPA's Representative approval, including any shoring, sloping, or benching**.** The support system will be designed in accordance with the OSHA Code of Federal Regulations (CFR) 29.1926, Subpart P.

The Contractor will be responsible for sloping the excavation, as necessary, or for providing other temporary supports to prevent soil slippage along the side slopes and slope stability. All Contractor-designed sloping will comply with OSHA requirements to be protective of personnel.

All slopes will be inspected daily by a qualified staff member for cracks in the soil at the head or along the face of the slopes and other changed conditions such as bulges or sloughs on the slopes. Inspection results will be documented in a Daily Inspection Log, and any unusual or changed conditions will be brought to the attention of the EPA's Representative.

4.11 Air Sampling and Monitoring

During all subsurface intrusion activities, exposure monitoring will be performed to monitor the occupational exposure of Contractor personnel. Monitoring will be performed to identify and quantify safety and health hazards and airborne levels of hazardous substances in order to maintain proper selection of engineering controls, work practices, and PPE for site personnel. Exposure monitoring parameters will include airborne lead, dust, and noise. Action levels will be established for the active work areas in accordance with current EPA air quality guidelines. If action levels are exceeded, response actions will be taken.

Additionally, the Contractor will also be responsible for the perimeter air monitoring and sampling in accordance with the Perimeter Air Monitoring Plan.

4.12 Waste Characterization, Handling, and Off-Site Disposal

4.12.1 Waste Characterization

Source materials including slag and battery casings, and associated waste comingled with soil/sediment, miscellaneous debris, and excavated soil/sediment will be segregated into distinct stockpiles corresponding to their respective categories. Based on the results of RI, PDI, and Data Gap Investigation, the type of material being excavated/removed has been divided into the following waste disposal categories:

- Hazardous Slag – RCRA characteristically hazardous waste which includes slag pieces greater than 6 inches from seawall that fail TCLP criteria of 5 mg/L and require off-site treatment.
- Hazardous Soil/Sediment with Slag/Riprap – RCRA characteristically hazardous waste which includes soil with small slag pieces & riprap which also fail TCLP criteria of 5 mg/l and require off-site treatment.
- Potentially Hazardous Soil/Sediment – Potentially RCRA characteristically hazardous soil and sediments that may fail TCLP criteria of 5 mg/l and may require off-site treatment.
- Non-Hazardous Soil/Sediment – Non-hazardous soil and sediment disposed to Subtitle D landfill.
- Non-Hazardous Debris – Non-hazardous miscellaneous debris disposed to Subtitle D landfill.

4.12.2 On-Site Waste Management

There will be no direct loading of soil/sediment, as waste characterization results are required prior to loading. The Contractor will collect waste characterization samples from soil/sediment stockpiles for waste disposal evaluation and for disposal classifications.

4.12.3 Off-Site Treatment/Stabilization

The Contractor will conduct off-site stabilization of source materials including slag and battery casings, and associated waste, source materials comingled with soil/sediment and hazardous soil at an approved RCRA Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDFs) as per the approved Stabilization Plan. The off-site stabilization will involve on-site segregation of the slag pieces to minimize the quantity material requiring off-site stabilization. The Contractor will require additional precautionary measures for the load out and transportation of slag pieces and slag/soil material. However, the off-site stabilization operations will be conducted in a more controlled environment with less risk to the environment and nearby receptors. The Contractor will need to submit the Stabilization Plan which will also include QA/QC requirements for each batch to verify waste has been rendered non-hazardous.

4.12.4 Off-site Disposal

4.12.4.1 RCRA Hazardous Wastes

Wastes that fail TCLP criteria will require treatment such as off-site stabilization to meet the land disposal requirement treatment standards prior to disposal in a Subtitle C landfill, which is a RCRA permitted hazardous waste disposal facility. Additional treatment of the waste material may also be required to meet the disposal facility requirements. The Contractor will be responsible for collecting

additional waste disposal samples during RA to meet the disposal facility requirements. The estimated volume of RCRA hazardous waste is approximately 15,050 tons of the slag material, 3,940 tons of soil/sediment with slag/riprap, and 16,750 tons of soil/sediment potentially failing TCLP criteria. It should be noted that approximately 25 percent of the soil/sediment volume is estimated to fail TCLP requirement and to be disposed off-site as characteristically hazardous waste. The exact total volume of soil/sediment disposed of as hazardous waste will be determined after waste disposal sample results are received. Based on the disposal facility's requirements, smaller slag pieces may need to be segregated on-site from soil/sediment for disposal, to the extent possible during the RA. Large pieces of slag (approximately greater than four inches) will be segregated visually from soils during excavation to the extent possible.

4.12.4.2 Non-Hazardous Wastes

All remaining soil/sediment is classified as Subtitle D non-hazardous material, requiring disposal in a Subtitle D landfill. This includes material that does not fail TCLP criteria. The estimated volume of Subtitle D soil/sediment is approximately 66,100 tons. Construction debris (~800 tons) removed from the seawall and debris from clearing the site will potentially be classified as Subtitle D non-hazardous material, requiring disposal in a Subtitle D landfill.

4.13 Backfill and Grading

The source of backfill will be preapproved by the EPA's Representative to verify all backfill materials including common backfill, sand beach fill, topsoil, riprap, and wetland backfill are certified clean fill. Samples of the backfill materials will be collected prior to importation of any material to the site. The sample results will be compared to NJDEP clean fill criteria provided in the Specifications.

Significant volumes of non-impacted material outside the extent of remedial excavation are anticipated to be excavated for the revetment construction (**Sheets 0D8-01 and 0D8-02**). This non-impacted "over-excavated material" from on-site areas will be utilized as clean common backfill (pending characterization results). This material will be removed for construction purposes based on the design of the engineered revetment. The over-excavated on-site material from Areas 1 and 4 will be reused as common backfill in Area 3, 4 and 9 to the extent possible if it meets NJDEP clean fill criteria based on the NJDEP clean fill sampling requirements.

The intertidal/subtidal zones in Area 1 and beach areas of Area 2 and 5 will be backfilled with clean, imported beach-quality sand or as necessary based on aesthetic requirements or to match the elevations of soil backfilling.

All imported backfill material, including common backfill, riprap, and beach sand fill brought to the site will be free of organic material, frozen material, rubbish, construction and demolition materials, or other unsuitable materials. All materials used as fill will be independently tested to ensure they are free from chemical contamination as defined by the NJRDCSRS. At a minimum, chemical analysis will be performed in accordance with the NJDEP's Fill Material Guidance (Version 4), for each source or borrow area.

The EPA's Representative will inspect all backfill materials and be present during sample collection from all backfill sources (common backfill, beach sand fill, topsoil, riprap, and wetland backfill). Samples of each material will be submitted for laboratory analysis in accordance with the Specifications. The analyses will include the chemical analysis and geotechnical testing requirements

contained in the Specifications. All testing results will be reviewed and approved by the EPA's Representative.

4.14 Site Restoration

4.14.1 Revetment Construction

The existing Extent of Riprap composed of riprap/slag and construction debris will be deconstructed and removed during the RA. The RD includes a plan to construct new engineered revetment to the extent practicable to the Footprint of Seawall. The new revetment design is provided on the Design Drawings, and associated basis of the design report and calculations are provided in **Appendix E**. The new revetment will be constructed with a geotextile material, bedding stone/armored stone placed on an approved subgrade and slope consistent with the design requirements. Decontaminated riprap will be used as the armored stone to construct the revetment if it meets the requirements listed in the Specifications. The Contractor will provide confirmation and testing results of the on-site decontaminated riprap meeting the design requirements prior to finalizing the workplan for the revetment construction.

4.14.2 Upland Area Restoration

The Contractor will perform general site restoration as shown on the Design Drawings. The upland area restoration will consist of the following activities:

- Park Restoration which includes, placing topsoil, seeding, and native plantings to achieve preconstruction conditions as shown on Design Drawings, restoring back park facilities including the playground, gazebo, and select light poles and benches that were removed prior to construction, constructing park pathways and parking area to match pre-construction conditions, to the extent practicable. Any park facilities in storage that cannot be restored will be replaced.
- Restoration of stormwater sewer systems encountered during the excavation. The drainage pipe outlet to the bay encountered during the excavation will be reconstructed during the revetment construction in accordance with the Design Drawings and Specifications.
- Removal of temporary Margaret's Creek's crossing and restoration of the area.
- Removal and/or Restoration of the access road along the bay through the Margaret's Creek area.
- If damaged during construction, any impacts to the entrance to the OBMUA fire access road from Route 35 will be restored back to its original condition.
- Restoration of the wooden boardwalk if removed during the remedial action

Turf seeding in the upland area will be performed in accordance with Specifications and will include appropriate species native to the region, with an emphasis on species that provide habitat for pollinators. A mix of additional tree and shrub seed will also be broadcast to help further the establishment of a forested system. Locally/regionally sourced seed will be used to the extent practicable.

4.14.3 Transition Area Restoration

Area 9 upland area and a small portion of Area 4 is within the transition area of the Margaret's Creek wetland and will be remediated under the Seawall Sector remedial action. The transition area upland

and transition area forested as shown on the Design Drawings, will be restored with topsoil and specific seed mix as per Specifications. Permanent seeding of this area will be performed. An erosion control blanket will be installed in this area following permanent seeding. In addition to the upland transition seed mix discussed above, trees and shrubs will also be installed within the forested transition area. Plantings of trees and shrubs will be conducted in accordance with the Contract Documents.

4.14.4 Other Upland Transition Areas

Transition areas, 50-feet from the tidal wetland limits, generally overlap with public access areas, such as beach, or the new revetment. Other than Area 9, as noted above, the transition area around the tidal wetland areas will not be planted as plantings are either infeasible or not viable due to anticipated pedestrian traffic upon completion.

4.15 Wetland Restoration

Ten (10) non-contiguous coastal salt marsh (tidal) areas and two freshwater wetland (non-tidal) areas were identified in the 2020 Wetland delineation report (AGE, 2020). Nine (9) of the tidal areas and one of the freshwater areas will be impacted by the remedial action, see **Figures 4-1A** and **4-1B**. Wetland impacts will be mitigated for either through in-kind and in-place restoration (restoration of temporary impacts) or by returning natural functions where they previously existed at a different location (restoration via re-establishment). For this report, the term "restoration" will be utilized for both the in-kind and in-place restoration of temporary impacts and the re-establishment of wetlands elsewhere onsite. Existing wetland areas, anticipated disturbances, and restoration are summarized below:

Tidal Wetland to the west of the existing jetty in Area 1

Area Designation in 2020 Wetland Delineation Report	Existing Wetland (square feet)	Anticipated Disturbance (square feet)	Restoration Type and Area (square feet)
Wetland J	7,378	7,378	In-Place Restoration – approximately 6,916
			Re-establishment - approximately 484
Total	**7,378**	**7,378**	**7,400 square feet**

Tidal Wetlands west of Margaret's Creek Outlet in Area 3

Area Designation in 2020 Wetland Delineation Report	Existing Wetland (square feet)	Anticipated Disturbance (square feet)	Restoration Type and Area (square feet)
Wetland A	655	0	N/A
Wetland B	1,270	1,270	Re-establishment - approximately 1,270
Wetland C	65	65	Re-establishment - approximately 65
Wetland D	550	550	Re-establishment - approximately 550
Wetland E	3,280	3,280	Re-establishment – approximately 3,280
Wetland F	2,911	2,911	In-Place Restoration – approximately 2,911
Wetland G	267	267	In-Place Restoration – approximately 267
Wetland H	3,400	3,400	In-Place Restoration – approximately 1,150
			Re-establishment –approximately 2,250
Wetland I	865	865	Re-establishment – approximately 865

Total	**13,263**	**12,608**	**In-Place Restoration – 4,328 square feet**
			Re-establishment – 8,282 square feet

Freshwater Wetland west of Margaret's Creek Outlet

Area Designation in 2020 Wetland Delineation Report	Existing Wetland (square feet)	Anticipated Disturbance (square feet)	Restoration Type and Area (square feet)
Wetland K & Wetland L (combined)	21,149 *	2,600	In-Place Restoration – Approximately 2,600
Wetland M	528	0	Not applicable
Total	**21,677**	**2,600**	**2,600 square feet**

*Note: Wetland K & Wetland L are part of a larger freshwater wetland system associated with Margaret's Creek, the square footage represents the area delineated for project.

The disturbed freshwater wetlands will be restored in-kind and in-place following construction and removal of the sheet pile wall. The contractor will restore impacted freshwater wetland areas to existing grades and replant with a palette of species to match the existing native vegetation per the contract documents, which include a mix of trees, shrubs, and herbaceous plugs.

Two tidal wetland restoration areas are proposed: (1) the wetlands to the west of the First Jetty will be restored in-kind within its existing footprint and (2) mitigation for the existing non-contiguous patches of wetlands to the west of Margaret's Creek will be consolidated into a single contiguous wetland restoration area of equal acreage. The existing marsh adjacent to the Jetty shows signs of stress along the lower reaches due to sea-level rise and increased levels of inundation at the lower extents. Similarly, the non-contiguous tidal wetlands to the west of Margaret's creek show stress and decline due to sea-level rise and exposure to wave forces. The NJDEP 1970 Tidal Wetlands Base maps, Figure 5 of the 2020 Wetland Delineation Report, shows a larger contiguous tidal wetland to the west of Margaret's Creek than currently found within the project area.

Restoration focuses in areas where the larger marsh segments are currently present, and where restoration will more likely be successful. The restored marshes will be protected by a rock berm. The top of the rock berm will be set at an elevation to match the upper extents of the existing vegetated tidal wetland elevations. The wetland fill will be placed behind the berm establishing a tidal wetland elevation at the upper extents of the existing wetlands. Restoring the tidal wetlands at a higher elevation to account for sea-level rise will result in a more robust restoration that will be less susceptible to degradation over time. Deposition to the west of Margaret's Creek will potentially provide a sediment source for the tidal wetland.

Prior to the start of the remedial construction work, the contractor will be responsible for re-verification of the tidal wetland extents and vegetative percent cover. The ratio of wetland restoration will be 1 acre of restoration for every 1 acre of disturbance. Following remedial and revetment construction activities, a rock berm consisting of bedding stone will be installed to protect the areas from wave energy and erosion. The rock berm will also provide a framework for the contractor to install wetland backfill at a higher elevation than that of the existing tidal marshes. Herbaceous plantings (2-inch plugs) of smooth cordgrass will be installed at 12 inches on center within the wetland backfill areas.

Waterfowl exclusion fencing as detailed on the Design Drawings will be installed to protect the tidal wetland areas from herbivory during establishment.

4.15.1 Post-Construction Monitoring of Wetland Restoration Areas

The progress of the restored wetland areas will be documented in a post-construction monitoring report developed by the Contractor's wetland scientist and reviewed by EPA . Plant survival and areal coverage estimates will be documented consistent with the monitoring specifications provided in the Contract Documents. Vegetative success criteria shall be as follows:

- At a minimum, tidal wetland restoration areas shall achieve 75% cover by native wetland plant species within five years of construction.
- At a minimum, freshwater wetland restoration areas shall achieve 85% cover by native wetland plant species within five years of construction.

Monitoring reports shall be prepared in accordance with the Monitoring Plan and the NJDEP Mitigation Project Monitoring Reports Checklist for Completeness (dated January 2018), or more recent NJDEP checklists as appropriate, as well as USACE regulatory guidance letter No. 08-03, "Minimum Monitoring Requirements for Compensatory Mitigation Projects Involving the Restoration, Establishment and/or Enhancement of Aquatic Resources", dated October 10, 2008.

During monitoring, the Contractor's wetland scientist will document how wetland areas are developing consistent with the 1987 USACE wetland delineation manual and relevant regional supplement. Annual monitoring reports will include:

- descriptions of vegetation within the wetland restoration areas including woody plant species, heights, and densities, and herbaceous vegetation species and coverage;
- site photographs;
- descriptions of hydrology including hydrologic data; and
- descriptions of any management issues and associated corrective actions.

Annual monitoring reports will be submitted by the Contractor to EPA no later than November 1st following each growing season during the monitoring period. Following EPA's review, the Contractor will submit the Annual monitoring report to NJDEP no later than December 15th. Monitoring will cover the time period from completion of RA activities and continue for a maximum period of five years after the initial maintenance period of 1 year.

During monitoring inspections, corrective actions may be identified by the Contractor's wetland scientist. Recommendations for adaptive management may include:

- replanting of areas not meeting the minimum percent vegetative cover with native species showing vigorous growth on-site;
- control of invasive species through manual removal, hand pulling or mowing, or herbicide application;
- minor regrading of an area to improve grading through the addition of soil or the creation of runnels (1'x1' channels) to drain ponding areas;
- placement of fill in areas of erosion;
- placement of erosion control protections, such as coir matting or logs; or

- the repair or replacement of herbivory fencing.

Such adaptive management techniques will be completed under the Contractor's maintenance requirements.

4.16 Green Remediation

Green remediation is the practice of considering all environmental effects of the implementation of a remedy and incorporating options to maximize the net environmental benefit of cleanup actions. EPA strives for cleanup programs that:

- Use natural resources and energy efficiently.
- Reduce negative impacts on the environment.
- Minimize or eliminate pollution at its source.
- Reduce waste and reuse materials to the maximum extent possible

The Contractor will be required to incorporate green remediation practices into the remedial design and construction whenever feasible in accordance with the EPA Region 2 "Clean & Green" Policy, issued on March 17, 2009, and updated on April 11, 2010. Green remediation strategies will be implemented to reduce direct and indirect greenhouse gas and other emissions, increase energy efficiency, conserve, and efficiently manage resources and materials, reduce waste, and increase reuse of materials.

Applicable green practices that will be required to be implemented by the Contractor during construction activities are included in the Contract Documents and are described below. The Contractor will be required to supply documentation and records supporting the green remediation practices implemented (i.e., disposal certificates, utility receipts, etc.) in accordance with the Specifications.

4.16.1 Use of 100% Renewable Energy

Use of renewable energy minimizes depletion of natural resources and contributes to cleaner air by reducing air emissions. Renewable energy certificates will be obtained from the local utility provider, Public Service Electric and Gas Company (PSE&G), for all electricity used during the remedial construction.

4.16.2 Incorporation of Clean Diesel Fuel and Technology

The majority of fuel that will be used during construction activities is associated with sheet pile wall installation and earth moving equipment that will be used during dewatering, excavation, and backfilling work. The Contractor and subcontractors will be required to certify that only ultra-low sulfur diesel is used on the project, which will improve the quality of the vehicle exhaust. In addition, vehicle idling will not be allowed for longer than 5 minutes.

4.16.3 Material Reuse, Reduction and Recycling

Material reuse, reduction, and recycling minimizes impacts on natural resources and reduces the production of waste. Waste reduction minimizes environmental impacts by limiting the amount of land required for waste disposal and minimizing consumption of fossil fuels and generation of air emissions

associated with transport of the waste. Material reuse, reduction and recycling practices at the Site will include the items detailed below.

- Approximately 15,050 tons of slag and battery casing and associated waste and 20,690 tons of impacted soil/sediment material is estimated to be disposed as RCRA hazardous waste. In accordance with Specifications, the Contractor will segregate slag pieces from soil/sediment to the extent possible to minimize the amount of RCRA waste requiring off-site stabilization and treatment.
- Non-hazardous construction waste generated during remediation shall be sent to an approved recycling facility. The Contractor will submit disposal certificates documenting that the waste was sent to a recycling facility.
- One hundred percent of the copy papers, file folders, and paper office supplies will be required to come from recycled sources. Required recovered materials content will be as recommended by EPA's Comprehensive Procurement Guidelines.
- Local labor shall be used, when possible, to reduce fuel consumption associated with driving to the Site. Locally supplied materials shall be used when possible.
- The number of field mobilizations shall be minimized, when possible, to reduce fuel consumption.
- Sequencing and scheduling shall be performed in such a manner to minimize transportation and/or shipping fuel consumption whenever possible. This shall include consideration for sample shipments, transportation of waste material for off-site disposal, import of clean material, and on-site handling of materials during removal and restoration activities.

4.16.4 Sustainable Practices

Sustainable site practices minimize degradation of ecosystems and promote good stormwater management. The sustainable practices listed below are associated with the site activities.

- No new impervious material will be generated as part of site activities, which can contribute to localized flooding and aquifer depletion.
- New vegetated areas will be created within all disturbed areas within the riparian zone in accordance with the NJDEP Division of Land Resource Protection (DLRP) program. In addition, any grassed areas that will be disturbed as part of the RA construction activities will be re-seeded upon completion of site activities.
- Soil erosion and sediment control measures will be implemented for the duration of site construction. Silt fences and/or hay bales will be installed around stockpiles and along site boundaries to reduce the amount of sediment leaving the site, which could adversely impact downgradient water bodies.
- Dust control will be implemented during earthwork activities so that the work will not adversely impact air quality.
- Stormwater accumulating within excavations with contaminated soils will be stored, sampled, and treated at the on-site temporary water treatment system (if required) prior to discharge to prevent contamination from spreading off-site.

4.17 Pre-Final Inspection and Final Inspection

A Pre-Final Inspection will be performed by the EPA and their representative, and the Contractor. The inspection will be conducted to demonstrate the project has met the design criteria set forth in the DAR and the Contract Documents.

During the Pre-Final Inspection, a list of incomplete work items will be developed by the EPA and issued to the Contractor. The Contractor is responsible for making all repairs, replacements, and/or adjustments required to meet performance criteria. Any incomplete work items identified by the EPA will be addressed promptly. If necessary, follow-up inspections will be performed to verify completion of major items.

The Final Inspection will be conducted by the EPA and their representative, the Contractor, and other project stakeholders identified by EPA after all “punch list” items identified during the Pre-Final Inspection have been addressed. The inspection will include a visual inspection of all work. Any remaining incomplete work items identified will be corrected by the Contractor.

4.18 Demobilization

After final inspection is completed, the Contractor will initiate demobilization activities. This will include, but is not limited to, removal of all temporary facilities, equipment, materials, and PPE.

4.19 Construction Cost Estimate

The preliminary cost estimate is provided for reference under separate cover to EPA. The total estimated cost is approximately $70.3 M. The final construction cost estimate was prepared using Micro-Computer Aided Cost Estimating System, (MII V4.4.3), and is provided under separate cover. The final submittal includes assumptions used for the final cost estimate.

5 CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

This section describes the procedures that will be implemented to provide QA/QC during site preparation, dewatering, source materials removal and soil/sediment excavation, temporary water treatment, all chemical sampling, backfilling, and site restoration, including revetment construction and wetlands restoration. The intent of the construction QA/QC is to ensure that all work is completed in accordance with the requirements in the Contract Documents (Design Drawings and Specifications) prepared during the RD. Information has been included herein to summarize the various QA/QC measures contained in the specifications and to identify the manner in which these QA/QC measures will be implemented and monitored during the course of construction.

5.1 Construction QA/QC Organization

It is the responsibility of all involved parties to maintain quality throughout the construction duration. The EPA's Representative will have the overall responsibility for construction QA/QC. EPA will involve the state, where appropriate.

The EPA's Representative will have the following roles in the implementation of the QA/QC procedures:

- Attend progress meetings weekly basis or as often as required during remediation to address the status of project construction, schedule changes, test results, observations and findings, issues of non-compliance, change orders, and upcoming activities. The frequency of the meetings depends on the environmental significance of site activities and the level of oversight required.
- Review all design documentation, including the workplans, design drawings and specifications, shop drawings, and other submittals from the Contractor. EPA will approve in consultation with the state, where appropriate.
- Monitor the construction quality assurance program, including review of the sampling results, testing data, and the various inspection reports.
- Review (as required) and maintain a continuous record of modifications to the design drawings and specifications as they occur during construction.
- Provide assistance in determining that the construction has been completed in general conformance with the drawings and specifications.
- Provide assistance in specific RA activities including the decontamination of riprap procedures, excavation around the First Jetty, secondary excavation, etc.
- Provide review and interpretation of field and laboratory testing results.
- Review all field and laboratory QA/QC testing and inspection results for conformance with the Specifications and DAR. Provide an interpretation of data to determine areas that are in conformance and in non-conformance with these documents. Determine areas that require reworking and/or repair.
- Perform site visits to review construction progress and QA/QC procedures.
- Coordinate with the Contractor and all lower-tier subcontractors to maintain compliance with the QA/QC requirements.
- Record any on-site activities that could result in non-compliance with the design documents and report these activities to the EPA Remedial Project Manager.

- Observe construction materials delivered to the site to determine general conformance with material specifications.
- Prepare daily construction oversight logs and a daily oversight quality control report.
- Serve as the daily contact person and maintain routine contact with the EPA Remedial Project Manager and the Contractor regarding conformance with quality control measures.

The Contractor will identify a contractor quality control (CQC) manager who will be responsible for overall management of CQC and have the authority to act in CQC matters for all features of work. The CQC manager will have the following roles:

- Maintain an on-site supervisory presence during construction, with no duties other than QC.
- Maintain a continuous line of communication with the EPA's Representative to identify and discuss field issues as they arise.
- Provide shop drawing submittals to confirm that the Specifications are being met.
- Confirm that the QA/QC requirements (e.g., testing, inspection) of the specifications are being met.
- Identify potential design/construction issues as early as possible to avoid impact to the project performance and/or construction schedule.

5.2 Construction QA/QC Activities

The Contract Documents play a significant role in the implementation and monitoring of QA/QC activities. The contents of these documents establish QA/QC elements of activities occurring before, during, and after the construction. Specific to QA/QC, the specifications may, depending on the given component of construction, specify any or all of the following:

- Performance standards or operating conditions to assist the Contractor in the selection and purchase of equipment.
- Required construction materials.
- Applicable codes, standards, and specifications to govern material and workmanship quality.
- Information to be submitted for technical review.
- Coordination of work activities for all elements of construction.
- Manufacturer or field-testing requirements
- Performance guarantees
- Workmanship/equipment warranties
- Daily quality control reports be prepared and submitted by the Contractor.

Fulfillment of the specifications provides the framework for QA/QC measures by identifying the appropriate equipment and materials to be utilized, indicating acceptable construction practices, requiring on and off-site testing, and specifying performance and workmanship warranties. To gauge compliance with the requirements of the Contract Documents, QA/QC activities are performed such as the review of technical submittals and material/equipment testing and inspection. The following activities are further discussed below.

5.2.1 Review of Technical Submittals

For certain elements of construction, the specifications require the Contractor to prepare technical data and plans and submit this information to the EPA's Representative for review. The objective of this requirement is to monitor the Contractor's understanding of the design and prevent any misinterpretation of the specifications that may otherwise impact the design objectives or construction schedule. The submittal of technical data, also referred to as shop drawing submittals, encompasses many elements of construction activity. Required submittals may include material samples, manufacturer's literature describing the component, engineering calculations, engineering drawings for components showing proper dimensions and details, installation drawings, operating instructions, layout drawings, and electrical interconnections.

The shop drawing review process is an essential activity for monitoring QA/QC before construction begins. The submittal of a shop drawing signifies that all quantities, dimensions, field construction criteria, materials, model numbers, and other pertinent information have been determined and verified by the Contractor. It also confirms that the Contractor incorporates the specifications and the design drawings into the construction activities.

The EPA's Representative will review the shop drawings to determine general compliance with the design drawings and specifications. Submitted data are reviewed as follows:

- "A – Approved" if no objections are observed or comments made".
- "B – Approved, except as Noted. Resubmission not Required" if minor objections, comments, or additions are made but resubmittal is not considered necessary.
- "C – Approved, except as Noted. Resubmission Required" if the objections, comments, or additions are extensive. The Contractor would be required to resubmit the items after correction.
- "D – Will be Returned by Separate Correspondence".
- "E – Disapproved" if the submittal under consideration is not acceptable or when the data submitted are not sufficiently complete to establish compliance with the design drawings and specifications.
- "F – Receipt Acknowledged" all submittal listed "For Information Only" will require this code.

5.2.2 Field Inspection and Testing of Materials, Equipment, and Installation

In addition to the technical data required by the Contractor prior to construction activities, several requirements exist in the Specifications for specific testing and inspection of equipment and materials. This testing and/or inspection will be required on-site once the component or material has been installed or placed. Testing of select material and equipment provides additional assurances that the component has been properly manufactured, installed, and/or coordinated with other components of construction. The Specifications require documentation that testing/inspections have been performed for, but not limited to, the following:

- Inspection of material on delivery and prior to installation
- Testing of pressure piping (water line) for leakage
- Sieve analysis of earthen materials

- Submittal of select design computations for the off-site stabilization, excavation dewatering system using sheet pile wall, collection trench, and/or deep well dewatering system, temporary water treatment, and temporary excavation slope stability systems.
- Field running tests on all pumps.
- Field screening tests from riprap decontamination and/or excavation
- Inspection and field testing of dewatering and water treatment
- Coordination and calibration of instrumentation components
- Inspection of segregation process of slag pieces, post-Sandy and weathered riprap, and debris
- Inspection of site work, including site grading, compaction testing, park, and access road restoration
- Inspection of restoration and wetland products, i.e. goose fencing, wetland backfill, topsoil, and vegetation.

In addition, on-site performance of the water treatment process using the frac tanks and if required, filtration and/or ion exchanger will be demonstrated through successful completion of a startup testing specified in Specifications where the Contractor will demonstrate that the dewatering of non-contact water and treatment system of contact water is capable meeting the requirements in accordance with the Specifications. The system will be tested with clean water followed by water generated from dewatering activities to confirm that the treatment is functioning as designed and that all equipment, controls, and instrumentation are working properly. The Contractor is responsible for making all repairs, replacements, or adjustments to meet the required performance criteria.

Excavation below the water table will not commence until the dewatering system is operating to the satisfaction of the EPA's Representative. In addition to the documentation involving the quality control of all materials and equipment, operational and performance requirements must be met for the water treatment process. Testing and inspection requirements are provided in the Specifications.

The below inspections will be conducted at two stages during remedial action. The first inspection will be conducted after all site preparation works are completed, and the second inspection will be conducted after the site restoration activities and prior to demobilization.

5.2.2.3 Pre-Final Inspection

Pre-final inspection will be performed by the EPA's Representative, EPA Remedial Project Manager, and the Contractor. The inspection will be performed over the course of a 1-day period and includes a visual inspection of the work completed at the site to demonstrate that the project has met design criteria detailed in the Contract Specifications.

For the pre-final inspection, a list of incomplete work items will be developed by the EPA's Representative and submitted to the Contractor according to the pre-final inspection results. The Contractor is responsible for making all repairs, replacements, or adjustments to meet the required performance criteria. Any incomplete work items identified by the EPA's Representative will be addressed immediately. If necessary, follow-up inspections will be performed to verify completion of major work items.

5.2.2.4 Final Inspection

The final inspection will be conducted by the EPA's Representative, EPA Remedial Project Manager, and the Contractor after all punch list items identified during the pre-final inspections have been

addressed. The inspection will include a visual inspection of all work. Any incomplete work items identified by the EPA's Representative and the EPA Remedial Project Manager will be corrected by the Contractor immediately.

6 REQUIRED PERMITS, APPROVALS, AND ACCESS AGREEMENTS

6.1 Involved Parties

Since the Raritan Bay Slag Superfund Site is being remediated under the CERCLA section 121(e)(1), which implies that 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 section 121. However, this does not remove the requirement to meet (or waive) the substantive provisions of permitting regulations that are Applicable or Relevant and Appropriate Requirements (ARARs). A pre-application meeting with the state is being scheduled to identify any needed permit-equivalencies required in addition to those listed below, and to establish any specific requirements. The Contractor will also work with EPA to coordinate as necessary with other Federal, State, and local authorities such as NOAA and USACE prior to implementing planned work activities. The following general permits and approvals (also listed in **Table 6-1**) have been identified as being potentially applicable to the RA work at the site. The substantive requirements of the identified permits have been incorporated into the RD.

6.1.1 NJDEP Division of Land Resource Protection (DLRP)

EPA will be responsible for obtaining the NJDEP DLRP permit equivalency described herein.

NJDEP DLRP Coastal General Permit-Equivalency No. 11 (N.J.A.C. 7:7)

A coastal general permit-equivalency would be necessary for investigations, cleanup, removal, or remediation of hazardous substances. This permit authorizes all regulated activities above the mean high-water line that are undertaken, authorized, or otherwise expressly approved in writing by the Department for the investigation, cleanup, removal, or remediation of hazardous substances as defined by or pursuant to the Spill Compensation and Control Act, N.J.S.A 58: 10- 23.11 et seq., or pollutants, as defined by the New Jersey Water Pollution Control Act.

Additionally, this permit-equivalency would also be necessary to address any coastal wetlands impacts. Since a portion of the site is located in New Jersey's Coastal Area Facility Review Act (CAFRA) zone, any regulated construction activities, such as excavation, grading, or filling, would require review under the CAFRA.

The NJDEP DLRP permit review covers regulated activities conducted in a tidal water location as noted above and would result in a federal Coastal Zone Management Act (CZMA) consistency determination review. In addition to consistency with the CZMA, this application would also require that impacts to cultural and/or archeological resources (coordination with the New Jersey State Historic Preservation Office) and threatened and/or endangered species and their habitats (coordination with State and Federal fish and wildlife services, National Oceanic and Atmospheric Administration National Marine Fisheries Service) be assessed and addressed, and appropriate stormwater management (N.J.A.C. 7:8) must also be addressed in the application.

NJDEP DLRP Flood Hazard Area Permit-Equivalency (N.J.A.C. 7:13)

The 100-year flood elevation at the site is between elevations 13.0 and 16.0 feet North American Vertical Datum of 1988 based on the Federal Emergency Management Agency's preliminary Flood

Insurance Rate Map corrected copy dated January 31, 2014, and the Flood Hazard Area (FHA) base flood elevation (BFE) is the same as the 100-year flood elevation at this tidal location. The majority of the proposed excavation will take place at or below the FHA BFE.

An FHA permit-equivalency will be necessary for work in flood hazard areas and riparian zones to protect the loss of life and property during flood events, preserve riverine habitat, and ensure the quality and integrity of the state's surface waters. However, if a project is regulated under NJDEP's coastal rules and a coastal general permit-equivalency is needed, then a separate FHA permit-equivalency application will not be required, except for those areas outside of the jurisdiction of the NJDEP coastal rules.

NJDEP DLRP Freshwater Wetlands Permit-Equivalency (N.J.A.C. 7:7A)

A Freshwater Wetlands (FWW) General Permit No. 4: Hazardous Site Investigation and Cleanup equivalency and Water Quality Certification is necessary for remediation and excavation activities conducted in freshwater wetlands, freshwater wetlands transition areas, and State open waters.

A separate FWW permit will not be required and will be issued along with the NJDEP DLRP Coastal General Permit No. 11. However, since the regulated activities will be conducted in freshwater wetlands, freshwater wetlands transition areas, and/or state open waters, the permit equivalency will incorporate the requirements of an FWW GP4 permit application (equivalency) in accordance with the FWW General Permit Authorization Application Checklist.

NJDEP Tidelands Instrument

The State of New Jersey claims ownership of tidelands and holds them in trust for the people of the state. Some tidelands may be sold in the form of a riparian grant while others may only be rented through either a tidelands license or lease. If there is no evidence of tidelands ownership, then an application for a tidelands license, grant, or lease will be necessary because removal activity will occur in an area that is presently or was formerly flowed by the tide. A copy of NJDEP's tidelands mapping covering the project area will be reviewed prior to RA for relevancy to the active work area, and the application for the appropriate tidelands instrument, if required, will be made.

6.1.2 New Jersey Pollutant Discharge Elimination System

NJDEP NJPDES Discharge to Surface Water (DSW) Permit-Equivalency (N.J.A.C. 7:14A)

An NJPDES DSW permit-equivalency for treated discharges, from dewatering and excavation activities, will be required. EPA will prepare and submit the permit-equivalency application and supporting documentation to the NJDEP Bureau of Surface Water Quality if surface water is identified as the discharge location.

NJDEP NJPDES Treatment Works Approval (TWA) Equivalency (N.J.A.C. 7:14A)

A TWA is required for water treatment systems. TWAs are a type of construction permit where the proposed treatment plant's design and its ability to meet the effluent standards specified in the NJPDES permit would be evaluated. The Contractor will be responsible for preparing and submitting the application to the NJDEP Division of Water Quality Bureau of Financing and Construction Permits.

NJDEP NJPDES Request for Authorization (RFA) for Stormwater Discharge during Construction (N.J.A.C. 7:14A)

In conjunction with the SESC plan certification during construction, an application for an NJDEP NJPDES RFA for storm water discharge during construction would be necessary and would be processed following receipt of SESC plan certification. Since more than 1 acre of disturbance is planned, this approval would be required. EPA will be responsible for preparing and submitting the application.

6.1.3 NJDEP, Bureau of Water Supply, Water Allocation

NJDEP Water Supply, Bureau of Water Allocation- Temporary Dewatering Permit- Equivalency (N.J.A.C. 7:19)

A temporary dewatering permit would be required for the withdrawal of ground and/or surface water in excess of 100,000 gallons of water per day for a period of more than 30 days in a consecutive 365-day period for purposes other than agriculture, aquaculture, or horticulture. For dewatering in excess of 100,000 gallons of water per day, the project owner must obtain a Temporary Dewatering Allocation Permit, or Dewatering Permit-by-Rule, or Short-Term Permit-by-Rule, depending on the duration of construction and the method employed. If this dewatering threshold is anticipated, the Contractor will be required to prepare a permit-equivalency application to allow for temporary dewatering.

6.1.4 Well Abandonment

An approval from NJDEP is required for abandonment of wells. The Well Abandonment Form will be submitted by the Contractor's licensed New Jersey well drilling contractor to NJDEP for approval.

6.1.5 Soil Erosion and Sediment Control Certification

Freehold Soil Conservation District (FSCD) SESC Plan Certification (SESC Act Chapter 251, P.L. 1975)

An SESC plan certification is required by the local soil conservation office for any project that disturbs more than 5,000 square feet of surface area of land. The SESC plan must be submitted to the FSCD office to demonstrate that the construction plans comply with the New Jersey Soil Erosion and Sediment Control Standards and other local requirements. EPA will be responsible for submitting the application and plans to the FSCD for certification and securing the fee payment necessary for this approval.

6.1.6 Other Permits/Plans

Local Site Plan Approval/Construction Permit – The county or municipal governments have enacted laws or ordinances that would otherwise require a person to obtain licenses or permits for the construction activities. Because the RA is being performed under CERCLA, no licenses or permits will be required except for permits required for construction trailers such as sewer and/or electrical service. These local permits will be obtained by the Contractor when site work commences. A copy of the Design Drawings will be submitted as a courtesy to the town.

State and Local Road Opening or Road Closure Permits – Any road closings, detours, or road openings will not be permitted unless approved by the Township of Old Bridge Police Traffic and Safety

Bureau if the road is local or the New Jersey Department of Transportation if the affected roadway is State Route 35 (Keyport/ South Amboy Road).

Community air monitoring program (CAMP) – Details of the air monitoring program are discussed in this report and Specifications.

Community Involvement Plan (CIP) – EPA-led public relations program meets the substantive requirements of the CIP.

Federal Occupational Health and Safety Administration (OSHA) regulations – Applicable requirements are included in the Specifications.

6.1.7 Access Agreements and Use Requirements

Implementation of the design is contingent upon EPA's ability to secure formal agreements and easements. At this time, all properties requiring access to complete the RA are owned by Old Bridge Township and NJDEP. Access to the park may also need to be coordinated with Middlesex County, which leases certain property from Old Bridge Township. Working around the existing utilities will need to be coordinated with OBMUA and Old Bridge Township.

6.2 Reporting

A Remedial Action Report (RAR) will be prepared upon the successful completion of the project and submitted to the EPA. EPA will use the RAR to document completion of the remedial action and indicate that the cleanup objectives have been met, as well as to summarize information for subsequent inclusion in the Superfund Site Close Out Report. The RAR will be prepared in accordance with EPA OSWER Directive 9320.2-09A-P, EPA 540/R 98-016, and EP 1110-1-19.

The RAR will include, at a minimum, the following essential elements:

- Summary of remedial activities conducted.
- Site background information
- Step-by-step summary of remedial activities conducted including but not limited to:
- Site preparation activities, including temporary facilities, clearing, and grubbing, sanitary and potable water supply, electrical and telecommunication installation, site security, fencing, construction of stockpile/loadout area, construction of decontamination pad, and temporary drainage features.
- Installation of dewatering and temporary water treatment systems including sheet pile wall installation and removal, collection trench and piping, frac tank storage and removal. Quantity of water treated and discharged. Operation and maintenance procedure, sampling data and data collected during the operation.
- Construction activities, including dewatering methods, source materials removal and excavation methods and quantities, riprap and armor stone decontamination methods and screening data, sampling methods and data, dust control, erosion control, work zone air monitoring, and perimeter air monitoring and sampling.
- Off-site treatment and/or disposal of all waste types including copies of all manifests and land disposal restriction notifications, copies of all certifications of final disposal signed by the responsible disposal facility official, and copies of waste profile sheets.

- Soil/sediment and water sampling results, including collection data such as date and time of collection, and sample chain-of-custody forms.
- Site restoration including revetment construction, source of backfill material and quantity including physical and chemical tests performed and results; removal of decontamination area, stockpile/loadout area if any constructed outside of the exclusion zone, temporary water treatment system containment area; final site grading, and transition, upland, and wetland area restoration.
- List of chronological events.
- Any changes to the approved Remedial Design
- Assessment and discussion of performance standards and analytical data, including quality assurance and quality control procedures followed.
- Waste management
- All inspection and certification reports including punch list items for pre-final and final inspections.
- Project organization and contract information for the major design and remediation contractors, EPA oversight contractors, and the project managers for EPA and the State of New Jersey
- Schedule.
- Cost and performance summary.
- Observations and lessons learned.
- Contingency Plan.
- Green Remediation.
- Site Maintenance and Monitoring.
- Required tables and figures.
- Appendices including but not limited to
- Survey and as-built drawings
- GIS Shape files showing areas of, but not limited to, excavation, restoration, and surveys.
- Copies of all project plans.
- Copies of all permits.
- Wetland restoration and monitoring plan.
- Analytical data reports in electronic format.
- Waste manifests.
- All daily and monthly reports in electronic format.
- The digital photo log in electronic format.
- Pre/Post-construction photographs and videos.
- Air monitoring summary reports.
- Delivery tickets for backfill materials.
- Copies of all decontamination certifications.
- Construction logs.
- Records of field change requests.

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7 REFERENCES

AGE, 2020. Wetland Delineation Report, with Brief Habitat Assessment and Wetlands Functions and Values for Raritan Bay Slag Superfund Site Seawall Sector. Amy Greene Environmental, A Davey Company. April 2020.

Agency for Toxic Substances and Disease Registry (ATSDR), 2009. Health Consultation, Evaluation of Environmental Data, Raritan Bay Slag, Old Bridge and Sayreville, Middlesex County, New Jersey, EPA Facility ID: NJN000206276. February 2009.

CDM Smith, 2010. Final (Revised) Data Gap Evaluation Technical Memorandum.

CDM Smith, 2012. Final Remedial Investigation Report, Raritan Bay Slag Superfund Site, Townships of Old Bridge/Sayreville, New Jersey. CERCLIS ID NJN000206276. June 25, 2012.

CDM Smith, 2012. Addendum to the Final Remedial Investigation Report, December 2011 Raritan Bay Slag, Old Bridge/Sayreville, New Jersey. CERCLIS ID NJN000206276. August 28, 2012.

CDM Smith, 2012. Revised Final Feasibility Study Report. Raritan Bay Slag Superfund Site, Townships of Old Bridge/Sayreville, New Jersey. CERCLIS ID NJN000206276. September 25, 2012.

CDM Smith, 2017. Remedial Action Work Plan, Raritan Bay Slag Superfund Site Margaret's Creek Sector. June 2017.

Department of the Army Eastern Permits Section, April 24, 2001, Department of the Army Permit Number 2001-00307 "Groin C Repair"

HDR, 2018. Final Uniform Federal Policy for Quality Assurance Project Plans Region 2 Architect-Engineering Services Contract. May 2018.

HDR, 2019. Final Pre-Design Investigation Report. Raritan Bay Slag Superfund Site Seawall Sector. Work Assignment Number 046-RDRD-A205. February 2019.

New Jersey Department of Environmental Protection. 2015. Site Remediation Program. Technical Guidance for Site Investigation of Soil, Remedial Investigation of Soil, and Remedial Action Verification Sampling for Soil. Version 1.2. March 2015.

New Jersey Department of Environmental Protection. 2021. Site Remediation and Waste Management Program. Fill Material Guidance for SRP Sites. Version 4.0. October 2021.

Montrose AGC, 2020. Data Gap Investigation Report, Raritan Bay Slag Superfund Site Seawall Sector. Prepared for NL Industries, Inc. Advanced GeoServices, a Montrose Environmental Group Company. June 2020.

Montrose AGC, 2021. Repair Permit File No 2001-00307, issued by Department of Army to New Jersey Coastal Engineering, April 24, 2001.

United States Environmental Protection Agency. 2013. Record of Decision, Raritan Bay Slag Superfund Site, Townships of Old Bridge/Sayreville, New Jersey, CERCLIS ID NJN000206276. May 2013.

United States Environmental Protection Agency. 2010. Region 2 “Clean & Green” Policy. Updated April 11, 2010.

Woods Hole Group, Inc. 2011. Objective #1: *Characterization of Hydrodynamics and Sediment Dynamics*. Rep. no. 2010-090.

8 LIST OF ACRONYMS AND ABBREVIATIONS

AGC	Montrose Advanced Geoservices Corporation
AMSL	Above Mean Sea Level
APP	Accident Prevention Plan
ARAR	Applicable or Relevant and Appropriate Requirements
ATSDR	Agency for Toxic Substances and Disease Registry
BFE	Base Flood Elevation
bgs	Below Ground Surface
CAFRA	Coastal Area Facility Review Act
CAMP	Community Air Monitoring Program
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIP	Community Involvement Plan
COC	Contaminant of Concern
CQA/CQC	Construction Quality Assurance/Construction Quality Control
CZMA	Coastal Zone Management Act
DAR	Design Analysis Report
DLRP	Division of Land Resource Protection
DSW	Discharge to Surface Water
DTMs	Digital Terrain Models
ENSP	Endangered and Nongame Species Program
EPA	United States Environmental Protection Agency
ERA	Ecological Risk Assessments
ESA	Endangered Species Act
FHA	Flood Hazard Area
FS	Feasibility Study
FSCD	Freehold Soil Conservation District
FWW	Freshwater Wetlands
GAC	Granulated Activated Carbon
GPRS	Ground Penetrating Radar Systems
GPS	Global Positioning System
SSHP	Site Safety and Health Plan
HDR	Henningson, Durham and Richardson Architecture and Engineering, P.C. in association with HDR Engineering, Inc.
IDW	Investigation-Derived Waste
MCUA	Middlesex County Utilities Authority
MII	Micro-computer Aided Cost Estimating System
MW	Monitoring Wells
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
NJDEP	New Jersey Department of Environmental Protection
NJPDES	New Jersey Pollutant Discharge Elimination System
NJRDCSRS	New Jersey Residential Direct Contact Soil Remediation Standard
NMFS	National Marine Fisheries Service
NOAA	National Oceanic Atmospheric Administration

NPL	National Priorities List
OBMUA	Old Bridge Municipal Utilities Authority
OHC	Office of Habitat Conservation
OSHA	Occupational Safety and Health Administration
PDI	Pre-Design Investigation
PM	Particulate Matter
PM-10	Particulate matter less than 10 micrometers
PPE	Personal Protective Equipment
PSE&G	Public Service Electric and Gas Company
PTW	Principal Threat Waste
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RA	Remedial Action
RAC	Remedial Action Contract
RAO	Remedial Action Objective
RAR	Remedial Action Report
RCL	Remediation Cleanup Level
RCP	Reinforced Concrete Pipe
RCRA	Resource Conversation and Recovery Act
RD	Remedial Design
RFA	Request for Authorization
RI	Remedial Investigation
ROD	Record of Decision
SESC	Soil Erosion and Sediment Control
SLERA	Screening Level Ecological Risk Assessment
TCLP	Toxicity Characteristic Leaching Procedure
TWA	Treatment Works Approval
UFP	Uniform Federal Policy
USACE	US Army Corps of Engineers
USFWS	United States Fish and Wildlife Services
XRF	X-ray Fluorescence

FIGURES

DATA SOURCE: (Source Name)

Miles

(DISCLAIMER)

Western Jetty

Seawall

Area 1

Area 2

Area 3

Area 4

Area 5

Area 6

Area 7

Area 8

Area 9

Area 10

Area 11

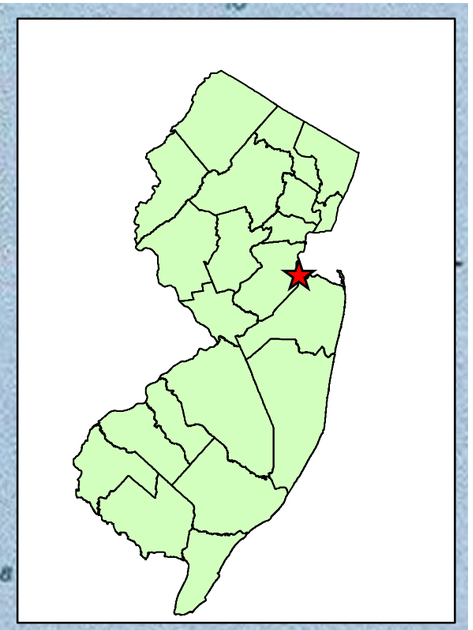
LEGEND

Areas

Seawall and Jetty

0 1,000 2,000 4,000 Feet

N



SITE LOCATION MAP

RARITAN BAY SLAG SITE – SEAWALL SECTOR

OLD BRIDGE/SAYREVILLE, NEW JERSEY

FIGURE 1-1

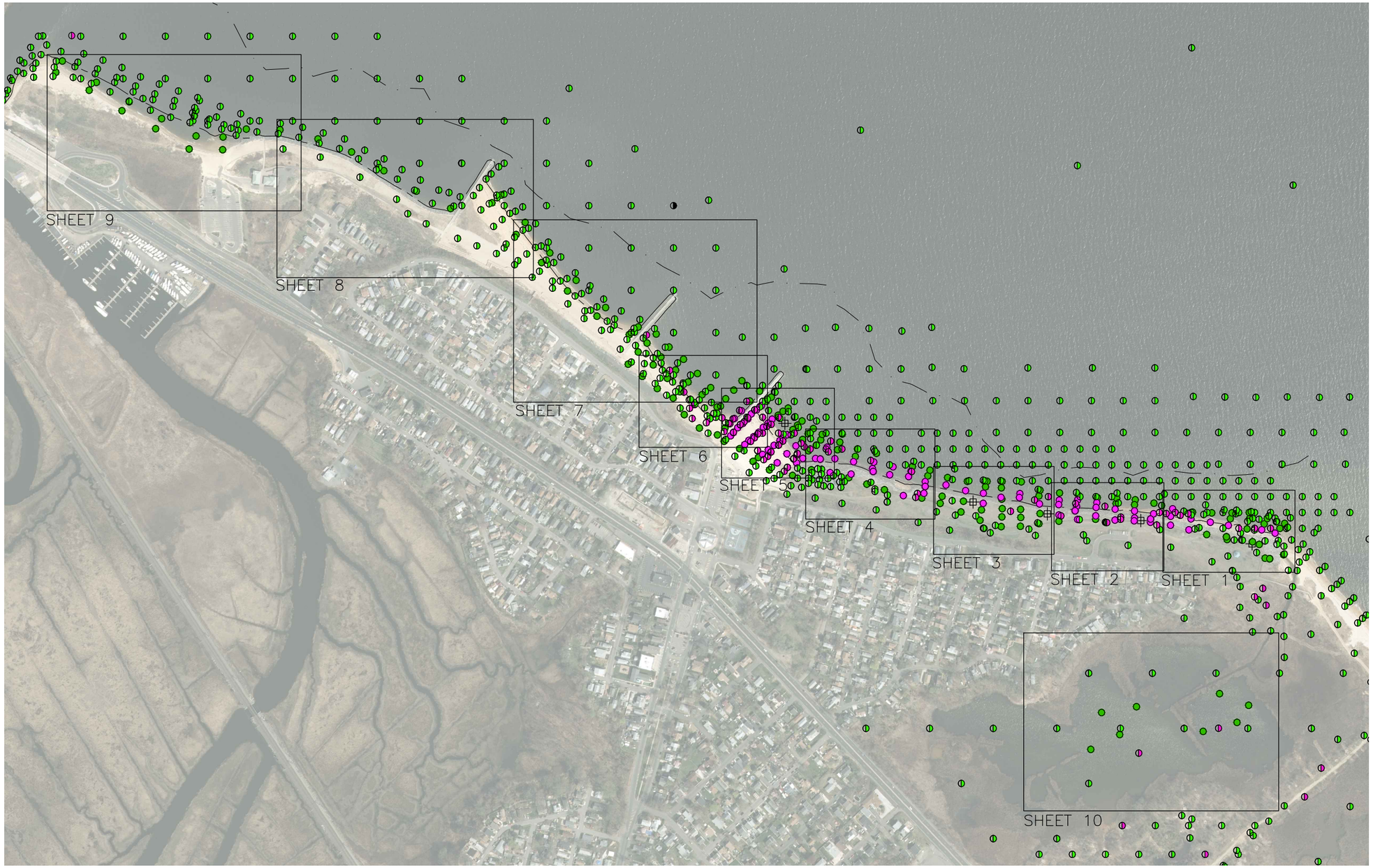
PATH: C:\USERS\APATEL\DESKTOP\MY DOCUMENTS\ARCGIS\00000_RARITANBAYSLAG\PDI\FIGURE 2-1 SITE LOCATION MAP.MXD - USER: APATEL - DATE: 9/4/2018

SEAWALL SECTOR RD

INVESTIGATION AREAS
RARITAN BAY SLAG SITE – SEAWALL SECTOR
OLD BRIDGE/SAYREVILLE, NEW JERSEY
FIGURE 2-1

PATH: C:\USERS\APATEL\DESKTOP\MY DOCUMENTS\ARCGIS\00000_RARITANBAYSLAG\PDI\FIGURE 2-2 INVESTIGATION AREAS.MXD - USER: APATEL - DATE: 9/4/2018

SEAWALL SECTOR RD



N

LEGEND

SAMPLE LOCATION WITH LEAD CONCENTRATIONS LESS THAN THE REMEDIATION CLEANUP LEVEL OF 400 MG/KG:

- RI SAMPLE LOCATION
- PDI SAMPLE LOCATION

SAMPLE LOCATION WITH LEAD CONCENTRATIONS GREATER THAN THE REMEDIATION CLEANUP LEVEL OF 400 MG/KG:

- RI SAMPLE LOCATION
- PDI SAMPLE LOCATION

- MEAN HIGH TIDE (2017)
- SPRING LOW TIDE (2017)
- PDI GEOTECHNICAL SAMPLE LOCATION

NOTES:

1. HIGHER RESULTS FROM DUPLICATE SAMPLES ARE SHOWN IN CHEMBOX.
2. AERIAL BACKGROUND OBTAINED FROM NJDEP BUREAU OF GIS https://www.nj.gov/dep/gis/
3. PDI SAMPLES COLLECTED IN JUNE AND JULY, 2018. SAMPLE LOCATIONS SURVEYED BY KENNON SURVEYING SERVICES, INC. AT THE SAME TIME.
4. TIDAL DATA OBTAINED FROM THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) TIDAL GAUGING STATION.
5. RI DATA OBTAINED FROM FINAL REMEDIAL INVESTIGATION REPORT DATED DECEMBER 2011.

500 0 500 1000

(IN FEET)

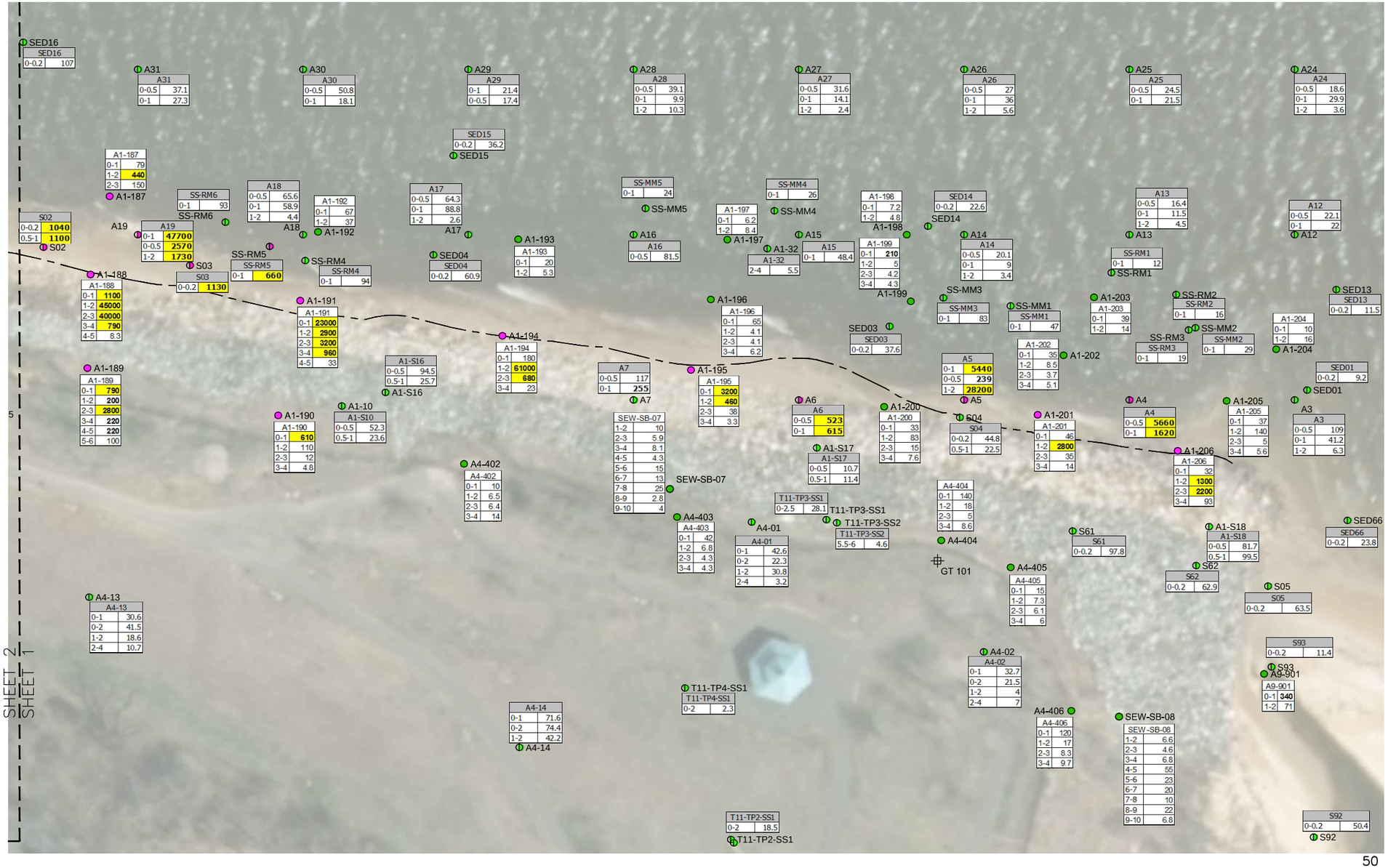
1 inch = 500 ft.

SUMMARY OF SOIL/SEDIMENT ANALYTICAL RESULTS KEY MAP

SEAWALL SECTOR
RARITAN BAY SLAG SUPERFUND SITE
OLD BRIDGE/SAYREVILLE, NEW JERSEY

DATE
SEPTEMBER 2023

FIGURE
2-2A



LEGEND

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- PDI SAMPLE LOCATION

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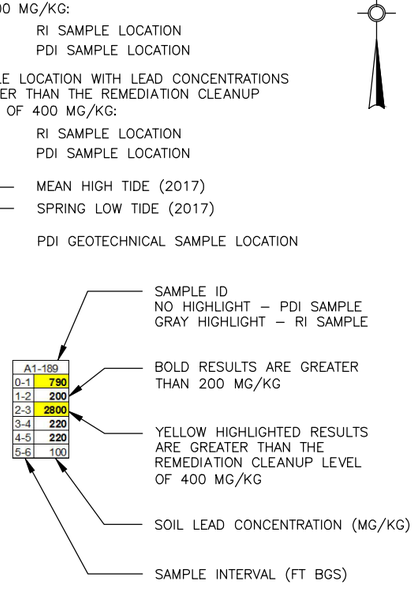
- PDI SAMPLE LOCATION

- MEAN HIGH TIDE (2017)
- SPRING LOW TIDE (2017)
- PDI GEOTECHNICAL SAMPLE LOCATION

N



FT BGS – FEET BELOW GROUND SURFACE
MG/KG – MILLIGRAMS PER KILOGRAM

NOTES:

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2. AERIAL BACKGROUND OBTAINED FROM NJDEP BUREAU OF GIS https://www.nj.gov/dep/gis/
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5. RI DATA OBTAINED FROM FINAL REMEDIAL INVESTIGATION REPORT DATED DECEMBER 2011.

50 0 50 100

(IN FEET)

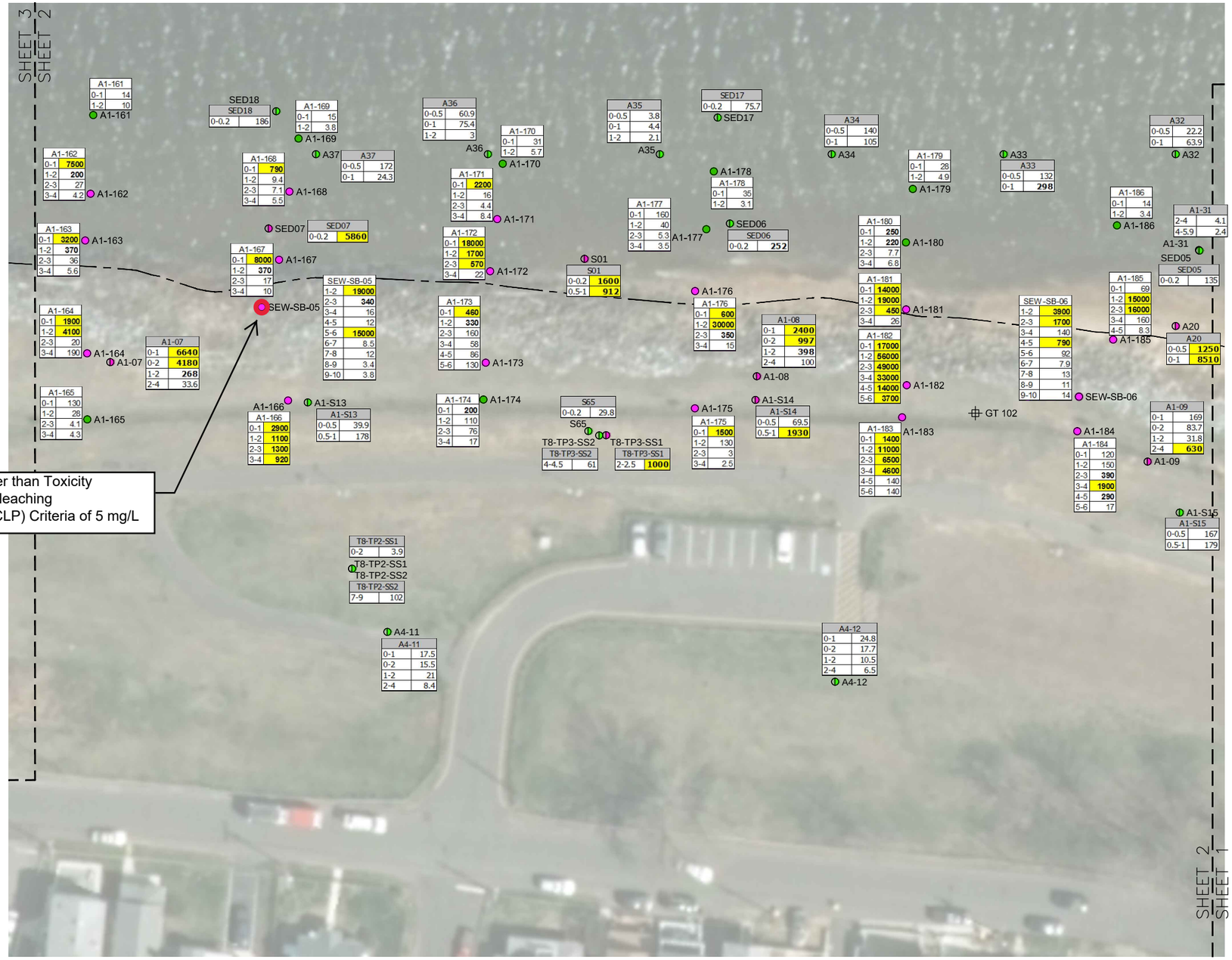
1 inch = 50 ft.

SUMMARY OF SOIL/SEDIMENT ANALYTICAL RESULTS SHEET 1

SEAWALL SECTOR
RARITAN BAY SLAG SUPERFUND SITE
OLD BRIDGE/SAYREVILLE, NEW JERSEY

DATE
SEPTEMBER 2023

FIGURE
2-2B



Results greater than Toxicity characteristic leaching procedure (TCLP) Criteria of 5 mg/L

LEGEND

SAMPLE LOCATION WITH LEAD CONCENTRATIONS LESS THAN THE REMEDIATION CLEANUP LEVEL OF 400 MG/KG:

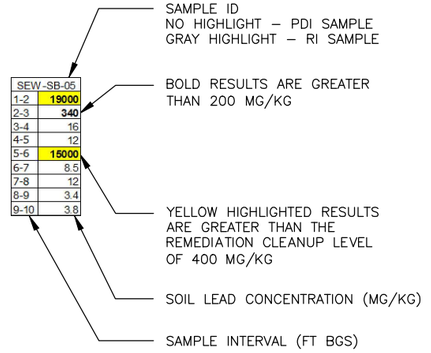
- RI SAMPLE LOCATION
- PDI SAMPLE LOCATION

SAMPLE LOCATION WITH LEAD CONCENTRATIONS GREATER THAN THE REMEDIATION CLEANUP LEVEL OF 400 MG/KG:

- RI SAMPLE LOCATION
- PDI SAMPLE LOCATION

- MEAN HIGH TIDE (2017)
- SPRING LOW TIDE (2017)
- PDI GEOTECHNICAL SAMPLE LOCATION

N



FT BGS – FEET BELOW GROUND SURFACE
MG/KG – MILLIGRAMS PER KILOGRAM

NOTES:

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5. RI DATA OBTAINED FROM FINAL REMEDIAL INVESTIGATION REPORT DATED DECEMBER 2011.

(IN FEET)
1 inch = 50 ft.

SUMMARY OF SOIL/SEDIMENT ANALYTICAL RESULTS SHEET 2

SEAWALL SECTOR
RARITAN BAY SLAG SUPERFUND SITE
OLD BRIDGE/SAYREVILLE, NEW JERSEY

DATE
SEPTEMBER 2023

FIGURE
2-2C

N

LEGEND

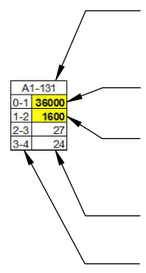
SAMPLE LOCATION WITH LEAD CONCENTRATIONS LESS THAN THE REMEDIATION CLEANUP LEVEL OF 400 MG/KG:

- RI SAMPLE LOCATION
- PDI SAMPLE LOCATION

SAMPLE LOCATION WITH LEAD CONCENTRATIONS GREATER THAN THE REMEDIATION CLEANUP LEVEL OF 400 MG/KG:

- RI SAMPLE LOCATION
- PDI SAMPLE LOCATION

- MEAN HIGH TIDE (2017)
- SPRING LOW TIDE (2017)
- PDI GEOTECHNICAL SAMPLE LOCATION



FT BGS – FEET BELOW GROUND SURFACE
MG/KG – MILLIGRAMS PER KILOGRAM

NOTES:

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5. RI DATA OBTAINED FROM FINAL REMEDIAL INVESTIGATION REPORT DATED DECEMBER 2011.

50 0 50 100

(IN FEET)
1 inch = 50 ft.

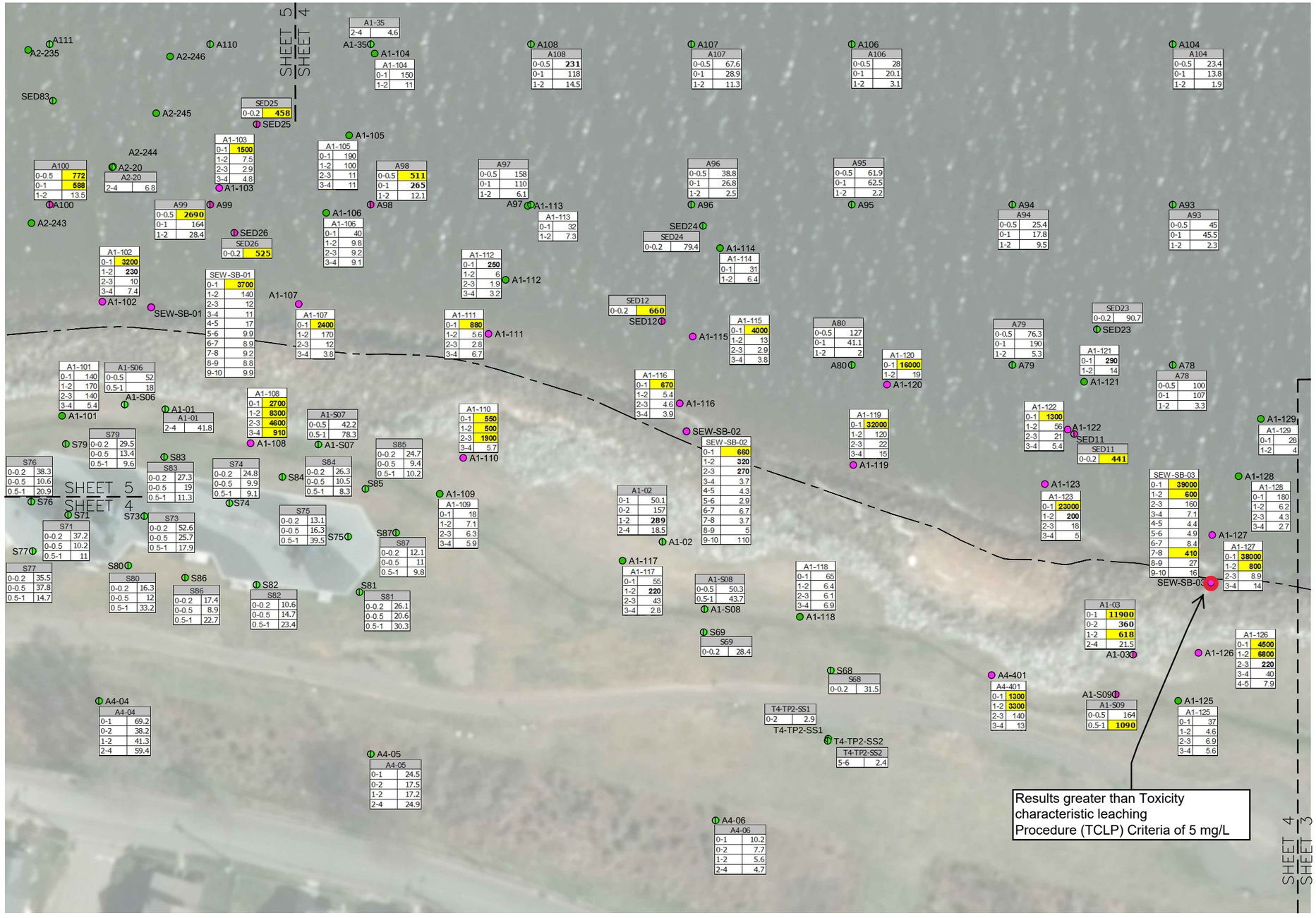
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

SUMMARY OF SOIL/SEDIMENT ANALYTICAL RESULTS SHEET 3

SEAWALL SECTOR
RARITAN BAY SLAG SUPERFUND SITE
OLD BRIDGE/SAYREVILLE, NEW JERSEY

DATE
SEPTEMBER 2023

FIGURE
2-2D



LEGEND

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- PDI SAMPLE LOCATION

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- RI SAMPLE LOCATION
- PDI SAMPLE LOCATION

MEAN HIGH TIDE (2017)

SPRING LOW TIDE (2017)

N

A1-03	
0-1	**11900**
0-2	**360**
1-2	**618**
2-4	21.5

SAMPLE ID
NO HIGHLIGHT – PDI SAMPLE
GRAY HIGHLIGHT – RI SAMPLE

BOLD RESULTS ARE GREATER THAN 200 MG/KG

YELLOW HIGHLIGHTED RESULTS ARE GREATER THAN THE REMEDIATION CLEANUP LEVEL OF 400 MG/KG

SOIL LEAD CONCENTRATION (MG/KG)

SAMPLE INTERVAL (FT BGS)

FT BGS – FEET BELOW GROUND SURFACE
MG/KG – MILLIGRAMS PER KILOGRAM

NOTES:

1. HIGHER RESULTS FROM DUPLICATE SAMPLES ARE SHOWN IN CHEMBOX.
2. AERIAL BACKGROUND OBTAINED FROM NJDEP BUREAU OF GIS https://www.nj.gov/dep/gis/
3. PDI SAMPLES COLLECTED IN JUNE AND JULY, 2018. SAMPLE LOCATIONS SURVEYED BY KENNON SURVEYING SERVICES, INC. AT THE SAME TIME.
4. TIDAL DATA OBTAINED FROM THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) TIDAL GAUGING STATION.
5. RI DATA OBTAINED FROM FINAL REMEDIAL INVESTIGATION REPORT DATED DECEMBER 2011.

50 0 50 100

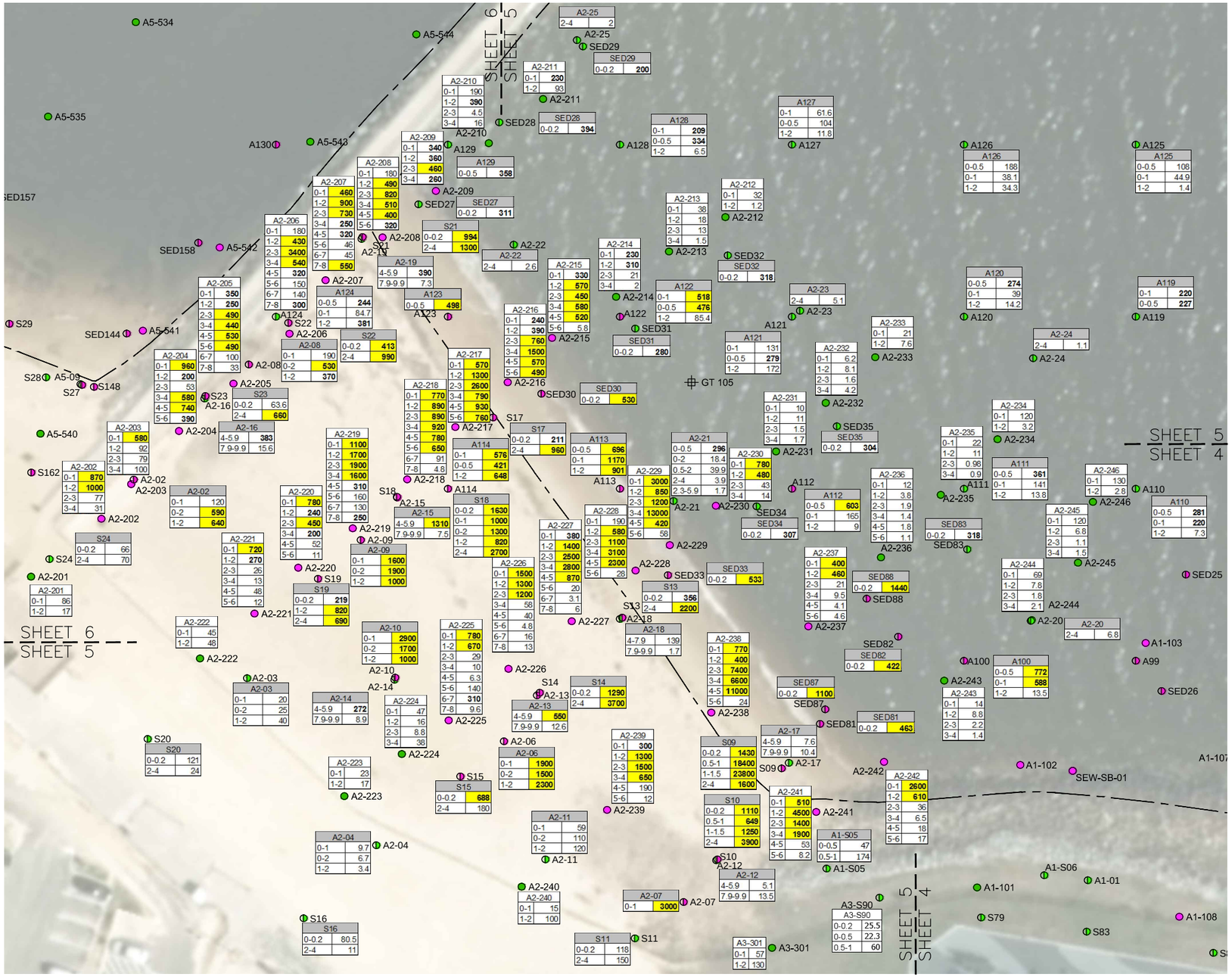
(IN FEET)
1 inch = 50 ft.

SUMMARY OF SOIL/SEDIMENT ANALYTICAL RESULTS SHEET 4

SEAWALL SECTOR
RARITAN BAY SLAG SUPERFUND SITE
OLD BRIDGE/SAYREVILLE, NEW JERSEY

DATE
SEPTEMBER 2023

FIGURE
2-2E



LEGEND

SAMPLE LOCATION WITH LEAD CONCENTRATIONS LESS THAN THE REMEDIATION CLEANUP LEVEL OF 400 MG/KG:

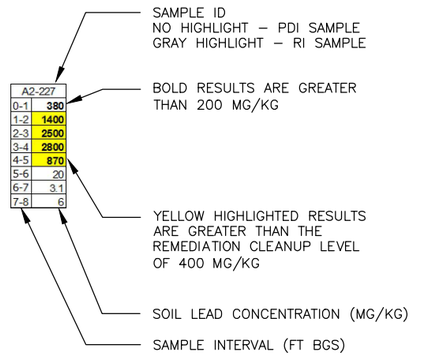
- RI SAMPLE LOCATION
- PDI SAMPLE LOCATION

SAMPLE LOCATION WITH LEAD CONCENTRATIONS GREATER THAN THE REMEDIATION CLEANUP LEVEL OF 400 MG/KG:

- RI SAMPLE LOCATION
- PDI SAMPLE LOCATION

- MEAN HIGH TIDE (2017)
- SPRING LOW TIDE (2017)
- PDI GEOTECHNICAL SAMPLE LOCATION

N



FT BGS – FEET BELOW GROUND SURFACE
MG/KG – MILLIGRAMS PER KILOGRAM

NOTES:

1. HIGHER RESULTS FROM DUPLICATE SAMPLES ARE SHOWN IN CHEMBOX.
2. AERIAL BACKGROUND OBTAINED FROM NJDEP BUREAU OF GIS https://www.nj.gov/dep/gis/
3. PDI SAMPLES COLLECTED IN JUNE AND JULY, 2018. SAMPLE LOCATIONS SURVEYED BY KENNON SURVEYING SERVICES, INC. AT THE SAME TIME.
4. TIDAL DATA OBTAINED FROM THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) TIDAL GAUGING STATION.
5. RI DATA OBTAINED FROM FINAL REMEDIAL INVESTIGATION REPORT DATED DECEMBER 2011.

50 0 50 100

(IN FEET)

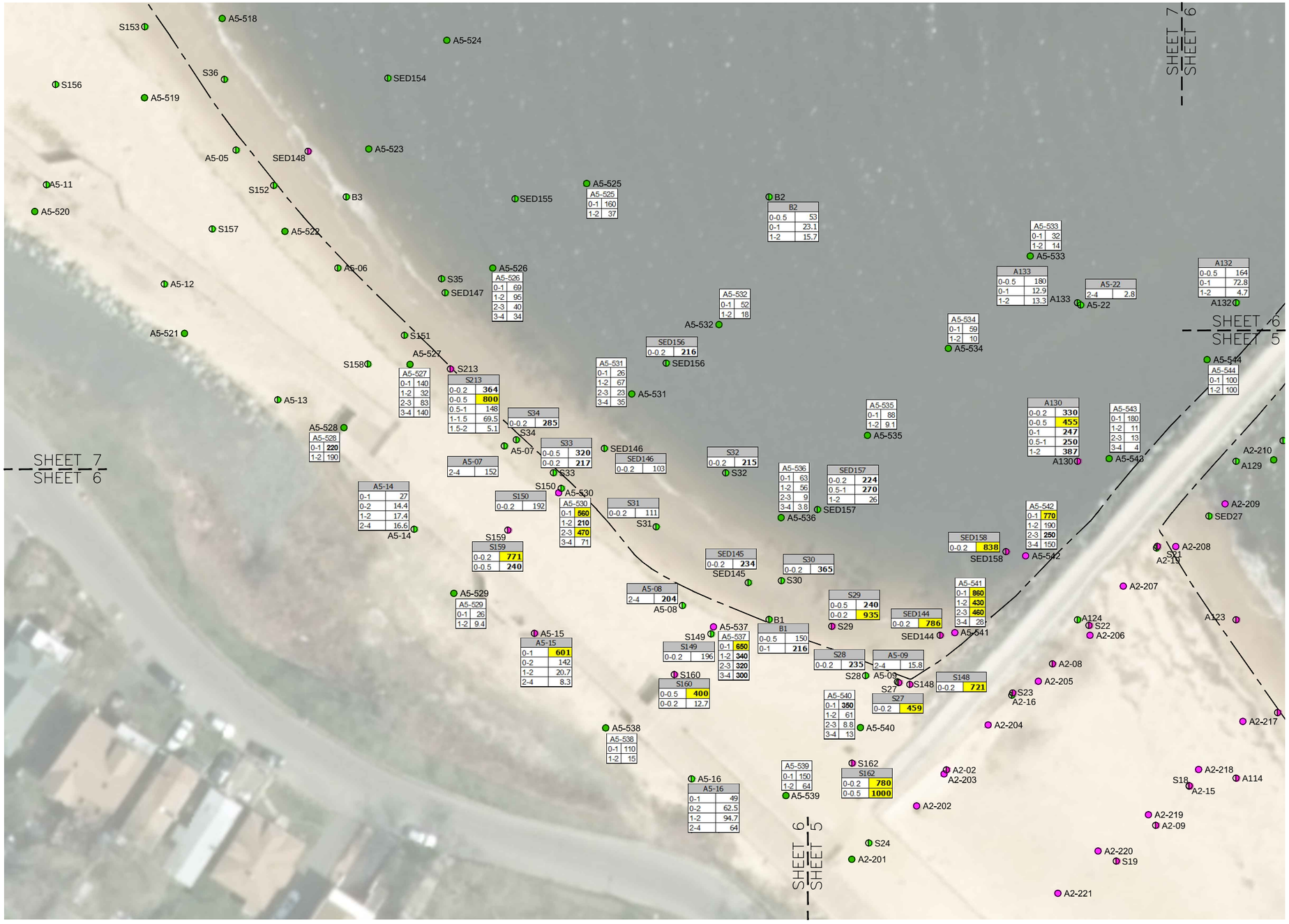
1 inch = 50 ft.

SUMMARY OF SOIL/SEDIMENT ANALYTICAL RESULTS SHEET 5

SEAWALL SECTOR
RARITAN BAY SLAG SUPERFUND SITE
OLD BRIDGE/SAYREVILLE, NEW JERSEY

DATE
SEPTEMBER 2023

FIGURE
2-2F



LEGEND

SAMPLE LOCATION WITH LEAD CONCENTRATIONS LESS THAN THE REMEDIATION CLEANUP LEVEL OF 400 MG/KG:

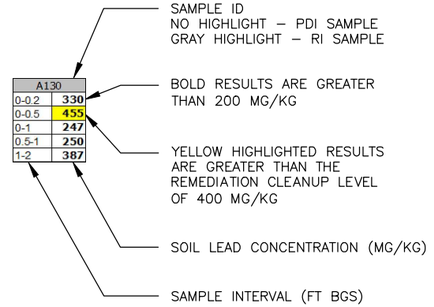
- RI SAMPLE LOCATION
- PDI SAMPLE LOCATION

SAMPLE LOCATION WITH LEAD CONCENTRATIONS GREATER THAN THE REMEDIATION CLEANUP LEVEL OF 400 MG/KG:

- RI SAMPLE LOCATION
- PDI SAMPLE LOCATION

- MEAN HIGH TIDE (2017)
- SPRING LOW TIDE (2017)

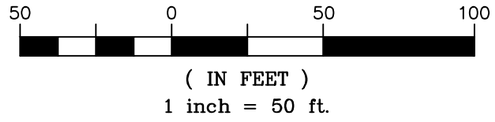
N



FT BGS – FEET BELOW GROUND SURFACE
MG/KG – MILLIGRAMS PER KILOGRAM

NOTES:

1. HIGHER RESULTS FROM DUPLICATE SAMPLES ARE SHOWN IN CHEMBOX.
2. AERIAL BACKGROUND OBTAINED FROM NJDEP BUREAU OF GIS https://www.nj.gov/dep/gis/
3. PDI SAMPLES COLLECTED IN JUNE AND JULY, 2018. SAMPLE LOCATIONS SURVEYED BY KENNON SURVEYING SERVICES, INC. AT THE SAME TIME.
4. TIDAL DATA OBTAINED FROM THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) TIDAL GAUGING STATION.
5. RI DATA OBTAINED FROM FINAL REMEDIAL INVESTIGATION REPORT DATED DECEMBER 2011.

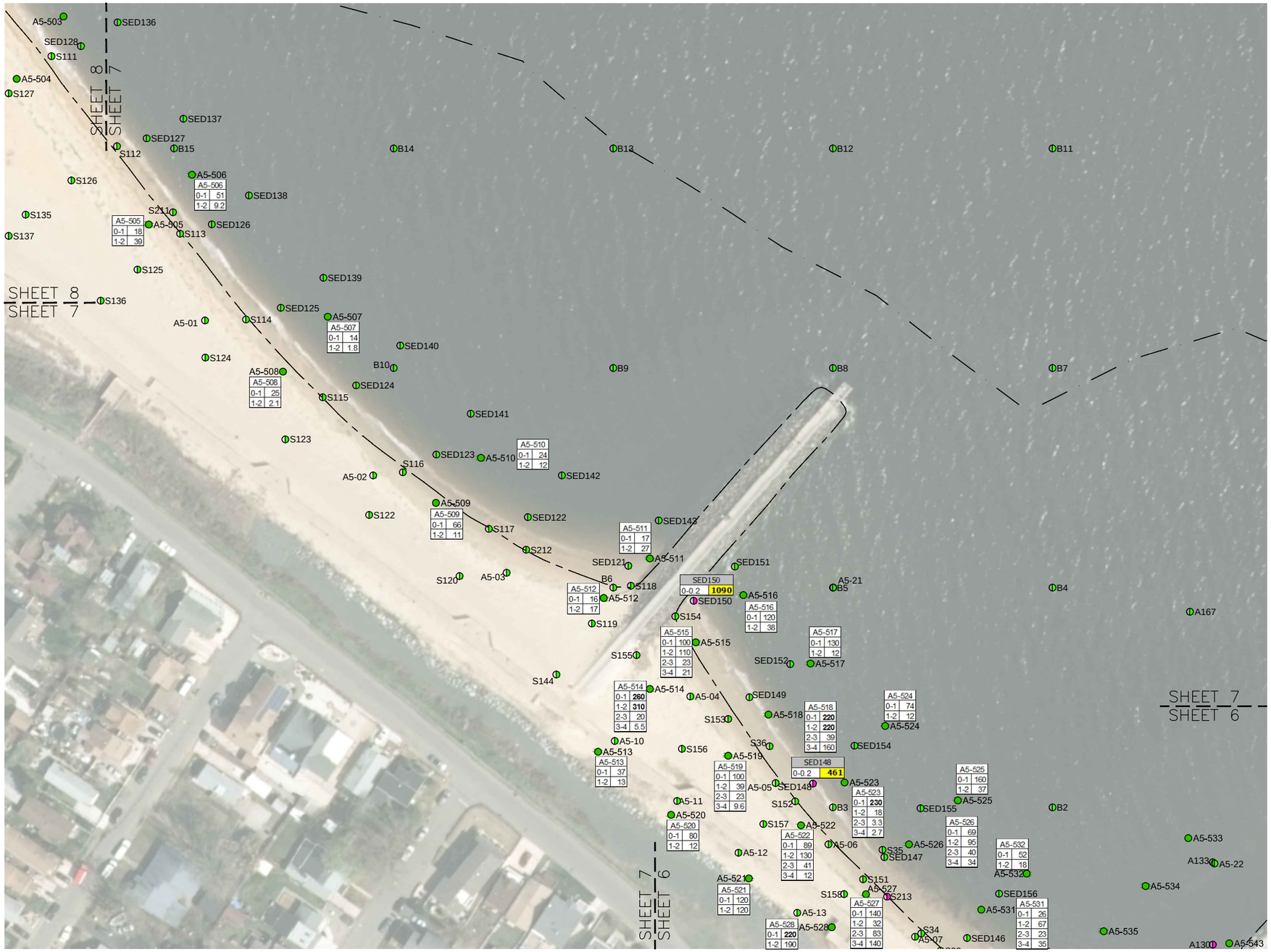


SUMMARY OF SOIL/SEDIMENT ANALYTICAL RESULTS SHEET 6

SEAWALL SECTOR
RARITAN BAY SLAG SUPERFUND SITE
OLD BRIDGE/SAYREVILLE, NEW JERSEY

DATE
SEPTEMBER 2023

FIGURE
2-2G



LEGEND

SAMPLE LOCATION WITH LEAD CONCENTRATIONS LESS THAN THE REMEDIATION CLEANUP LEVEL OF 400 MG/KG:

- RI SAMPLE LOCATION
- PDI SAMPLE LOCATION

SAMPLE LOCATION WITH LEAD CONCENTRATIONS GREATER THAN THE REMEDIATION CLEANUP LEVEL OF 400 MG/KG:

- RI SAMPLE LOCATION
- PDI SAMPLE LOCATION

- MEAN HIGH TIDE (2017)
- SPRING LOW TIDE (2017)

N

A5-523	
0-1	**230**
1-2	18
2-3	3.3
3-4	2.7

SAMPLE ID
NO HIGHLIGHT – PDI SAMPLE
GRAY HIGHLIGHT – RI SAMPLE

BOLD RESULTS ARE GREATER THAN 200 MG/KG

SOIL LEAD CONCENTRATION (MG/KG)

SAMPLE INTERVAL (FT BGS)

FT BGS – FEET BELOW GROUND SURFACE
MG/KG – MILLIGRAMS PER KILOGRAM

NOTES:

1. HIGHER RESULTS FROM DUPLICATE SAMPLES ARE SHOWN IN CHEMBOX.
2. AERIAL BACKGROUND OBTAINED FROM NJDEP BUREAU OF GIS https://www.nj.gov/dep/gis/
3. PDI SAMPLES COLLECTED IN JUNE AND JULY, 2018. SAMPLE LOCATIONS SURVEYED BY KENNON SURVEYING SERVICES, INC. AT THE SAME TIME.
4. TIDAL DATA OBTAINED FROM THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) TIDAL GAUGING STATION.
5. CHEMBOXES ARE NOT SHOWN FOR RI LOCATIONS WITH LEAD RESULTS LESS THAN THE REMEDIATION CLEANUP LEVELS OF 400 MG/KG. RI DATA OBTAINED FROM FINAL REMEDIAL INVESTIGATION REPORT DATED DECEMBER 2011.

100 0 100 200

(IN FEET)
1 inch = 100 ft.

SUMMARY OF SOIL/SEDIMENT ANALYTICAL RESULTS SHEET 7

SEAWALL SECTOR
RARITAN BAY SLAG SUPERFUND SITE
OLD BRIDGE/SAYREVILLE, NEW JERSEY

DATE
SEPTEMBER 2023

FIGURE
2-2H

N

LEGEND

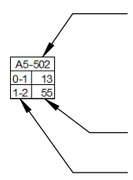
SAMPLE LOCATION WITH LEAD CONCENTRATIONS LESS THAN THE REMEDIATION CLEANUP LEVEL OF 400 MG/KG:

- RI SAMPLE LOCATION
- PDI SAMPLE LOCATION

SAMPLE LOCATION WITH LEAD CONCENTRATIONS GREATER THAN THE REMEDIATION CLEANUP LEVEL OF 400 MG/KG:

- RI SAMPLE LOCATION
- PDI SAMPLE LOCATION

- MEAN HIGH TIDE (2017)
- SPRING LOW TIDE (2017)



SAMPLE ID
NO HIGHLIGHT – PDI SAMPLE
GRAY HIGHLIGHT – RI SAMPLE

SOIL LEAD CONCENTRATION (MG/KG)

SAMPLE INTERVAL (FT BGS)

FT BGS – FEET BELOW GROUND SURFACE
MG/KG – MILLIGRAMS PER KILOGRAM

NOTES:

1. HIGHER RESULTS FROM DUPLICATE SAMPLES ARE SHOWN IN CHEMBOX.
2. AERIAL BACKGROUND OBTAINED FROM NJDEP BUREAU OF GIS https://www.nj.gov/dep/gis/
3. PDI SAMPLES COLLECTED IN JUNE AND JULY, 2018. SAMPLE LOCATIONS SURVEYED BY KENNON SURVEYING SERVICES, INC. AT THE SAME TIME.
4. TIDAL DATA OBTAINED FROM THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) TIDAL GAUGING STATION.
5. CHEMBOXES ARE NOT SHOWN FOR RI LOCATIONS WITH LEAD RESULTS LESS THAN THE REMEDIATION CLEANUP LEVELS OF 400 MG/KG. RI DATA OBTAINED FROM FINAL REMEDIAL INVESTIGATION REPORT DATED DECEMBER 2011.

100 0 100 200

(IN FEET)
1 inch = 100 ft.

SUMMARY OF SOIL/SEDIMENT ANALYTICAL RESULTS SHEET 8

SEAWALL SECTOR
RARITAN BAY SLAG SUPERFUND SITE
OLD BRIDGE/SAYREVILLE, NEW JERSEY

DATE
SEPTEMBER 2023

FIGURE
2-2I

N

LEGEND

SAMPLE LOCATION WITH LEAD CONCENTRATIONS LESS THAN THE REMEDIATION CLEANUP LEVEL OF 400 MG/KG:

- RI SAMPLE LOCATION
- PDI SAMPLE LOCATION

SAMPLE LOCATION WITH LEAD CONCENTRATIONS GREATER THAN THE REMEDIATION CLEANUP LEVEL OF 400 MG/KG:

- RI SAMPLE LOCATION
- PDI SAMPLE LOCATION

- MEAN HIGH TIDE (2017)
- SPRING LOW TIDE (2017)

A6-614
0-1 | 6.2
1-2 | 13

SAMPLE ID
NO HIGHLIGHT – PDI SAMPLE
GRAY HIGHLIGHT – RI SAMPLE

SOIL LEAD CONCENTRATION (MG/KG)

SAMPLE INTERVAL (FT BGS)

FT BGS – FEET BELOW GROUND SURFACE
MG/KG – MILLIGRAMS PER KILOGRAM

NOTES:

1. HIGHER RESULTS FROM DUPLICATE SAMPLES ARE SHOWN IN CHEMBOX.
2. AERIAL BACKGROUND OBTAINED FROM NJDEP BUREAU OF GIS https://www.nj.gov/dep/gis/
3. PDI SAMPLES COLLECTED IN JUNE AND JULY, 2018. SAMPLE LOCATIONS SURVEYED BY KENNON SURVEYING SERVICES, INC. AT THE SAME TIME.
4. TIDAL DATA OBTAINED FROM THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) TIDAL GAUGING STATION.
5. CHEMBOXES ARE NOT SHOWN FOR RI LOCATIONS WITH LEAD RESULTS LESS THAN THE REMEDIATION CLEANUP LEVELS OF 400 MG/KG. RI DATA OBTAINED FROM FINAL REMEDIAL INVESTIGATION REPORT DATED DECEMBER 2011.

100 0 100 200

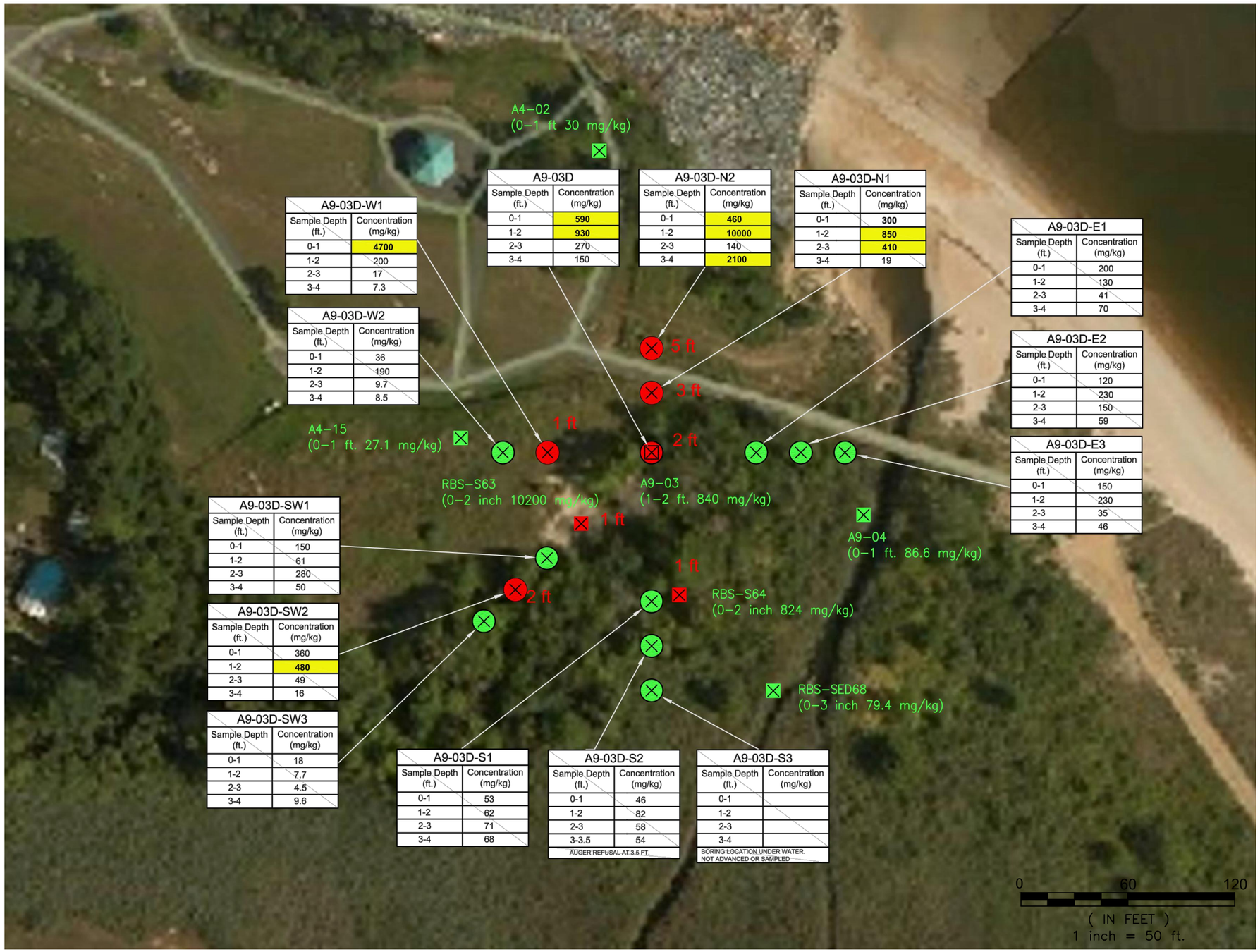
(IN FEET)
1 inch = 100 ft.

SUMMARY OF SOIL/SEDIMENT ANALYTICAL RESULTS
SHEET 9

SEAWALL SECTOR
RARITAN BAY SLAG SUPERFUND SITE
OLD BRIDGE/SAYREVILLE, NEW JERSEY

DATE
SEPTEMBER 2023

FIGURE
2-2J



A9-03D-W1	
Sample Depth (ft.)	Concentration (mg/kg)
0-1	**4700**
1-2	200
2-3	17
3-4	7.3

A9-03D-W2	
Sample Depth (ft.)	Concentration (mg/kg)
0-1	36
1-2	190
2-3	9.7
3-4	8.5

A9-03D-SW1	
Sample Depth (ft.)	Concentration (mg/kg)
0-1	150
1-2	61
2-3	280
3-4	50

A9-03D-SW2	
Sample Depth (ft.)	Concentration (mg/kg)
0-1	360
1-2	**480**
2-3	49
3-4	16

A9-03D-SW3	
Sample Depth (ft.)	Concentration (mg/kg)
0-1	18
1-2	7.7
2-3	4.5
3-4	9.6

A9-03D	
Sample Depth (ft.)	Concentration (mg/kg)
0-1	**590**
1-2	**930**
2-3	270
3-4	150

A9-03D-N2	
Sample Depth (ft.)	Concentration (mg/kg)
0-1	**460**
1-2	**10000**
2-3	140
3-4	**2100**

A9-03D-N1	
Sample Depth (ft.)	Concentration (mg/kg)
0-1	**300**
1-2	**850**
2-3	**410**
3-4	19

A9-03D-E1	
Sample Depth (ft.)	Concentration (mg/kg)
0-1	200
1-2	130
2-3	41
3-4	70

A9-03D-E2	
Sample Depth (ft.)	Concentration (mg/kg)
0-1	120
1-2	230
2-3	150
3-4	59

A9-03D-E3	
Sample Depth (ft.)	Concentration (mg/kg)
0-1	150
1-2	230
2-3	35
3-4	46

A9-03D-S1	
Sample Depth (ft.)	Concentration (mg/kg)
0-1	53
1-2	62
2-3	71
3-4	68

A9-03D-S2	
Sample Depth (ft.)	Concentration (mg/kg)
0-1	46
1-2	82
2-3	58
3-3.5	54
AUGER REFUSAL AT 3.5 FT.	

A9-03D-S3	
Sample Depth (ft.)	Concentration (mg/kg)
0-1	
1-2	
2-3	
3-4	
BORING LOCATION UNDER WATER. NOT ADVANCED OR SAMPLED	

N

PREVIOUS RI SAMPLE LOCATIONS		
SAMPLE ID	STATE PLANE NJ COORDINATES	
	NORTHING	EASTING
A4-02	591525.4470'	565285.5055'
A4-15	591364.2812'	565208.0219'
A9-03	591356.1474'	565315.0523'
A9-04	591321.1261'	565434.0037'
RBS-S63	591316.2440'	565275.3650'
RBS-S64	591276.2380'	565330.5830'
RBS-SED68	591222.4030'	565383.1510'

SAMPLE LOCATIONS		
SAMPLE ID	STATE PLANE NJ COORDINATES	
	NORTHING	EASTING
A9-03D	591356.1474'	565315.0523'
A9-03D-N1	591389.6474'	565315.0523'
A9-03D-N2	591414.6474'	565315.0523'
A9-03D-E1	591356.1474'	565373.5523'
A9-03D-E2	591356.1474'	565398.5523'
A9-03D-E3	591356.1474'	565423.5523'
A9-03D-S1	591272.6474'	565315.0523'
A9-03D-S2	591247.6474'	565315.0523'
A9-03D-S3	591222.6474'	565315.0523'
A9-03D-SW1	591296.9439'	565256.1694'
A9-03D-SW2	591279.2183'	565238.5398'
A9-03D-SW3	591261.4927'	565220.9102'
A9-03D-W1	591356.1474'	565256.5523'
A9-03D-W2	591356.1474'	565231.5523'

LEGEND:

DATA GAP SAMPLE LOCATIONS (<400 mg/kg)
A9–03D–E1

DATA GAP SAMPLE LOCATIONS (>400 mg/kg)
A9–03D–N2

PREVIOUS RI SAMPLE LOCATIONS
A9–04 (<400 mg/kg)

PREVIOUS RI SAMPLE LOCATIONS
A9–03 (>400 mg/kg)

NOTES:

1. ALL CONCENTRATIONS SHOWN ARE IN TOTAL LEAD.
2. HIGHLIGHTED, BOLD CONCENTRATIONS ARE ABOVE SITE CLEANUP LEVELS.
3. PREVIOUS RI SAMPLE RESULTS SHOWN ARE THE HIGHEST HISTORICAL CONCENTRATION FOR THE LOCATION.
4. THIS FIGURE AND DATA PRESENTED HEREIN WERE SOURCED FROM FIGURE 2 OF THE JUNE 2020 DRAFT DATA GAP INVESTIGATION REPORT (PREPARED BY ADVANCED GEOSERVICES FOR NL INDUSTRIES, INC.).

SUMMARY OF ANALYTICAL RESULTS DATA GAP INVESTIGATION (2020)

SEAWALL SECTOR
RARITAN BAY SLAG SUPERFUND SITE
OLD BRIDGE/SAYREVILLE, NEW JERSEY

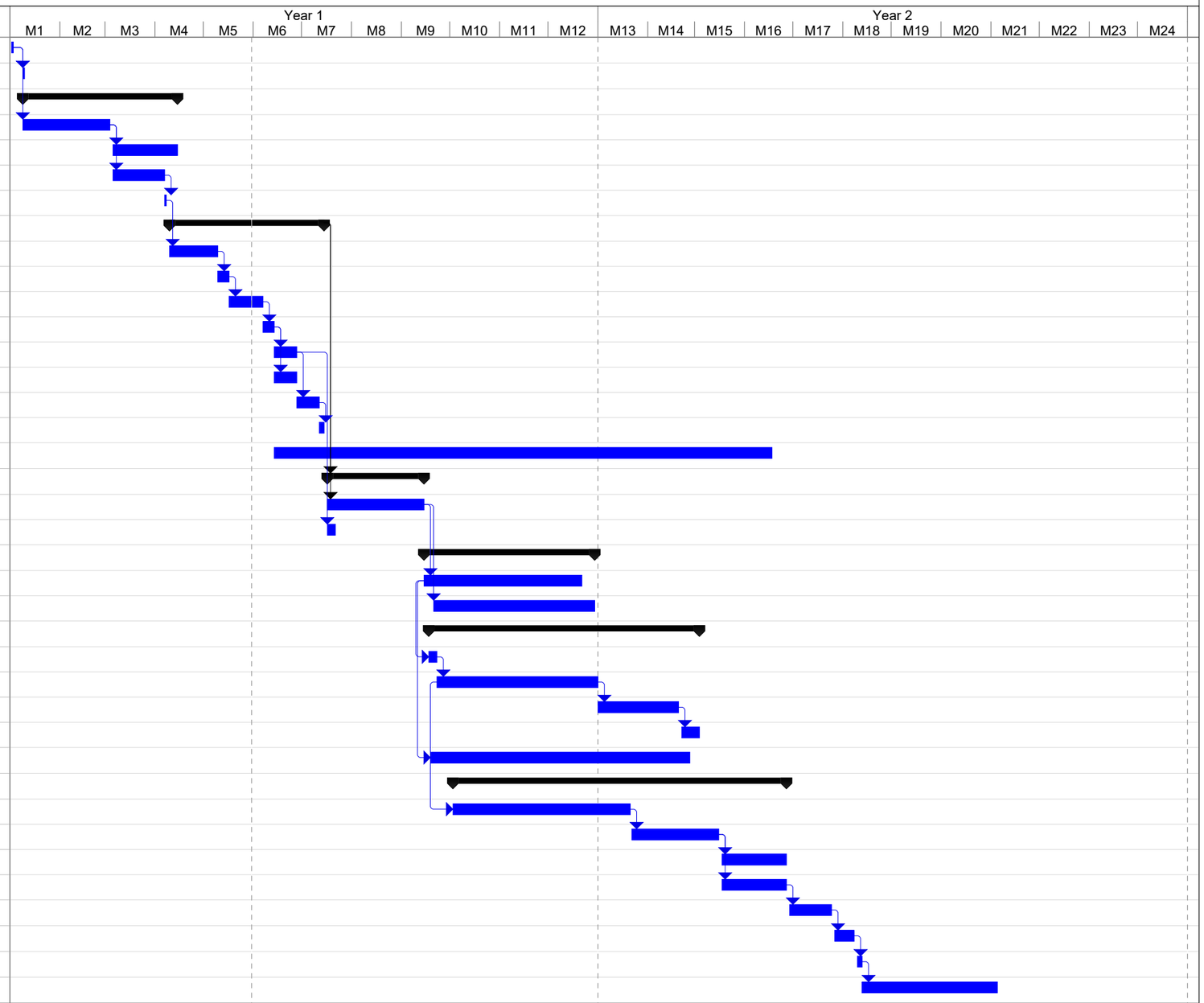
DATE
SEPTEMBER 2023

FIGURE
2-3

Figure 3-1 General Remedial Action Construction Schedule

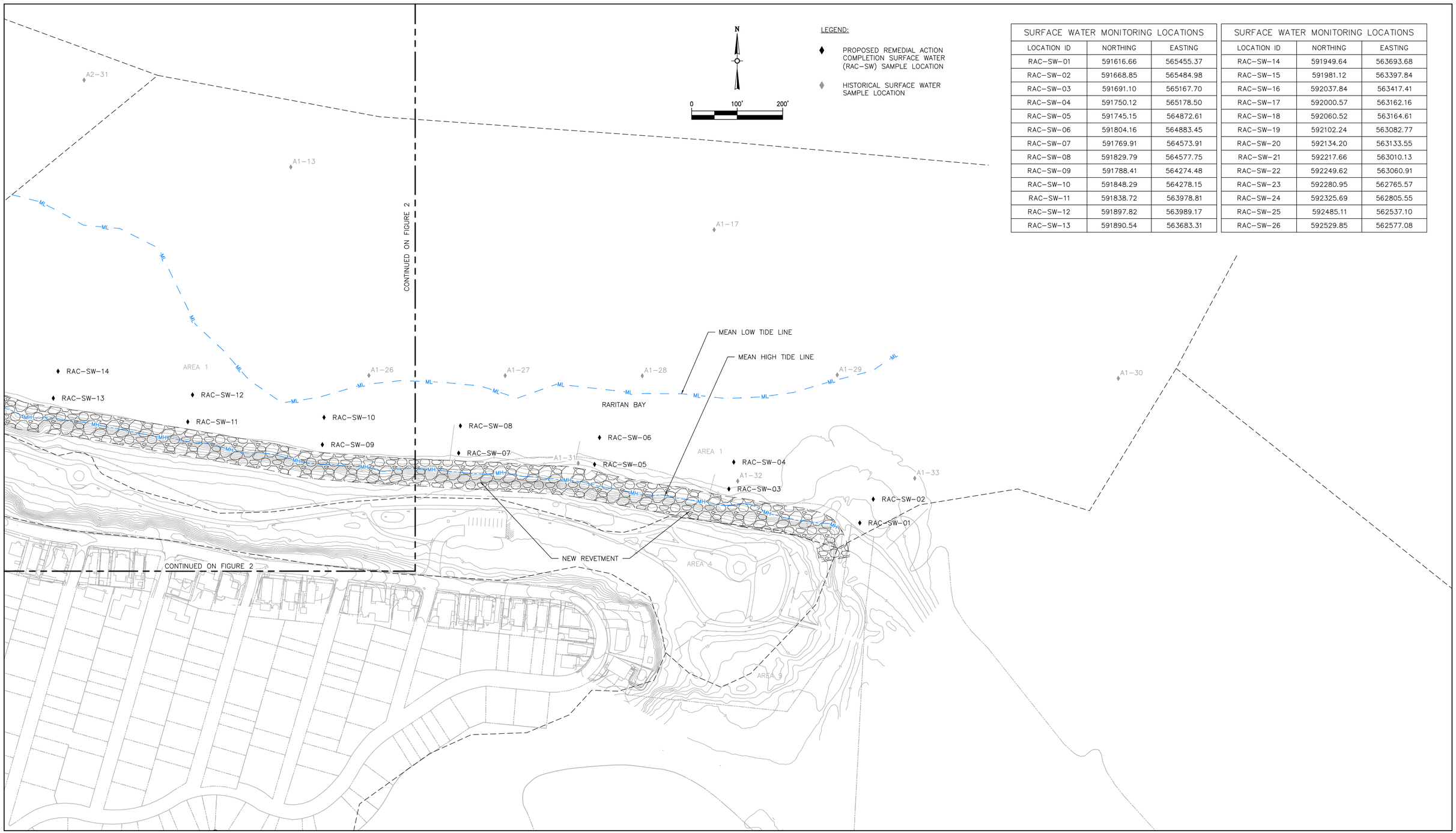
Raritan Bay Slag Superfund Site - Seawall Sector

ID	Task Name	Duration
1	**Contractor Bid Review and Approval**	**1 day**
2	**Notice to Proceed**	**1 day**
3	**Pre-Construction Activities**	**70 days**
4	Contractor Project Plans Preparation and Submittal	40 days
5	Contractor Project Plans Review and Approval	30 days
6	Permitting	24 days
7	Pre-Construction Meeting	1 day
8	**Site Preparation**	**70 days**
9	Mobilization	30 days
10	Site Security	5 days
11	Utilities Mark Out and Pre-Construction Surveys	15 days
12	Clearing and Grubbing	5 days
13	Access Road and Temporary Construction Facilities	10 days
14	Soil Erosion and Sediment Control Measures	10 days
15	Staging Area Set Up	10 days
16	Monitoring Well Decommissioning	3 days
17	**Air Monitoring**	**309 days**
18	**Dewatering**	**60 days**
19	Sheet Pile Wall Installation	60 days
20	Water Treatment Plant Set Up	5 days
21	**Removal of Riprap and Source Materials**	**106 days**
22	Removal of Slag and Riprap	98 days
23	Decontamination of Riprap	100 days
24	**Excavation, Sampling and Backfilling**	**168 days**
25	Area 9 Excavation, Sampling and Backfilling	5 days
26	Area 1 & 4 Excavation, Sampling and Backfilling	100 days
27	Area 2 & 5 and First Jetty Excavation, Sampling and Backfilling	50 days
28	Final Grading	11 days
29	**Transporation and Disposal**	**115 days**
30	**Site Restoration**	**207 days**
31	Revetment Construction	110 days
32	Sheet Pile Wall Removal	40 days
33	Tidal Wetlands and Transition Areas Restoration	30 days
34	Park & Beach Restoration	30 days
35	**Demobilization**	**20 days**
36	**Post-Construction Surveys**	**10 days**
37	**Final Inspection**	**3 days**
38	**Contractor's Final Submittals**	**60 days**



Project: Raritan Bay Slag Site - Seawall Sector
General Remedial Action Construction Schedule
Date: Wed 09/26/23

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Progress
Split	External Tasks	Inactive Summary	Manual Summary	Deadline
Milestone	External Milestone	Manual Task	Start-only
Summary	Inactive Task	Duration-only	Finish-only



SURFACE WATER MONITORING LOCATIONS		
LOCATION ID	NORTHING	EASTING
RAC-SW-01	591616.66	565455.37
RAC-SW-02	591668.85	565484.98
RAC-SW-03	591691.10	565167.70
RAC-SW-04	591750.12	565178.50
RAC-SW-05	591745.15	564872.61
RAC-SW-06	591804.16	564883.45
RAC-SW-07	591769.91	564573.91
RAC-SW-08	591829.79	564577.75
RAC-SW-09	591788.41	564274.48
RAC-SW-10	591848.29	564278.15
RAC-SW-11	591838.72	563978.81
RAC-SW-12	591897.82	563989.17
RAC-SW-13	591890.54	563683.31

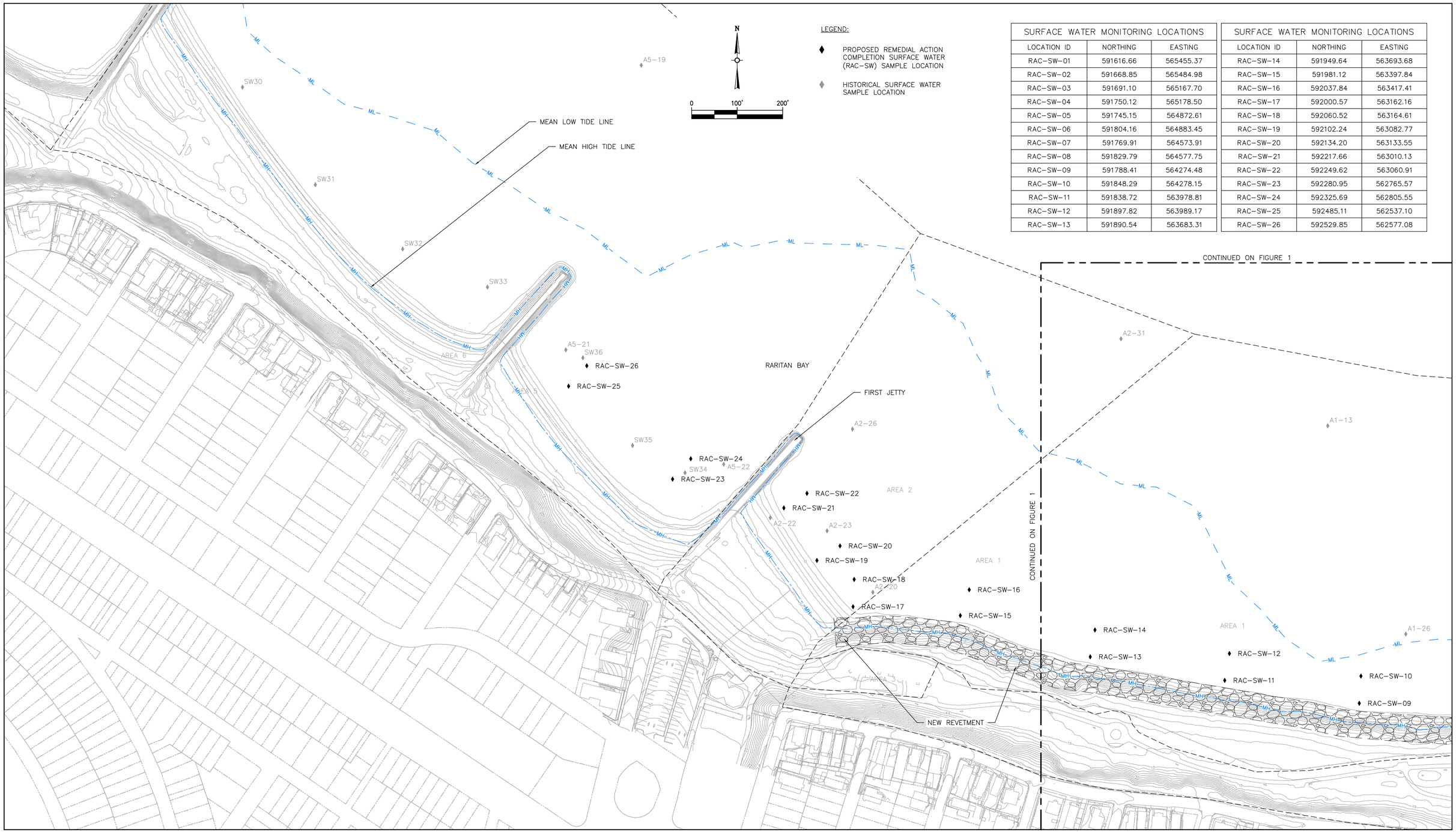
SURFACE WATER MONITORING LOCATIONS		
LOCATION ID	NORTHING	EASTING
RAC-SW-14	591949.64	563693.68
RAC-SW-15	591981.12	563397.84
RAC-SW-16	592037.84	563417.41
RAC-SW-17	592000.57	563162.16
RAC-SW-18	592060.52	563164.61
RAC-SW-19	592102.24	563082.77
RAC-SW-20	592134.20	563133.55
RAC-SW-21	592217.66	563010.13
RAC-SW-22	592249.62	563060.91
RAC-SW-23	592280.95	562765.57
RAC-SW-24	592325.69	562805.55
RAC-SW-25	592485.11	562537.10
RAC-SW-26	592529.85	562577.08

SURFACE WATER MONITORING LOCATIONS SHEET-1

SEAWALL SECTOR
RARITAN BAY SLAG SUPERFUND SITE
TOWNSHIPS OF OLD BRIDGE/SAYERVILLE NEW JERSEY

DATE
SEPTEMBER 2023

FIGURE
3-2A



SURFACE WATER MONITORING LOCATIONS		
LOCATION ID	NORTHING	EASTING
RAC-SW-01	591616.66	565455.37
RAC-SW-02	591668.85	565484.98
RAC-SW-03	591691.10	565167.70
RAC-SW-04	591750.12	565178.50
RAC-SW-05	591745.15	564872.61
RAC-SW-06	591804.16	564883.45
RAC-SW-07	591769.91	564573.91
RAC-SW-08	591829.79	564577.75
RAC-SW-09	591788.41	564274.48
RAC-SW-10	591848.29	564278.15
RAC-SW-11	591838.72	563978.81
RAC-SW-12	591897.82	563989.17
RAC-SW-13	591890.54	563683.31

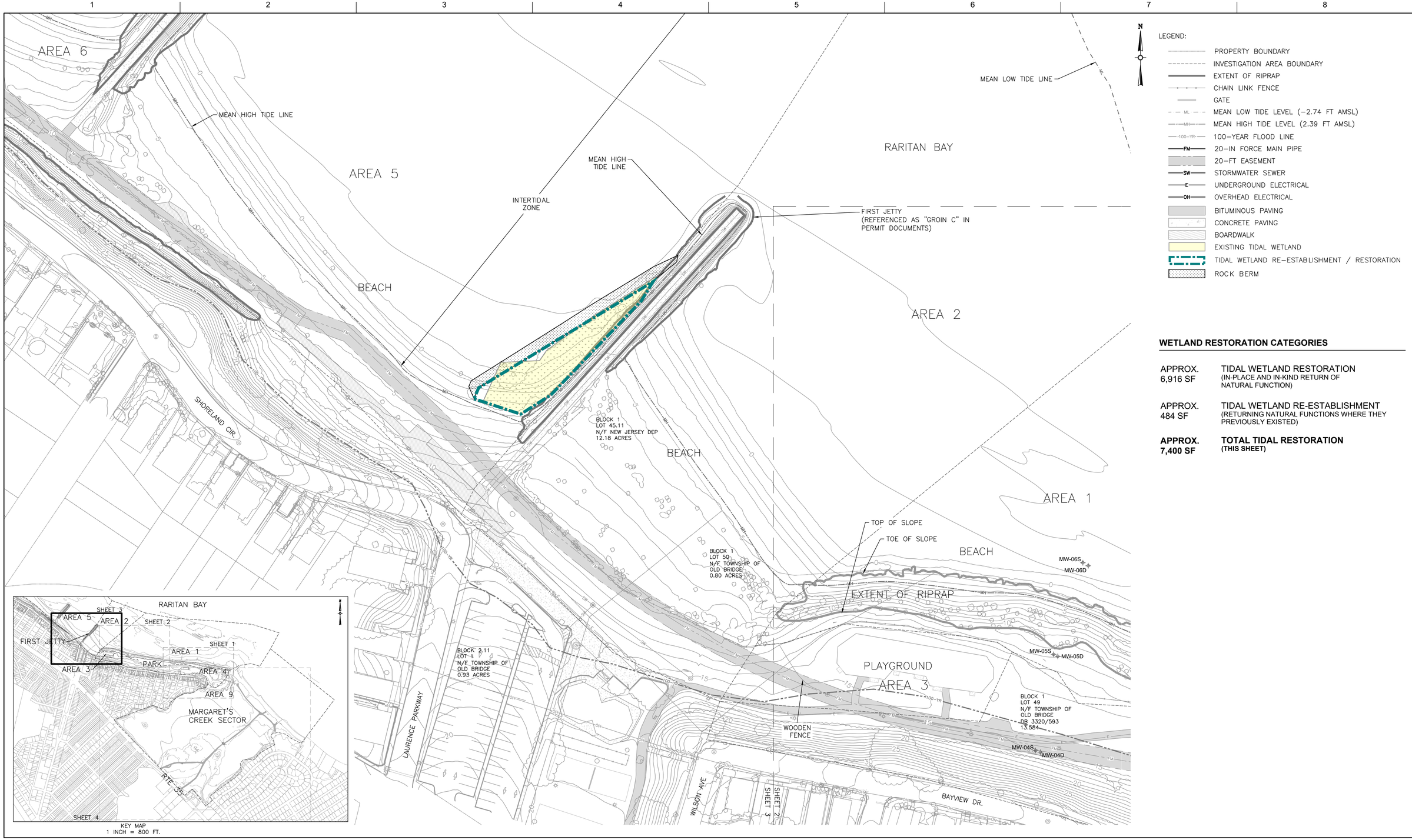
SURFACE WATER MONITORING LOCATIONS		
LOCATION ID	NORTHING	EASTING
RAC-SW-14	591949.64	563693.68
RAC-SW-15	591981.12	563397.84
RAC-SW-16	592037.84	563417.41
RAC-SW-17	592000.57	563162.16
RAC-SW-18	592060.52	563164.61
RAC-SW-19	592102.24	563082.77
RAC-SW-20	592134.20	563133.55
RAC-SW-21	592217.66	563010.13
RAC-SW-22	592249.62	563060.91
RAC-SW-23	592280.95	562765.57
RAC-SW-24	592325.69	562805.55
RAC-SW-25	592485.11	562537.10
RAC-SW-26	592529.85	562577.08

SURFACE WATER MONITORING LOCATIONS SHEET - 2

SEAWALL SECTOR
RARITAN BAY SLAG SUPERFUND SITE
TOWNSHIPS OF OLD BRIDGE/SAYERVILLE NEW JERSEY

DATE
SEPTEMBER 2023

FIGURE
3-2B



WETLAND RESTORATION CATEGORIES

APPROX. 6,916 SF	TIDAL WETLAND RESTORATION (IN-PLACE AND IN-KIND RETURN OF NATURAL FUNCTION)
APPROX. 484 SF	TIDAL WETLAND RE-ESTABLISHMENT (RETURNING NATURAL FUNCTIONS WHERE THEY PREVIOUSLY EXISTED)
APPROX. 7,400 SF	**TOTAL TIDAL RESTORATION (THIS SHEET)**

HDR APTIM
a Joint Venture

ISSUE	DATE	DESCRIPTION
3	05/31/23	FINAL DESIGN
2	10/14/22	PRE−FINAL DESIGN
1	05/30/22	INTERMEDIATE DESIGN
0	03/30/19	PRELIMINARY DESIGN

PROJECT MANAGER	T. CONNORS
PROJECT NUMBER	10337755

SEAWALL SECTOR
RARITAN BAY SLAG SUPERFUND SITE
TOWNSHIPS OF OLD BRIDGE/SAYREVILLE NEW JERSEY

Figure 4-1A
OVERLAY OF EXISTING WETLANDS AND IN-PLACE RESTORATION AND RE-ESTABLISHMENT

0 50 100
(IN FEET)
1 INCH = 50 FT.

FILENAME
SCALE
SHEET 1

WETLAND RESTORATION CATEGORIES

APPROX, 4,328 SF	TIDAL WETLAND RESTORATION (IN-PLACE AND IN-KIND RETURN OF NATURAL FUNCTION)
APPROX. 8,280 SF	TIDAL WETLAND RE-ESTABLISHMENT (RETURNING NATURAL FUNCTIONS WHERE THEY PREVIOUSLY EXISTED)
APPROX. 2,600 SF	FRESHWATER WETLAND RESTORATION (IN-PLACE AND IN-KIND RETURN OF NATURAL FUNCTION)
APPROX 18,984 SF	FRESHWATER WETLAND PRESERVATION (PROTECTED DURING CONSTRUCTION)
12,608 SF	**TOTAL TIDAL RESTORATION (THIS SHEET)**
2,600 SF	**TOTAL FRESHWATER RESTORATION (THIS SHEET)**

HDR APTIM
a Joint Venture

ISSUE	DATE	DESCRIPTION
2	05/31/23	FINAL DESIGN
1	10/14/22	PRE−FINAL DESIGN
0	05/30/22	INTERMEDIATE DESIGN

PROJECT MANAGER T. CONNORS
PROJECT NUMBER 10337755

SEAWALL SECTOR
RARITAN BAY SLAG SUPERFUND SITE
TOWNSHIPS OF OLD BRIDGE/SAYREVILLE NEW JERSEY

Figure 4-1B
OVERLAY OF EXISTING WETLANDS AND IN-PLACE RESTORATION AND RE-ESTABLISHMENT

0 50 100
(IN FEET)
1 INCH = 50 FT.

FILENAME
SCALE
SHEET 2

TABLES

Table 2-1
Soil, Sediment and Surface Water Cleanup Levels
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

Medium	COC	Cleanup Level	Unit
Soil and Sediment	Lead	400	mg/kg
Surface Water	Arsenic	36	µg/l
	Copper	3.1	µg/l
	Iron	1000	µg/l
	Lead	24	µg/l
	Manganese	120	µg/l
	Vanadium	20	µg/l
	Zinc	81	µg/l

Notes:

COC – chemical of concern

µg/l – microgram per liter

mg/kg – milligram per kilogram

Cleanup levels for COCs are established in the May 2013 Record of Decision, Table 5-2.

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
Area 1								
A1-101	A1-101-0-1	N	6/28/2018	0	1	mg/kg	140	
A1-101	A1-101-1-2	N	6/28/2018	1	2	mg/kg	170	
A1-101	A1-101-2-3	N	6/28/2018	2	3	mg/kg	140	
A1-101	A1-101-3-4	N	6/28/2018	3	4	mg/kg	5.4	
A1-102	A1-102-0-1	N	7/5/2018	0	1	mg/kg	**3200**	
A1-102	A1-102-1-2	N	7/5/2018	1	2	mg/kg	**230**	
A1-102	A1-102-2-3	N	7/5/2018	2	3	mg/kg	10	
A1-102	A1-102-2-3-1	FD	7/5/2018	2	3	mg/kg	4.7	
A1-102	A1-102-3-4	N	7/5/2018	3	4	mg/kg	7.4	
A1-103	A1-103-0-1	N	7/5/2018	0	1	mg/kg	**1500**	
A1-103	A1-103-1-2	N	7/5/2018	1	2	mg/kg	4.8	
A1-103	A1-103-1-2-1	FD	7/5/2018	1	2	mg/kg	7.5	
A1-103	A1-103-2-3	N	7/5/2018	2	3	mg/kg	2.9	
A1-103	A1-103-3-4	N	7/5/2018	3	4	mg/kg	4.8	
A1-104	A1-104-0-1	N	7/9/2018	0	1	mg/kg	150	
A1-104	A1-104-1-2	N	7/9/2018	1	2	mg/kg	11	
A1-105	A1-105-0-1	N	7/9/2018	0	1	mg/kg	190	
A1-105	A1-105-1-2	N	7/9/2018	1	2	mg/kg	100	
A1-105	A1-105-1-2-1	FD	7/9/2018	1	2	mg/kg	52	
A1-105	A1-105-2-3	N	7/9/2018	2	3	mg/kg	11	
A1-105	A1-105-3-4	N	7/9/2018	3	4	mg/kg	11	
A1-106	A1-106-0-1	N	7/6/2018	0	1	mg/kg	40	
A1-106	A1-106-1-2	N	7/6/2018	1	2	mg/kg	9.8	
A1-106	A1-106-2-3	N	7/6/2018	2	3	mg/kg	9.2	
A1-106	A1-106-3-4	N	7/6/2018	3	4	mg/kg	9.1	
A1-107	A1-107-0-1	N	7/5/2018	0	1	mg/kg	**2400**	
A1-107	A1-107-1-2	N	7/5/2018	1	2	mg/kg	170	
A1-107	A1-107-2-3	N	7/5/2018	2	3	mg/kg	12	
A1-107	A1-107-2-3-1	FD	7/5/2018	2	3	mg/kg	4.7	
A1-107	A1-107-3-4	N	7/5/2018	3	4	mg/kg	3.8	
A1-108	A1-108-0-1	N	6/28/2018	0	1	mg/kg	**2700**	
A1-108	A1-108-1-2	N	6/28/2018	1	2	mg/kg	**8300**	
A1-108	A1-108-2-3	N	6/28/2018	2	3	mg/kg	**4600**	
A1-108	A1-108-3-4	N	6/28/2018	3	4	mg/kg	**910**	
A1-109	A1-109-0-1	N	6/28/2018	0	1	mg/kg	18	
A1-109	A1-109-1-2	N	6/28/2018	1	2	mg/kg	7.1	
A1-109	A1-109-2-3	N	6/28/2018	2	3	mg/kg	6.3	
A1-109	A1-109-3-4	N	6/28/2018	3	4	mg/kg	5.9	
A1-110	A1-110-0-1	N	6/28/2018	0	1	mg/kg	**550**	
A1-110	A1-110-1-2	N	6/28/2018	1	2	mg/kg	**500**	
A1-110	A1-110-2-3	N	6/28/2018	2	3	mg/kg	**1900**	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A1-110	A1-110-3-4	N	6/28/2018	3	4	mg/kg	5.7	
A1-111	A1-111-0-1	N	7/5/2018	0	1	mg/kg	**880**	
A1-111	A1-111-1-2	N	7/5/2018	1	2	mg/kg	5.6	
A1-111	A1-111-2-3	N	7/5/2018	2	3	mg/kg	2.8	
A1-111	A1-111-3-4	N	7/5/2018	3	4	mg/kg	6.7	
A1-112	A1-112-0-1	N	7/6/2018	0	1	mg/kg	**250**	
A1-112	A1-112-1-2	N	7/6/2018	1	2	mg/kg	6	
A1-112	A1-112-2-3	N	7/6/2018	2	3	mg/kg	1.9	
A1-112	A1-112-3-4	N	7/6/2018	3	4	mg/kg	3.2	
A1-113	A1-113-0-1	N	7/10/2018	0	1	mg/kg	32	
A1-113	A1-113-1-2	N	7/10/2018	1	2	mg/kg	2.1	
A1-113	A1-113-1-2-1	FD	7/10/2018	1	2	mg/kg	7.3	
A1-114	A1-114-0-1	N	7/10/2018	0	1	mg/kg	31	
A1-114	A1-114-1-2	N	7/10/2018	1	2	mg/kg	6.4	
A1-115	A1-115-0-1	N	7/6/2018	0	1	mg/kg	**4000**	
A1-115	A1-115-0-1-1	FD	7/6/2018	0	1	mg/kg	**1100**	
A1-115	A1-115-1-2	N	7/6/2018	1	2	mg/kg	13	
A1-115	A1-115-2-3	N	7/6/2018	2	3	mg/kg	2.9	
A1-115	A1-115-3-4	N	7/6/2018	3	4	mg/kg	3.8	
A1-116	A1-116-0-1	N	7/5/2018	0	1	mg/kg	**670**	
A1-116	A1-116-1-2	N	7/5/2018	1	2	mg/kg	5.4	
A1-116	A1-116-2-3	N	7/5/2018	2	3	mg/kg	4.6	
A1-116	A1-116-3-4	N	7/5/2018	3	4	mg/kg	3.9	
A1-117	A1-117-0-1	N	6/28/2018	0	1	mg/kg	55	
A1-117	A1-117-1-2	N	6/28/2018	1	2	mg/kg	**220**	
A1-117	A1-117-2-3	N	6/28/2018	2	3	mg/kg	43	
A1-117	A1-117-3-4	N	6/28/2018	3	4	mg/kg	2.8	
A1-118	A1-118-0-1	N	6/28/2018	0	1	mg/kg	65	
A1-118	A1-118-1-2	N	6/28/2018	1	2	mg/kg	6.4	
A1-118	A1-118-2-3	N	6/28/2018	2	3	mg/kg	6.1	
A1-118	A1-118-3-4	N	6/28/2018	3	4	mg/kg	6.9	
A1-119	A1-119-0-1	N	7/9/2018	0	1	mg/kg	**32000**	
A1-119	A1-119-1-2	N	7/9/2018	1	2	mg/kg	120	
A1-119	A1-119-2-3	N	7/9/2018	2	3	mg/kg	22	
A1-119	A1-119-3-4	N	7/9/2018	3	4	mg/kg	15	
A1-120	A1-120-0-1	N	7/9/2018	0	1	mg/kg	**16000**	
A1-120	A1-120-1-2	N	7/9/2018	1	2	mg/kg	19	
A1-121	A1-121-0-1	N	7/12/2018	0	1	mg/kg	**290**	
A1-121	A1-121-1-2	N	7/12/2018	1	2	mg/kg	14	
A1-122	A1-122-0-1	N	7/10/2018	0	1	mg/kg	**1300**	
A1-122	A1-122-1-2	N	7/10/2018	1	2	mg/kg	56	
A1-122	A1-122-2-3	N	7/10/2018	2	3	mg/kg	21	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A1-122	A1-122-3-4	N	7/10/2018	3	4	mg/kg	5.4	
A1-123	A1-123-0-1	N	7/9/2018	0	1	mg/kg	**23000**	
A1-123	A1-123-1-2	N	7/9/2018	1	2	mg/kg	**200**	
A1-123	A1-123-2-3	N	7/9/2018	2	3	mg/kg	18	
A1-123	A1-123-3-4	N	7/9/2018	3	4	mg/kg	5	
A1-125	A1-125-0-1	N	6/29/2018	0	1	mg/kg	37	
A1-125	A1-125-1-2	N	6/29/2018	1	2	mg/kg	4.6	
A1-125	A1-125-2-3	N	6/29/2018	2	3	mg/kg	6.9	
A1-125	A1-125-3-4	N	6/29/2018	3	4	mg/kg	5.6	
A1-126	A1-126-0-1	N	6/29/2018	0	1	mg/kg	**4500**	
A1-126	A1-126-1-2	N	6/29/2018	1	2	mg/kg	**6800**	
A1-126	A1-126-2-3	N	6/29/2018	2	3	mg/kg	**220**	
A1-126	A1-126-3-4	N	6/29/2018	3	4	mg/kg	40	
A1-126	A1-126-4-5	N	6/29/2018	4	5	mg/kg	7.2	
A1-126	A1-126-4-5-1	FD	6/29/2018	4	5	mg/kg	7.9	
A1-127	A1-127-0-1	N	7/10/2018	0	1	mg/kg	**38000**	
A1-127	A1-127-1-2	N	7/10/2018	1	2	mg/kg	**800**	
A1-127	A1-127-2-3	N	7/10/2018	2	3	mg/kg	8.9	
A1-127	A1-127-3-4	N	7/10/2018	3	4	mg/kg	14	
A1-128	A1-128-0-1	N	7/9/2018	0	1	mg/kg	180	
A1-128	A1-128-1-2	N	7/9/2018	1	2	mg/kg	6.2	
A1-128	A1-128-2-3	N	7/9/2018	2	3	mg/kg	4.3	
A1-128	A1-128-3-4	N	7/9/2018	3	4	mg/kg	2.7	
A1-129	A1-129-0-1	N	7/12/2018	0	1	mg/kg	28	
A1-129	A1-129-1-2	N	7/12/2018	1	2	mg/kg	4	
A1-130	A1-130-0-1	N	7/12/2018	0	1	mg/kg	43	
A1-130	A1-130-1-2	N	7/12/2018	1	2	mg/kg	2.9	
A1-130	A1-130-1-2-1	FD	7/12/2018	1	2	mg/kg	3.3	
A1-131	A1-131-0-1	N	7/10/2018	0	1	mg/kg	**36000**	
A1-131	A1-131-1-2	N	7/10/2018	1	2	mg/kg	**1600**	
A1-131	A1-131-2-3	N	7/10/2018	2	3	mg/kg	27	
A1-131	A1-131-3-4	N	7/10/2018	3	4	mg/kg	24	
A1-132	A1-132-0-1	N	6/29/2018	0	1	mg/kg	120	
A1-132	A1-132-1-2	N	6/29/2018	1	2	mg/kg	76	
A1-132	A1-132-2-3	N	6/29/2018	2	3	mg/kg	49	
A1-132	A1-132-3-4	N	6/29/2018	3	4	mg/kg	39	
A1-133	A1-133-0-1	N	6/29/2018	0	1	mg/kg	8.9	
A1-133	A1-133-1-2	N	6/29/2018	1	2	mg/kg	9.1	
A1-133	A1-133-2-3	N	6/29/2018	2	3	mg/kg	5.6	
A1-133	A1-133-3-4	N	6/29/2018	3	4	mg/kg	11	
A1-134	A1-134-0-1	N	6/29/2018	0	1	mg/kg	11	
A1-134	A1-134-1-2	N	6/29/2018	1	2	mg/kg	2.7	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A1-134	A1-134-2-3	N	6/29/2018	2	3	mg/kg	1.6	
A1-134	A1-134-3-4	N	6/29/2018	3	4	mg/kg	9.8	
A1-135	A1-135-0-1	N	6/29/2018	0	1	mg/kg	71	
A1-135	A1-135-1-2	N	6/29/2018	1	2	mg/kg	97	
A1-135	A1-135-2-3	N	6/29/2018	2	3	mg/kg	**210**	
A1-135	A1-135-3-4	N	6/29/2018	3	4	mg/kg	6.1	
A1-136	A1-136-0-1	N	7/11/2018	0	1	mg/kg	**12000**	
A1-136	A1-136-1-2	N	7/11/2018	1	2	mg/kg	48	
A1-136	A1-136-2-3	N	7/11/2018	2	3	mg/kg	15	
A1-136	A1-136-3-4	N	7/11/2018	3	4	mg/kg	4	
A1-137	A1-137-0-1	N	7/12/2018	0	1	mg/kg	42	
A1-137	A1-137-1-2	N	7/12/2018	1	2	mg/kg	4.4	
A1-138	A1-138-0-1	N	7/13/2018	0	1	mg/kg	12	
A1-138	A1-138-1-2	N	7/13/2018	1	2	mg/kg	4.3	
A1-139	A1-139-0-1	N	7/9/2018	0	1	mg/kg	**300**	
A1-139	A1-139-1-2	N	7/9/2018	1	2	mg/kg	5.2	
A1-139	A1-139-2-3	N	7/9/2018	2	3	mg/kg	3.2	
A1-139	A1-139-3-4	N	7/9/2018	3	4	mg/kg	3	
A1-140	A1-140-0-1	N	7/11/2018	0	1	mg/kg	**23000**	
A1-140	A1-140-1-2	N	7/11/2018	1	2	mg/kg	**9400**	
A1-140	A1-140-2-3	N	7/11/2018	2	3	mg/kg	**2400**	
A1-140	A1-140-3-4	N	7/11/2018	3	4	mg/kg	98	
A1-140	A1-140-3-4-1	FD	7/11/2018	3	4	mg/kg	96	
A1-141	A1-141-0-1	N	6/29/2018	0	1	mg/kg	**2200**	
A1-141	A1-141-1-2	N	6/29/2018	1	2	mg/kg	68	
A1-141	A1-141-2-3	N	6/29/2018	2	3	mg/kg	15	
A1-141	A1-141-3-4	N	6/29/2018	3	4	mg/kg	21	
A1-142	A1-142-0-1	N	6/29/2018	0	1	mg/kg	12	
A1-142	A1-142-1-2	N	6/29/2018	1	2	mg/kg	3.2	
A1-142	A1-142-2-3	N	6/29/2018	2	3	mg/kg	8.8	
A1-142	A1-142-3-4	N	6/29/2018	3	4	mg/kg	6	
A1-143	A1-143-0-1	N	6/29/2018	0	1	mg/kg	20	
A1-143	A1-143-1-2	N	6/29/2018	1	2	mg/kg	18	
A1-143	A1-143-2-3	N	6/29/2018	2	3	mg/kg	11	
A1-143	A1-143-3-4	N	6/29/2018	3	4	mg/kg	13	
A1-144	A1-144-0-1	N	7/2/2018	0	1	mg/kg	12	
A1-144	A1-144-1-2	N	7/2/2018	1	2	mg/kg	6.8	
A1-144	A1-144-2-3	N	7/2/2018	2	3	mg/kg	4.2	
A1-144	A1-144-3-4	N	7/2/2018	3	4	mg/kg	8.1	
A1-144	A1-144-3-4-1	FD	7/2/2018	3	4	mg/kg	8.6	
A1-145	A1-145-0-1	N	7/2/2018	0	1	mg/kg	11	
A1-145	A1-145-1-2	N	7/2/2018	1	2	mg/kg	5.9	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A1-145	A1-145-2-3	N	7/2/2018	2	3	mg/kg	6.6	
A1-145	A1-145-2-3-1	FD	7/2/2018	2	3	mg/kg	5.2	
A1-145	A1-145-3-4	N	7/2/2018	3	4	mg/kg	5.5	
A1-146	A1-146-0-1	N	7/2/2018	0	1	mg/kg	85	
A1-146	A1-146-1-2	N	7/2/2018	1	2	mg/kg	92	
A1-146	A1-146-1-2-1	FD	7/2/2018	1	2	mg/kg	110	
A1-146	A1-146-2-3	N	7/2/2018	2	3	mg/kg	45	
A1-146	A1-146-3-4	N	7/2/2018	3	4	mg/kg	**280**	
A1-147	A1-147-0-1	N	7/11/2018	0	1	mg/kg	**410**	
A1-147	A1-147-1-2	N	7/11/2018	1	2	mg/kg	**11000**	
A1-147	A1-147-2-3	N	7/11/2018	2	3	mg/kg	82	
A1-147	A1-147-2-3-1	FD	7/11/2018	2	3	mg/kg	83	
A1-147	A1-147-3-4	N	7/11/2018	3	4	mg/kg	2.9	
A1-148	A1-148-0-1	N	7/11/2018	0	1	mg/kg	160	
A1-148	A1-148-1-2	N	7/11/2018	1	2	mg/kg	40	
A1-148	A1-148-2-3	N	7/11/2018	2	3	mg/kg	21	
A1-148	A1-148-3-4	N	7/11/2018	3	4	mg/kg	8.1	
A1-149	A1-149-0-1	N	7/11/2018	0	1	mg/kg	6.7	U
A1-149	A1-149-1-2	N	7/11/2018	1	2	mg/kg	13	
A1-150	A1-150-0-1	N	7/12/2018	0	1	mg/kg	7.2	
A1-150	A1-150-1-2	N	7/12/2018	1	2	mg/kg	10	
A1-151	A1-151A-0-1	N	7/17/2018	0	1	mg/kg	**7700**	
A1-151	A1-151A-1-2	N	7/17/2018	1	2	mg/kg	160	
A1-151	A1-151A-2-3	N	7/17/2018	2	3	mg/kg	29	
A1-151	A1-151A-3-4	N	7/17/2018	3	4	mg/kg	6	
A1-152	A1-152-0-1	N	7/11/2018	0	1	mg/kg	**26000**	
A1-152	A1-152-1-2	N	7/11/2018	1	2	mg/kg	**1200**	
A1-152	A1-152-2-3	N	7/11/2018	2	3	mg/kg	130	
A1-152	A1-152-3-4	N	7/11/2018	3	4	mg/kg	7.3	
A1-153	A1-153-0-1	N	7/2/2018	0	1	mg/kg	110	
A1-153	A1-153-1-2	N	7/2/2018	1	2	mg/kg	42	
A1-153	A1-153-2-3	N	7/2/2018	2	3	mg/kg	3	
A1-153	A1-153-3-4	N	7/2/2018	3	4	mg/kg	62	
A1-154	A1-154-0-1	N	7/2/2018	0	1	mg/kg	150	
A1-154	A1-154-1-2	N	7/2/2018	1	2	mg/kg	6.2	
A1-154	A1-154-2-3	N	7/2/2018	2	3	mg/kg	7.2	
A1-154	A1-154-3-4	N	7/2/2018	3	4	mg/kg	5.2	
A1-155	A1-155-0-1	N	7/2/2018	0	1	mg/kg	10	
A1-155	A1-155-1-2	N	7/2/2018	1	2	mg/kg	6	
A1-155	A1-155-2-3	N	7/2/2018	2	3	mg/kg	12	
A1-155	A1-155-3-4	N	7/2/2018	3	4	mg/kg	5.8	
A1-156	A1-156-0-1	N	7/2/2018	0	1	mg/kg	140	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A1-156	A1-156-1-2	N	7/2/2018	1	2	mg/kg	3.5	
A1-156	A1-156-2-3	N	7/2/2018	2	3	mg/kg	5.1	
A1-156	A1-156-3-4	N	7/2/2018	3	4	mg/kg	6.8	
A1-157	A1-157-0-1	N	7/2/2018	0	1	mg/kg	65	
A1-157	A1-157-1-2	N	7/2/2018	1	2	mg/kg	5.8	
A1-157	A1-157-2-3	N	7/2/2018	2	3	mg/kg	6.8	
A1-157	A1-157-3-4	N	7/2/2018	3	4	mg/kg	7.7	
A1-158	A1-158-0-1	N	7/11/2018	0	1	mg/kg	**800**	
A1-158	A1-158-1-2	N	7/11/2018	1	2	mg/kg	**9600**	
A1-158	A1-158-2-3	N	7/11/2018	2	3	mg/kg	25	
A1-158	A1-158-3-4	N	7/11/2018	3	4	mg/kg	9.7	
A1-159	A1-159-0-1	N	7/17/2018	0	1	mg/kg	110	
A1-159	A1-159-1-2	N	7/17/2018	1	2	mg/kg	75	
A1-159	A1-159-2-3	N	7/17/2018	2	3	mg/kg	5.9	
A1-159	A1-159-2-3-1	FD	7/17/2018	2	3	mg/kg	5.9	
A1-159	A1-159-3-4	N	7/17/2018	3	4	mg/kg	6.2	
A1-160	A1-160-0-1	N	7/12/2018	0	1	mg/kg	8.2	
A1-160	A1-160-1-2	N	7/12/2018	1	2	mg/kg	9.1	
A1-161	A1-161-0-1	N	7/12/2018	0	1	mg/kg	14	
A1-161	A1-161-1-2	N	7/12/2018	1	2	mg/kg	10	
A1-162	A1-162-0-1	N	7/12/2018	0	1	mg/kg	**7500**	
A1-162	A1-162-0-1-1	FD	7/12/2018	0	1	mg/kg	**5000**	
A1-162	A1-162-1-2	N	7/12/2018	1	2	mg/kg	**200**	
A1-162	A1-162-2-3	N	7/12/2018	2	3	mg/kg	27	
A1-162	A1-162-3-4	N	7/12/2018	3	4	mg/kg	4.2	
A1-163	A1-163-0-1	N	7/12/2018	0	1	mg/kg	**3200**	
A1-163	A1-163-1-2	N	7/12/2018	1	2	mg/kg	**370**	
A1-163	A1-163-2-3	N	7/12/2018	2	3	mg/kg	36	
A1-163	A1-163-3-4	N	7/12/2018	3	4	mg/kg	5.6	
A1-164	A1-164-0-1	N	7/2/2018	0	1	mg/kg	**1900**	
A1-164	A1-164-1-2	N	7/2/2018	1	2	mg/kg	**4100**	
A1-164	A1-164-2-3	N	7/2/2018	2	3	mg/kg	20	
A1-164	A1-164-3-4	N	7/2/2018	3	4	mg/kg	190	
A1-165	A1-165-0-1	N	7/2/2018	0	1	mg/kg	130	
A1-165	A1-165-1-2	N	7/2/2018	1	2	mg/kg	28	
A1-165	A1-165-2-3	N	7/2/2018	2	3	mg/kg	4.1	
A1-165	A1-165-3-4	N	7/2/2018	3	4	mg/kg	4.3	
A1-166	A1-166-0-1	N	7/2/2018	0	1	mg/kg	**2900**	
A1-166	A1-166-1-2	N	7/2/2018	1	2	mg/kg	**1100**	
A1-166	A1-166-2-3	N	7/2/2018	2	3	mg/kg	**1300**	
A1-166	A1-166-3-4	N	7/2/2018	3	4	mg/kg	**920**	
A1-167	A1-167-0-1	N	7/16/2018	0	1	mg/kg	**8000**	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A1-167	A1-167-1-2	N	7/16/2018	1	2	mg/kg	**370**	
A1-167	A1-167-2-3	N	7/16/2018	2	3	mg/kg	17	
A1-167	A1-167-3-4	N	7/16/2018	3	4	mg/kg	10	
A1-168	A1-168-0-1	N	7/16/2018	0	1	mg/kg	**790**	
A1-168	A1-168-1-2	N	7/16/2018	1	2	mg/kg	9.4	
A1-168	A1-168-2-3	N	7/16/2018	2	3	mg/kg	7.1	
A1-168	A1-168-2-3-1	FD	7/16/2018	2	3	mg/kg	6.9	
A1-168	A1-168-3-4	N	7/16/2018	3	4	mg/kg	5.5	
A1-169	A1-169-0-1	N	7/12/2018	0	1	mg/kg	15	
A1-169	A1-169-1-2	N	7/12/2018	1	2	mg/kg	3.8	
A1-170	A1-170-0-1	N	7/12/2018	0	1	mg/kg	31	
A1-170	A1-170-1-2	N	7/12/2018	1	2	mg/kg	5.7	
A1-171	A1-171-0-1	N	7/16/2018	0	1	mg/kg	**2200**	
A1-171	A1-171-0-1-1	FD	7/16/2018	0	1	mg/kg	**1000**	
A1-171	A1-171-1-2	N	7/16/2018	1	2	mg/kg	16	
A1-171	A1-171-2-3	N	7/16/2018	2	3	mg/kg	4.4	
A1-171	A1-171-3-4	N	7/16/2018	3	4	mg/kg	8.4	
A1-172	A1-172-0-1	N	7/16/2018	0	1	mg/kg	**18000**	
A1-172	A1-172-1-2	N	7/16/2018	1	2	mg/kg	**1700**	
A1-172	A1-172-2-3	N	7/16/2018	2	3	mg/kg	**510**	
A1-172	A1-172-2-3-1	FD	7/16/2018	2	3	mg/kg	**570**	
A1-172	A1-172-3-4	N	7/16/2018	3	4	mg/kg	22	
A1-173	A1-173-0-1	N	7/2/2018	0	1	mg/kg	**460**	
A1-173	A1-173-1-2	N	7/2/2018	1	2	mg/kg	**330**	
A1-173	A1-173-2-3	N	7/2/2018	2	3	mg/kg	160	
A1-173	A1-173-3-4	N	7/2/2018	3	4	mg/kg	58	
A1-173	A1-173-4-5	N	7/2/2018	4	5	mg/kg	86	
A1-173	A1-173-5-6	N	7/2/2018	5	6	mg/kg	130	
A1-174	A1-174-0-1	N	7/2/2018	0	1	mg/kg	**200**	
A1-174	A1-174-1-2	N	7/2/2018	1	2	mg/kg	110	
A1-174	A1-174-2-3	N	7/2/2018	2	3	mg/kg	76	
A1-174	A1-174-3-4	N	7/2/2018	3	4	mg/kg	17	
A1-175	A1-175-0-1	N	7/2/2018	0	1	mg/kg	**1500**	
A1-175	A1-175-1-2	N	7/2/2018	1	2	mg/kg	130	
A1-175	A1-175-2-3	N	7/2/2018	2	3	mg/kg	3	
A1-175	A1-175-3-4	N	7/2/2018	3	4	mg/kg	2.5	
A1-176	A1-176-0-1	N	7/17/2018	0	1	mg/kg	**600**	
A1-176	A1-176-1-2	N	7/17/2018	1	2	mg/kg	**30000**	
A1-176	A1-176-2-3	N	7/17/2018	2	3	mg/kg	**350**	
A1-176	A1-176-3-4	N	7/17/2018	3	4	mg/kg	15	
A1-177	A1-177-0-1	N	7/16/2018	0	1	mg/kg	160	
A1-177	A1-177-1-2	N	7/16/2018	1	2	mg/kg	40	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A1-177	A1-177-2-3	N	7/16/2018	2	3	mg/kg	5.3	
A1-177	A1-177-3-4	N	7/16/2018	3	4	mg/kg	3.5	
A1-178	A1-178-0-1	N	7/12/2018	0	1	mg/kg	35	
A1-178	A1-178-1-2	N	7/12/2018	1	2	mg/kg	3.1	
A1-179	A1-179-0-1	N	7/16/2018	0	1	mg/kg	28	
A1-179	A1-179-1-2	N	7/16/2018	1	2	mg/kg	4.9	
A1-180	A1-180-0-1	N	7/16/2018	0	1	mg/kg	**250**	
A1-180	A1-180-1-2	N	7/16/2018	1	2	mg/kg	**220**	
A1-180	A1-180-2-3	N	7/16/2018	2	3	mg/kg	7.7	
A1-180	A1-180-3-4	N	7/16/2018	3	4	mg/kg	6.8	
A1-181	A1-181-0-1	N	7/17/2018	0	1	mg/kg	**14000**	
A1-181	A1-181-1-2	N	7/17/2018	1	2	mg/kg	**19000**	
A1-181	A1-181-2-3	N	7/17/2018	2	3	mg/kg	**450**	
A1-181	A1-181-3-4	N	7/17/2018	3	4	mg/kg	26	
A1-182	A1-182-0-1	N	7/3/2018	0	1	mg/kg	**17000**	
A1-182	A1-182-1-2	N	7/3/2018	1	2	mg/kg	**56000**	
A1-182	A1-182-2-3	N	7/3/2018	2	3	mg/kg	**49000**	
A1-182	A1-182-3-4	N	7/3/2018	3	4	mg/kg	**33000**	
A1-182	A1-182-4-5	N	7/3/2018	4	5	mg/kg	**11000**	
A1-182	A1-182-4-5-1	FD	7/3/2018	4	5	mg/kg	**14000**	
A1-182	A1-182-5-6	N	7/3/2018	5	6	mg/kg	**3700**	
A1-183	A1-183-0-1	N	7/3/2018	0	1	mg/kg	**1400**	
A1-183	A1-183-0-1-1	FD	7/3/2018	0	1	mg/kg	**730**	
A1-183	A1-183-1-2	N	7/3/2018	1	2	mg/kg	**11000**	
A1-183	A1-183-2-3	N	7/3/2018	2	3	mg/kg	**6500**	
A1-183	A1-183-3-4	N	7/3/2018	3	4	mg/kg	**4600**	
A1-183	A1-183-4-5	N	7/3/2018	4	5	mg/kg	140	
A1-183	A1-183-5-6	N	7/3/2018	5	6	mg/kg	140	
A1-184	A1-184-0-1	N	7/3/2018	0	1	mg/kg	120	
A1-184	A1-184-1-2	N	7/3/2018	1	2	mg/kg	150	
A1-184	A1-184-2-3	N	7/3/2018	2	3	mg/kg	**390**	
A1-184	A1-184-3-4	N	7/3/2018	3	4	mg/kg	**1900**	
A1-184	A1-184-4-5	N	7/3/2018	4	5	mg/kg	**290**	
A1-184	A1-184-5-6	N	7/3/2018	5	6	mg/kg	17	
A1-185	A1-185-0-1	N	7/17/2018	0	1	mg/kg	69	
A1-185	A1-185-1-2	N	7/17/2018	1	2	mg/kg	**15000**	
A1-185	A1-185-2-3	N	7/17/2018	2	3	mg/kg	**14000**	
A1-185	A1-185-2-3-1	FD	7/17/2018	2	3	mg/kg	**16000**	
A1-185	A1-185-3-4	N	7/17/2018	3	4	mg/kg	160	
A1-185	A1-185-4-5	N	7/17/2018	4	5	mg/kg	8.3	
A1-186	A1-186-0-1	N	7/16/2018	0	1	mg/kg	14	
A1-186	A1-186-1-2	N	7/16/2018	1	2	mg/kg	3.4	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A1-187	A1-187-0-1	N	7/13/2018	0	1	mg/kg	79	
A1-187	A1-187-1-2	N	7/13/2018	1	2	mg/kg	**440**	
A1-187	A1-187-2-3	N	7/13/2018	2	3	mg/kg	150	
A1-188	A1-188-0-1	N	7/17/2018	0	1	mg/kg	**1100**	
A1-188	A1-188-0-1-1	FD	7/17/2018	0	1	mg/kg	**370**	
A1-188	A1-188-1-2	N	7/17/2018	1	2	mg/kg	**45000**	
A1-188	A1-188-2-3	N	7/17/2018	2	3	mg/kg	**40000**	
A1-188	A1-188-3-4	N	7/17/2018	3	4	mg/kg	**790**	
A1-188	A1-188-4-5	N	7/17/2018	4	5	mg/kg	8.3	
A1-189	A1-189-0-1	N	7/3/2018	0	1	mg/kg	**790**	
A1-189	A1-189-1-2	N	7/3/2018	1	2	mg/kg	**200**	
A1-189	A1-189-2-3	N	7/3/2018	2	3	mg/kg	**2800**	
A1-189	A1-189-3-4	N	7/3/2018	3	4	mg/kg	**220**	
A1-189	A1-189-4-5	N	7/3/2018	4	5	mg/kg	**220**	
A1-189	A1-189-5-6	N	7/3/2018	5	6	mg/kg	100	
A1-190	A1-190-0-1	N	7/3/2018	0	1	mg/kg	**610**	
A1-190	A1-190-1-2	N	7/3/2018	1	2	mg/kg	110	
A1-190	A1-190-2-3	N	7/3/2018	2	3	mg/kg	12	
A1-190	A1-190-3-4	N	7/3/2018	3	4	mg/kg	4.8	
A1-191	A1-191-0-1	N	7/17/2018	0	1	mg/kg	**23000**	
A1-191	A1-191-1-2	N	7/17/2018	1	2	mg/kg	**2900**	
A1-191	A1-191-2-3	N	7/17/2018	2	3	mg/kg	**3200**	
A1-191	A1-191-3-4	N	7/17/2018	3	4	mg/kg	**960**	
A1-191	A1-191-4-5	N	7/17/2018	4	5	mg/kg	33	
A1-192	A1-192-0-1	N	7/13/2018	0	1	mg/kg	67	
A1-192	A1-192-1-2	N	7/13/2018	1	2	mg/kg	37	
A1-193	A1-193-0-1	N	7/13/2018	0	1	mg/kg	20	
A1-193	A1-193-1-2	N	7/13/2018	1	2	mg/kg	5.3	
A1-194	A1-194-0-1	N	7/17/2018	0	1	mg/kg	180	
A1-194	A1-194-1-2	N	7/17/2018	1	2	mg/kg	**61000**	
A1-194	A1-194-2-3	N	7/17/2018	2	3	mg/kg	**680**	
A1-194	A1-194-3-4	N	7/17/2018	3	4	mg/kg	23	
A1-195	A1-195-0-1	N	7/17/2018	0	1	mg/kg	**3200**	
A1-195	A1-195-1-2	N	7/17/2018	1	2	mg/kg	**460**	
A1-195	A1-195-2-3	N	7/17/2018	2	3	mg/kg	38	
A1-195	A1-195-3-4	N	7/17/2018	3	4	mg/kg	3.3	
A1-196	A1-196-0-1	N	7/16/2018	0	1	mg/kg	65	
A1-196	A1-196-1-2	N	7/16/2018	1	2	mg/kg	4.1	
A1-196	A1-196-2-3	N	7/16/2018	2	3	mg/kg	4.1	
A1-196	A1-196-3-4	N	7/16/2018	3	4	mg/kg	6.2	
A1-197	A1-197-0-1	N	7/13/2018	0	1	mg/kg	6.2	
A1-197	A1-197-1-2	N	7/13/2018	1	2	mg/kg	8.4	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A1-198	A1-198-0-1	N	7/13/2018	0	1	mg/kg	7.2	
A1-198	A1-198-1-2	N	7/13/2018	1	2	mg/kg	4.8	
A1-199	A1-199-0-1	N	7/16/2018	0	1	mg/kg	**210**	
A1-199	A1-199-1-2	N	7/16/2018	1	2	mg/kg	5	
A1-199	A1-199-2-3	N	7/16/2018	2	3	mg/kg	4.2	
A1-199	A1-199-3-4	N	7/16/2018	3	4	mg/kg	4.3	
A1-200	A1-200-0-1	N	7/17/2018	0	1	mg/kg	33	
A1-200	A1-200-1-2	N	7/17/2018	1	2	mg/kg	83	
A1-200	A1-200-2-3	N	7/17/2018	2	3	mg/kg	15	
A1-200	A1-200-3-4	N	7/17/2018	3	4	mg/kg	7.6	
A1-201	A1-201-0-1	N	7/17/2018	0	1	mg/kg	46	
A1-201	A1-201-1-2	N	7/17/2018	1	2	mg/kg	**2800**	
A1-201	A1-201-2-3	N	7/17/2018	2	3	mg/kg	35	
A1-201	A1-201-3-4	N	7/17/2018	3	4	mg/kg	14	
A1-202	A1-202-0-1	N	7/16/2018	0	1	mg/kg	35	
A1-202	A1-202-1-2	N	7/16/2018	1	2	mg/kg	8.5	
A1-202	A1-202-2-3	N	7/16/2018	2	3	mg/kg	3.7	
A1-202	A1-202-3-4	N	7/16/2018	3	4	mg/kg	5.1	
A1-203	A1-203-0-1	N	7/13/2018	0	1	mg/kg	39	
A1-203	A1-203-1-2	N	7/13/2018	1	2	mg/kg	14	
A1-204	A1-204-0-1	N	7/13/2018	0	1	mg/kg	10	
A1-204	A1-204-1-2	N	7/13/2018	1	2	mg/kg	16	
A1-205	A1-205-0-1	N	7/16/2018	0	1	mg/kg	37	
A1-205	A1-205-1-2	N	7/16/2018	1	2	mg/kg	140	
A1-205	A1-205-2-3	N	7/16/2018	2	3	mg/kg	5	
A1-205	A1-205-3-4	N	7/16/2018	3	4	mg/kg	5.6	
A1-206	A1-206-0-1	N	7/17/2018	0	1	mg/kg	32	
A1-206	A1-206-1-2	N	7/17/2018	1	2	mg/kg	**1300**	
A1-206	A1-206-2-3	N	7/17/2018	2	3	mg/kg	**2200**	
A1-206	A1-206-3-4	N	7/17/2018	3	4	mg/kg	93	
Area 2								
A2-201	A2-201-0-1	N	6/26/2018	0	1	mg/kg	86	
A2-201	A2-201-1-2	N	6/26/2018	1	2	mg/kg	17	
A2-202	A2-202-0-1	N	6/26/2018	0	1	mg/kg	**870**	
A2-202	A2-202-1-2	N	6/26/2018	1	2	mg/kg	**1000**	
A2-202	A2-202-2-3	N	6/26/2018	2	3	mg/kg	77	
A2-202	A2-202-3-4	N	6/26/2018	3	4	mg/kg	31	
A2-203	A2-203-0-1	N	6/26/2018	0	1	mg/kg	**580**	
A2-203	A2-203-1-2	N	6/26/2018	1	2	mg/kg	92	
A2-203	A2-203-2-3	N	6/26/2018	2	3	mg/kg	79	
A2-203	A2-203-3-4	N	6/26/2018	3	4	mg/kg	43	
A2-203	A2-203-3-4-1	FD	6/26/2018	3	4	mg/kg	100	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A2-204	A2-204-0-1	N	6/26/2018	0	1	mg/kg	**960**	
A2-204	A2-204-1-2	N	6/26/2018	1	2	mg/kg	**200**	
A2-204	A2-204-2-3	N	6/26/2018	2	3	mg/kg	53	
A2-204	A2-204-3-4	N	6/26/2018	3	4	mg/kg	**580**	
A2-204	A2-204-4-5	N	6/26/2018	4	5	mg/kg	**740**	
A2-204	A2-204-5-6	N	6/26/2018	5	6	mg/kg	**390**	
A2-205	A2-205-0-1	N	6/26/2018	0	1	mg/kg	**350**	
A2-205	A2-205-1-2	N	6/26/2018	1	2	mg/kg	**250**	
A2-205	A2-205-2-3	N	6/26/2018	2	3	mg/kg	**490**	
A2-205	A2-205-3-4	N	6/26/2018	3	4	mg/kg	**440**	
A2-205	A2-205-4-5	N	6/26/2018	4	5	mg/kg	**530**	
A2-205	A2-205-5-6	N	6/26/2018	5	6	mg/kg	**490**	
A2-205	A2-205-6-7	N	6/26/2018	6	7	mg/kg	100	
A2-205	A2-205-7-8	N	6/26/2018	7	8	mg/kg	33	
A2-206	A2-206-0-1	N	6/26/2018	0	1	mg/kg	180	
A2-206	A2-206-1-2	N	6/26/2018	1	2	mg/kg	**430**	
A2-206	A2-206-2-3	N	6/26/2018	2	3	mg/kg	**3400**	
A2-206	A2-206-3-4	N	6/26/2018	3	4	mg/kg	**540**	
A2-206	A2-206-4-5	N	6/26/2018	4	5	mg/kg	**320**	
A2-206	A2-206-5-6	N	6/26/2018	5	6	mg/kg	150	
A2-206	A2-206-6-7	N	6/26/2018	6	7	mg/kg	140	
A2-206	A2-206-7-8	N	6/26/2018	7	8	mg/kg	**300**	
A2-207	A2-207-0-1	N	6/26/2018	0	1	mg/kg	**460**	
A2-207	A2-207-1-2	N	6/26/2018	1	2	mg/kg	**900**	
A2-207	A2-207-2-3	N	6/26/2018	2	3	mg/kg	**730**	
A2-207	A2-207-3-4	N	6/26/2018	3	4	mg/kg	**250**	
A2-207	A2-207-4-5	N	6/26/2018	4	5	mg/kg	**320**	
A2-207	A2-207-5-6	N	6/26/2018	5	6	mg/kg	46	
A2-207	A2-207-6-7	N	6/26/2018	6	7	mg/kg	45	
A2-207	A2-207-7-8	N	6/26/2018	7	8	mg/kg	**550**	
A2-208	A2-208-0-1	N	6/26/2018	0	1	mg/kg	180	
A2-208	A2-208-1-2	N	6/26/2018	1	2	mg/kg	**490**	
A2-208	A2-208-2-3	N	6/26/2018	2	3	mg/kg	**820**	
A2-208	A2-208-3-4	N	6/26/2018	3	4	mg/kg	**510**	
A2-208	A2-208-4-5	N	6/26/2018	4	5	mg/kg	**400**	
A2-208	A2-208-5-6	N	6/26/2018	5	6	mg/kg	**320**	
A2-209	A2-209-0-1	N	6/26/2018	0	1	mg/kg	**290**	
A2-209	A2-209-0-1-1	FD	6/26/2018	0	1	mg/kg	**340**	
A2-209	A2-209-1-2	N	6/26/2018	1	2	mg/kg	**360**	
A2-209	A2-209-2-3	N	6/26/2018	2	3	mg/kg	**460**	
A2-209	A2-209-3-4	N	6/26/2018	3	4	mg/kg	**260**	
A2-210	A2-210-0-1	N	6/26/2018	0	1	mg/kg	190	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A2-210	A2-210-1-2	N	6/26/2018	1	2	mg/kg	**390**	
A2-210	A2-210-2-3	N	6/26/2018	2	3	mg/kg	4.5	
A2-210	A2-210-3-4	N	6/26/2018	3	4	mg/kg	16	
A2-211	A2-211-0-1	N	6/26/2018	0	1	mg/kg	**230**	
A2-211	A2-211-1-2	N	6/26/2018	1	2	mg/kg	93	
A2-212	A2-212-0-1	N	7/5/2018	0	1	mg/kg	32	
A2-212	A2-212-1-2	N	7/5/2018	1	2	mg/kg	1.2	
A2-213	A2-213-0-1	N	7/5/2018	0	1	mg/kg	38	
A2-213	A2-213-1-2	N	7/5/2018	1	2	mg/kg	18	
A2-213	A2-213-2-3	N	7/5/2018	2	3	mg/kg	13	
A2-213	A2-213-2-3-1	FD	7/5/2018	2	3	mg/kg	6.9	
A2-213	A2-213-3-4	N	7/5/2018	3	4	mg/kg	1.5	
A2-214	A2-214-0-1	N	6/28/2018	0	1	mg/kg	**230**	
A2-214	A2-214-1-2	N	6/28/2018	1	2	mg/kg	**310**	
A2-214	A2-214-2-3	N	6/28/2018	2	3	mg/kg	21	
A2-214	A2-214-3-4	N	6/28/2018	3	4	mg/kg	2	
A2-215	A2-215-0-1	N	6/28/2018	0	1	mg/kg	**330**	
A2-215	A2-215-1-2	N	6/28/2018	1	2	mg/kg	**570**	
A2-215	A2-215-2-3	N	6/28/2018	2	3	mg/kg	**450**	
A2-215	A2-215-3-4	N	6/28/2018	3	4	mg/kg	**580**	
A2-215	A2-215-4-5	N	6/28/2018	4	5	mg/kg	**520**	
A2-215	A2-215-5-6	N	6/28/2018	5	6	mg/kg	5.8	
A2-216	A2-216-0-1	N	6/27/2018	0	1	mg/kg	**240**	
A2-216	A2-216-1-2	N	6/27/2018	1	2	mg/kg	**390**	
A2-216	A2-216-2-3	N	6/27/2018	2	3	mg/kg	**760**	
A2-216	A2-216-3-4	N	6/27/2018	3	4	mg/kg	**1500**	
A2-216	A2-216-4-5	N	6/27/2018	4	5	mg/kg	**570**	
A2-216	A2-216-5-6	N	6/27/2018	5	6	mg/kg	**490**	
A2-217	A2-217-0-1	N	6/27/2018	0	1	mg/kg	**570**	
A2-217	A2-217-0-1-1	FD	6/27/2018	0	1	mg/kg	**370**	
A2-217	A2-217-1-2	N	6/27/2018	1	2	mg/kg	**1300**	
A2-217	A2-217-2-3	N	6/27/2018	2	3	mg/kg	**2600**	
A2-217	A2-217-3-4	N	6/27/2018	3	4	mg/kg	**790**	
A2-217	A2-217-4-5	N	6/27/2018	4	5	mg/kg	**930**	
A2-217	A2-217-5-6	N	6/27/2018	5	6	mg/kg	**760**	
A2-218	A2-218-0-1	N	6/27/2018	0	1	mg/kg	**770**	
A2-218	A2-218-1-2	N	6/27/2018	1	2	mg/kg	**890**	
A2-218	A2-218-2-3	N	6/27/2018	2	3	mg/kg	**890**	
A2-218	A2-218-3-4	N	6/27/2018	3	4	mg/kg	**920**	
A2-218	A2-218-4-5	N	6/27/2018	4	5	mg/kg	**780**	
A2-218	A2-218-5-6	N	6/27/2018	5	6	mg/kg	**650**	
A2-218	A2-218-6-7	N	6/27/2018	6	7	mg/kg	91	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A2-218	A2-218-7-8	N	6/27/2018	7	8	mg/kg	4.8	
A2-219	A2-219-0-1	N	6/27/2018	0	1	mg/kg	**1100**	
A2-219	A2-219-1-2	N	6/27/2018	1	2	mg/kg	**1700**	
A2-219	A2-219-2-3	N	6/27/2018	2	3	mg/kg	**1900**	
A2-219	A2-219-3-4	N	6/27/2018	3	4	mg/kg	**1600**	
A2-219	A2-219-4-5	N	6/27/2018	4	5	mg/kg	**310**	
A2-219	A2-219-5-6	N	6/27/2018	5	6	mg/kg	160	
A2-219	A2-219-6-7	N	6/27/2018	6	7	mg/kg	130	
A2-219	A2-219-7-8	N	6/27/2018	7	8	mg/kg	**250**	
A2-220	A2-220-0-1	N	6/27/2018	0	1	mg/kg	**780**	
A2-220	A2-220-1-2	N	6/27/2018	1	2	mg/kg	**240**	
A2-220	A2-220-2-3	N	6/27/2018	2	3	mg/kg	**450**	
A2-220	A2-220-3-4	N	6/27/2018	3	4	mg/kg	**200**	
A2-220	A2-220-4-5	N	6/27/2018	4	5	mg/kg	52	
A2-220	A2-220-5-6	N	6/27/2018	5	6	mg/kg	9.8	
A2-220	A2-220-5-6-1	FD	6/27/2018	5	6	mg/kg	11	
A2-221	A2-221-0-1	N	6/27/2018	0	1	mg/kg	**720**	
A2-221	A2-221-1-2	N	6/27/2018	1	2	mg/kg	**270**	
A2-221	A2-221-2-3	N	6/27/2018	2	3	mg/kg	26	
A2-221	A2-221-3-4	N	6/27/2018	3	4	mg/kg	13	
A2-221	A2-221-4-5	N	6/27/2018	4	5	mg/kg	48	
A2-221	A2-221-5-6	N	6/27/2018	5	6	mg/kg	12	
A2-222	A2-222-0-1	N	6/27/2018	0	1	mg/kg	45	
A2-222	A2-222-1-2	N	6/27/2018	1	2	mg/kg	48	
A2-222	A2-222-1-2-1	FD	6/27/2018	1	2	mg/kg	45	
A2-223	A2-223-0-1	N	6/27/2018	0	1	mg/kg	22	
A2-223	A2-223-0-1-1	FD	6/27/2018	0	1	mg/kg	23	
A2-223	A2-223-1-2	N	6/27/2018	1	2	mg/kg	17	
A2-224	A2-224-0-1	N	6/27/2018	0	1	mg/kg	47	
A2-224	A2-224-1-2	N	6/27/2018	1	2	mg/kg	16	
A2-224	A2-224-2-3	N	6/27/2018	2	3	mg/kg	8.8	
A2-224	A2-224-3-4	N	6/27/2018	3	4	mg/kg	38	
A2-225	A2-225-0-1	N	6/27/2018	0	1	mg/kg	**780**	
A2-225	A2-225-1-2	N	6/27/2018	1	2	mg/kg	**670**	
A2-225	A2-225-2-3	N	6/27/2018	2	3	mg/kg	29	
A2-225	A2-225-3-4	N	6/27/2018	3	4	mg/kg	10	
A2-225	A2-225-4-5	N	6/27/2018	4	5	mg/kg	6.3	
A2-225	A2-225-5-6	N	6/27/2018	5	6	mg/kg	140	
A2-225	A2-225-6-7	N	6/27/2018	6	7	mg/kg	**310**	
A2-225	A2-225-7-8	N	6/27/2018	7	8	mg/kg	9.6	
A2-226	A2-226-0-1	N	6/27/2018	0	1	mg/kg	**1500**	
A2-226	A2-226-1-2	N	6/27/2018	1	2	mg/kg	**1300**	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A2-226	A2-226-2-3	N	6/27/2018	2	3	mg/kg	**1200**	
A2-226	A2-226-3-4	N	6/27/2018	3	4	mg/kg	58	
A2-226	A2-226-4-5	N	6/27/2018	4	5	mg/kg	40	
A2-226	A2-226-5-6	N	6/27/2018	5	6	mg/kg	4.8	
A2-226	A2-226-6-7	N	6/27/2018	6	7	mg/kg	16	
A2-226	A2-226-7-8	N	6/27/2018	7	8	mg/kg	13	
A2-227	A2-227-0-1	N	6/27/2018	0	1	mg/kg	**380**	
A2-227	A2-227-1-2	N	6/27/2018	1	2	mg/kg	**1400**	
A2-227	A2-227-2-3	N	6/27/2018	2	3	mg/kg	**2500**	
A2-227	A2-227-3-4	N	6/27/2018	3	4	mg/kg	**2800**	
A2-227	A2-227-4-5	N	6/27/2018	4	5	mg/kg	**870**	
A2-227	A2-227-5-6	N	6/27/2018	5	6	mg/kg	20	
A2-227	A2-227-6-7	N	6/27/2018	6	7	mg/kg	3.1	
A2-227	A2-227-7-8	N	6/27/2018	7	8	mg/kg	6	
A2-228	A2-228-0-1	N	6/28/2018	0	1	mg/kg	190	
A2-228	A2-228-1-2	N	6/28/2018	1	2	mg/kg	**580**	
A2-228	A2-228-2-3	N	6/28/2018	2	3	mg/kg	**1100**	
A2-228	A2-228-3-4	N	6/28/2018	3	4	mg/kg	**3100**	
A2-228	A2-228-4-5	N	6/28/2018	4	5	mg/kg	**2300**	
A2-228	A2-228-4-5-1	FD	6/28/2018	4	5	mg/kg	**1600**	
A2-228	A2-228-5-6	N	6/28/2018	5	6	mg/kg	28	
A2-229	A2-229-0-1	N	6/28/2018	0	1	mg/kg	**3000**	
A2-229	A2-229-1-2	N	6/28/2018	1	2	mg/kg	**850**	
A2-229	A2-229-2-3	N	6/28/2018	2	3	mg/kg	**1200**	
A2-229	A2-229-3-4	N	6/28/2018	3	4	mg/kg	**13000**	
A2-229	A2-229-4-5	N	6/28/2018	4	5	mg/kg	**420**	
A2-229	A2-229-5-6	N	6/28/2018	5	6	mg/kg	58	
A2-230	A2-230-0-1	N	6/28/2018	0	1	mg/kg	**780**	
A2-230	A2-230-1-2	N	6/28/2018	1	2	mg/kg	**480**	
A2-230	A2-230-2-3	N	6/28/2018	2	3	mg/kg	43	
A2-230	A2-230-3-4	N	6/28/2018	3	4	mg/kg	14	
A2-231	A2-231-0-1	N	7/5/2018	0	1	mg/kg	10	
A2-231	A2-231-1-2	N	7/5/2018	1	2	mg/kg	11	
A2-231	A2-231-2-3	N	7/5/2018	2	3	mg/kg	1.5	
A2-231	A2-231-3-4	N	7/5/2018	3	4	mg/kg	1.7	
A2-232	A2-232-0-1	N	7/5/2018	0	1	mg/kg	6.2	
A2-232	A2-232-1-2	N	7/5/2018	1	2	mg/kg	8.1	
A2-232	A2-232-2-3	N	7/5/2018	2	3	mg/kg	1.6	
A2-232	A2-232-3-4	N	7/5/2018	3	4	mg/kg	4.2	
A2-233	A2-233-0-1	N	7/5/2018	0	1	mg/kg	21	
A2-233	A2-233-1-2	N	7/5/2018	1	2	mg/kg	7.6	
A2-234	A2-234-0-1	N	7/5/2018	0	1	mg/kg	120	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A2-234	A2-234-1-2	N	7/5/2018	1	2	mg/kg	3.2	
A2-235	A2-235-0-1	N	7/5/2018	0	1	mg/kg	22	
A2-235	A2-235-1-2	N	7/5/2018	1	2	mg/kg	11	
A2-235	A2-235-2-3	N	7/5/2018	2	3	mg/kg	0.98	
A2-235	A2-235-3-4	N	7/5/2018	3	4	mg/kg	0.9	
A2-236	A2-236-0-1	N	7/5/2018	0	1	mg/kg	12	
A2-236	A2-236-1-2	N	7/5/2018	1	2	mg/kg	3.8	
A2-236	A2-236-2-3	N	7/5/2018	2	3	mg/kg	1.9	
A2-236	A2-236-3-4	N	7/5/2018	3	4	mg/kg	1.4	
A2-236	A2-236-4-5	N	7/5/2018	4	5	mg/kg	1.8	
A2-236	A2-236-5-6	N	7/5/2018	5	6	mg/kg	1.1	
A2-237	A2-237-0-1	N	6/28/2018	0	1	mg/kg	**400**	
A2-237	A2-237-1-2	N	6/28/2018	1	2	mg/kg	**460**	
A2-237	A2-237-2-3	N	6/28/2018	2	3	mg/kg	21	
A2-237	A2-237-3-4	N	6/28/2018	3	4	mg/kg	9.5	
A2-237	A2-237-4-5	N	6/28/2018	4	5	mg/kg	4.1	
A2-237	A2-237-5-6	N	6/28/2018	5	6	mg/kg	4.6	
A2-238	A2-238-0-1	N	6/28/2018	0	1	mg/kg	**770**	
A2-238	A2-238-1-2	N	6/28/2018	1	2	mg/kg	**400**	
A2-238	A2-238-2-3	N	6/28/2018	2	3	mg/kg	**7400**	
A2-238	A2-238-2-3-1	FD	6/28/2018	2	3	mg/kg	**3700**	
A2-238	A2-238-3-4	N	6/28/2018	3	4	mg/kg	**6600**	
A2-238	A2-238-4-5	N	6/28/2018	4	5	mg/kg	**11000**	
A2-238	A2-238-5-6	N	6/28/2018	5	6	mg/kg	24	
A2-239	A2-239-0-1	N	6/28/2018	0	1	mg/kg	**300**	
A2-239	A2-239-1-2	N	6/28/2018	1	2	mg/kg	**1300**	
A2-239	A2-239-2-3	N	6/28/2018	2	3	mg/kg	**1500**	
A2-239	A2-239-3-4	N	6/28/2018	3	4	mg/kg	**6500**	
A2-239	A2-239-4-5	N	6/28/2018	4	5	mg/kg	190	
A2-239	A2-239-5-6	N	6/28/2018	5	6	mg/kg	12	
A2-240	A2-240-0-1	N	6/28/2018	0	1	mg/kg	12	
A2-240	A2-240-0-1-1	FD	6/28/2018	0	1	mg/kg	15	
A2-240	A2-240-1-2	N	6/28/2018	1	2	mg/kg	100	
A2-241	A2-241-0-1	N	6/28/2018	0	1	mg/kg	**510**	
A2-241	A2-241-1-2	N	6/28/2018	1	2	mg/kg	**4500**	
A2-241	A2-241-2-3	N	6/28/2018	2	3	mg/kg	**1400**	
A2-241	A2-241-3-4	N	6/28/2018	3	4	mg/kg	**1900**	
A2-241	A2-241-4-5	N	6/28/2018	4	5	mg/kg	53	
A2-241	A2-241-5-6	N	6/28/2018	5	6	mg/kg	8.2	
A2-242	A2-242-0-1	N	6/28/2018	0	1	mg/kg	**2600**	
A2-242	A2-242-1-2	N	6/28/2018	1	2	mg/kg	**610**	
A2-242	A2-242-2-3	N	6/28/2018	2	3	mg/kg	36	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A2-242	A2-242-3-4	N	6/28/2018	3	4	mg/kg	6.5	
A2-242	A2-242-4-5	N	6/28/2018	4	5	mg/kg	18	
A2-242	A2-242-5-6	N	6/28/2018	5	6	mg/kg	17	
A2-243	A2-243-0-1	N	7/5/2018	0	1	mg/kg	14	
A2-243	A2-243-1-2	N	7/5/2018	1	2	mg/kg	8.8	
A2-243	A2-243-2-3	N	7/5/2018	2	3	mg/kg	2.2	
A2-243	A2-243-3-4	N	7/5/2018	3	4	mg/kg	1.4	
A2-244	A2-244-0-1	N	7/5/2018	0	1	mg/kg	69	
A2-244	A2-244-1-2	N	7/5/2018	1	2	mg/kg	5.7	
A2-244	A2-244-1-2-1	FD	7/5/2018	1	2	mg/kg	7.8	
A2-244	A2-244-2-3	N	7/5/2018	2	3	mg/kg	1.8	
A2-244	A2-244-3-4	N	7/5/2018	3	4	mg/kg	2.1	
A2-245	A2-245-0-1	N	7/5/2018	0	1	mg/kg	120	
A2-245	A2-245-1-2	N	7/5/2018	1	2	mg/kg	6.8	
A2-245	A2-245-2-3	N	7/5/2018	2	3	mg/kg	1.1	
A2-245	A2-245-3-4	N	7/5/2018	3	4	mg/kg	1.5	
A2-246	A2-246-0-1	N	7/5/2018	0	1	mg/kg	130	
A2-246	A2-246-1-2	N	7/5/2018	1	2	mg/kg	2.8	
Area 3								
A3-301	A3-301-0-1	N	6/28/2018	0	1	mg/kg	57	
A3-301	A3-301-0-1-1	FD	6/28/2018	0	1	mg/kg	56	
A3-301	A3-301-1-2	N	6/28/2018	1	2	mg/kg	130	
Area 4								
A4-401	A4-401-0-1	N	6/29/2018	0	1	mg/kg	**1300**	
A4-401	A4-401-1-2	N	6/29/2018	1	2	mg/kg	**3300**	
A4-401	A4-401-2-3	N	6/29/2018	2	3	mg/kg	140	
A4-401	A4-401-2-3-1	FD	6/29/2018	2	3	mg/kg	100	
A4-401	A4-401-3-4	N	6/29/2018	3	4	mg/kg	13	L
A4-402	A4-402-0-1	N	7/3/2018	0	1	mg/kg	10	
A4-402	A4-402-1-2	N	7/3/2018	1	2	mg/kg	6.5	
A4-402	A4-402-2-3	N	7/3/2018	2	3	mg/kg	6.4	
A4-402	A4-402-3-4	N	7/3/2018	3	4	mg/kg	14	
A4-403	A4-403-0-1	N	7/3/2018	0	1	mg/kg	42	
A4-403	A4-403-1-2	N	7/3/2018	1	2	mg/kg	6.8	
A4-403	A4-403-2-3	N	7/3/2018	2	3	mg/kg	4.3	
A4-403	A4-403-3-4	N	7/3/2018	3	4	mg/kg	4.3	
A4-404	A4-404-0-1	N	7/3/2018	0	1	mg/kg	140	
A4-404	A4-404-1-2	N	7/3/2018	1	2	mg/kg	18	
A4-404	A4-404-2-3	N	7/3/2018	2	3	mg/kg	5	
A4-404	A4-404-3-4	N	7/3/2018	3	4	mg/kg	8.6	
A4-405	A4-405-0-1	N	7/3/2018	0	1	mg/kg	15	
A4-405	A4-405-1-2	N	7/3/2018	1	2	mg/kg	7.3	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A4-405	A4-405-2-3	N	7/3/2018	2	3	mg/kg	6.1	
A4-405	A4-405-3-4	N	7/3/2018	3	4	mg/kg	6	
A4-406	A4-406-0-1	N	7/3/2018	0	1	mg/kg	120	
A4-406	A4-406-1-2	N	7/3/2018	1	2	mg/kg	17	
A4-406	A4-406-2-3	N	7/3/2018	2	3	mg/kg	8.3	
A4-406	A4-406-3-4	N	7/3/2018	3	4	mg/kg	9.7	
Area 5								
A5-501	A5-501-0-1	N	7/20/2018	0	1	mg/kg	35	
A5-501	A5-501-1-2	N	7/20/2018	1	2	mg/kg	31	
A5-502	A5-502-0-1	N	7/20/2018	0	1	mg/kg	13	
A5-502	A5-502-1-2	N	7/20/2018	1	2	mg/kg	55	
A5-503	A5-503-0-1	N	7/20/2018	0	1	mg/kg	82	
A5-503	A5-503-1-2	N	7/20/2018	1	2	mg/kg	37	
A5-504	A5-504-0-1	N	7/20/2018	0	1	mg/kg	19	
A5-504	A5-504-1-2	N	7/20/2018	1	2	mg/kg	21	
A5-505	A5-505-0-1	N	7/20/2018	0	1	mg/kg	18	
A5-505	A5-505-1-2	N	7/20/2018	1	2	mg/kg	39	
A5-506	A5-506-0-1	N	7/20/2018	0	1	mg/kg	51	
A5-506	A5-506-1-2	N	7/20/2018	1	2	mg/kg	9.2	
A5-507	A5-507-0-1	N	7/20/2018	0	1	mg/kg	14	
A5-507	A5-507-1-2	N	7/20/2018	1	2	mg/kg	1.8	
A5-508	A5-508-0-1	N	7/20/2018	0	1	mg/kg	25	
A5-508	A5-508-1-2	N	7/20/2018	1	2	mg/kg	2.1	
A5-509	A5-509-0-1	N	7/20/2018	0	1	mg/kg	66	
A5-509	A5-509-1-2	N	7/20/2018	1	2	mg/kg	11	
A5-510	A5-510-0-1	N	7/20/2018	0	1	mg/kg	24	
A5-510	A5-510-1-2	N	7/20/2018	1	2	mg/kg	12	
A5-510	A5-510-1-2-1	FD	7/20/2018	1	2	mg/kg	11	
A5-511	A5-511-0-1	N	7/20/2018	0	1	mg/kg	17	
A5-511	A5-511-1-2	N	7/20/2018	1	2	mg/kg	27	
A5-512	A5-512-0-1	N	7/20/2018	0	1	mg/kg	16	
A5-512	A5-512-1-2	N	7/20/2018	1	2	mg/kg	17	
A5-513	A5-513-0-1	N	7/6/2018	0	1	mg/kg	37	
A5-513	A5-513-1-2	N	7/6/2018	1	2	mg/kg	13	
A5-514	A5-514-0-1	N	7/23/2018	0	1	mg/kg	**260**	
A5-514	A5-514-1-2	N	7/23/2018	1	2	mg/kg	**310**	
A5-514	A5-514-2-3	N	7/23/2018	2	3	mg/kg	20	
A5-514	A5-514-3-4	N	7/23/2018	3	4	mg/kg	5.5	
A5-515	A5-515-0-1	N	7/23/2018	0	1	mg/kg	100	
A5-515	A5-515-1-2	N	7/23/2018	1	2	mg/kg	110	
A5-515	A5-515-2-3	N	7/23/2018	2	3	mg/kg	23	
A5-515	A5-515-3-4	N	7/23/2018	3	4	mg/kg	21	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A5-516	A5-516-0-1	N	7/19/2018	0	1	mg/kg	120	
A5-516	A5-516-1-2	N	7/19/2018	1	2	mg/kg	38	
A5-517	A5-517-0-1	N	7/19/2018	0	1	mg/kg	130	
A5-517	A5-517-1-2	N	7/19/2018	1	2	mg/kg	12	
A5-518	A5-518-0-1	N	7/23/2018	0	1	mg/kg	**220**	
A5-518	A5-518-1-2	N	7/23/2018	1	2	mg/kg	**220**	
A5-518	A5-518-1-2-1	FD	7/23/2018	1	2	mg/kg	190	
A5-518	A5-518-2-3	N	7/23/2018	2	3	mg/kg	39	
A5-518	A5-518-3-4	N	7/23/2018	3	4	mg/kg	160	
A5-519	A5-519-0-1	N	7/23/2018	0	1	mg/kg	100	
A5-519	A5-519-1-2	N	7/23/2018	1	2	mg/kg	39	
A5-519	A5-519-2-3	N	7/23/2018	2	3	mg/kg	23	
A5-519	A5-519-3-4	N	7/23/2018	3	4	mg/kg	9.6	
A5-520	A5-520-0-1	N	7/6/2018	0	1	mg/kg	80	
A5-520	A5-520-1-2	N	7/6/2018	1	2	mg/kg	12	
A5-521	A5-521-0-1	N	7/6/2018	0	1	mg/kg	120	
A5-521	A5-521-1-2	N	7/6/2018	1	2	mg/kg	120	
A5-522	A5-522-0-1	N	7/23/2018	0	1	mg/kg	89	
A5-522	A5-522-1-2	N	7/23/2018	1	2	mg/kg	130	
A5-522	A5-522-2-3	N	7/23/2018	2	3	mg/kg	41	
A5-522	A5-522-3-4	N	7/23/2018	3	4	mg/kg	12	
A5-523	A5-523-0-1	N	7/23/2018	0	1	mg/kg	**230**	
A5-523	A5-523-1-2	N	7/23/2018	1	2	mg/kg	18	
A5-523	A5-523-2-3	N	7/23/2018	2	3	mg/kg	3.3	
A5-523	A5-523-3-4	N	7/23/2018	3	4	mg/kg	2.7	
A5-524	A5-524-0-1	N	7/19/2018	0	1	mg/kg	74	
A5-524	A5-524-1-2	N	7/19/2018	1	2	mg/kg	12	
A5-525	A5-525-0-1	N	7/19/2018	0	1	mg/kg	160	
A5-525	A5-525-1-2	N	7/19/2018	1	2	mg/kg	37	
A5-526	A5-526-0-1	N	7/23/2018	0	1	mg/kg	69	
A5-526	A5-526-1-2	N	7/23/2018	1	2	mg/kg	95	
A5-526	A5-526-2-3	N	7/23/2018	2	3	mg/kg	40	
A5-526	A5-526-3-4	N	7/23/2018	3	4	mg/kg	34	
A5-527	A5-527-0-1	N	7/23/2018	0	1	mg/kg	140	
A5-527	A5-527-1-2	N	7/23/2018	1	2	mg/kg	32	
A5-527	A5-527-2-3	N	7/23/2018	2	3	mg/kg	83	
A5-527	A5-527-3-4	N	7/23/2018	3	4	mg/kg	140	
A5-528	A5-528-0-1	N	7/6/2018	0	1	mg/kg	**220**	
A5-528	A5-528-1-2	N	7/6/2018	1	2	mg/kg	190	
A5-529	A5-529-0-1	N	7/6/2018	0	1	mg/kg	26	
A5-529	A5-529-1-2	N	7/6/2018	1	2	mg/kg	9.4	
A5-530	A5-530-0-1	N	7/9/2018	0	1	mg/kg	**200**	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A5-530	A5-530-0-1-1	FD	7/9/2018	0	1	mg/kg	**560**	
A5-530	A5-530-1-2	N	7/9/2018	1	2	mg/kg	**210**	
A5-530	A5-530-2-3	N	7/9/2018	2	3	mg/kg	**470**	
A5-530	A5-530-3-4	N	7/9/2018	3	4	mg/kg	71	
A5-531	A5-531-0-1	N	7/23/2018	0	1	mg/kg	26	
A5-531	A5-531-1-2	N	7/23/2018	1	2	mg/kg	67	
A5-531	A5-531-2-3	N	7/23/2018	2	3	mg/kg	23	
A5-531	A5-531-3-4	N	7/23/2018	3	4	mg/kg	35	
A5-532	A5-532-0-1	N	7/19/2018	0	1	mg/kg	52	
A5-532	A5-532-1-2	N	7/19/2018	1	2	mg/kg	18	
A5-533	A5-533-0-1	N	7/19/2018	0	1	mg/kg	32	
A5-533	A5-533-1-2	N	7/19/2018	1	2	mg/kg	9.3	
A5-533	A5-533-1-2-1	FD	7/19/2018	1	2	mg/kg	14	
A5-534	A5-534-0-1	N	7/19/2018	0	1	mg/kg	59	
A5-534	A5-534-0-1-1	FD	7/19/2018	0	1	mg/kg	53	
A5-534	A5-534-1-2	N	7/19/2018	1	2	mg/kg	10	
A5-535	A5-535-0-1	N	7/19/2018	0	1	mg/kg	88	
A5-535	A5-535-1-2	N	7/19/2018	1	2	mg/kg	9.1	
A5-536	A5-536-0-1	N	7/23/2018	0	1	mg/kg	63	
A5-536	A5-536-0-1-1	FD	7/23/2018	0	1	mg/kg	47	
A5-536	A5-536-1-2	N	7/23/2018	1	2	mg/kg	56	
A5-536	A5-536-2-3	N	7/23/2018	2	3	mg/kg	9	
A5-536	A5-536-3-4	N	7/23/2018	3	4	mg/kg	3.8	
A5-537	A5-537-0-1	N	7/9/2018	0	1	mg/kg	**650**	
A5-537	A5-537-1-2	N	7/9/2018	1	2	mg/kg	**340**	
A5-537	A5-537-2-3	N	7/9/2018	2	3	mg/kg	**320**	
A5-537	A5-537-3-4	N	7/9/2018	3	4	mg/kg	**300**	
A5-538	A5-538-0-1	N	7/6/2018	0	1	mg/kg	110	
A5-538	A5-538-1-2	N	7/6/2018	1	2	mg/kg	15	
A5-539	A5-539-0-1	N	7/6/2018	0	1	mg/kg	130	
A5-539	A5-539-0-1-1	FD	7/6/2018	0	1	mg/kg	150	
A5-539	A5-539-1-2	N	7/6/2018	1	2	mg/kg	64	
A5-540	A5-540-0-1	N	7/9/2018	0	1	mg/kg	**350**	
A5-540	A5-540-1-2	N	7/9/2018	1	2	mg/kg	61	
A5-540	A5-540-2-3	N	7/9/2018	2	3	mg/kg	8.8	
A5-540	A5-540-3-4	N	7/9/2018	3	4	mg/kg	13	
A5-541	A5-541-0-1	N	7/19/2018	0	1	mg/kg	**860**	
A5-541	A5-541-1-2	N	7/19/2018	1	2	mg/kg	**430**	
A5-541	A5-541-2-3	N	7/19/2018	2	3	mg/kg	**460**	
A5-541	A5-541-3-4	N	7/19/2018	3	4	mg/kg	28	
A5-542	A5-542-0-1	N	7/19/2018	0	1	mg/kg	**770**	
A5-542	A5-542-1-2	N	7/19/2018	1	2	mg/kg	190	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

						Analyte	LEAD	
						Cas Number	7439-92-1	
						Remediation Cleanup Level (mg/kg)	400	
						Half of Remediation Cleanup Level (mg/kg)	200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A5-542	A5-542-2-3	N	7/19/2018	2	3	mg/kg	**250**	
A5-542	A5-542-3-4	N	7/19/2018	3	4	mg/kg	150	
A5-543	A5-543-0-1	N	7/19/2018	0	1	mg/kg	180	
A5-543	A5-543-1-2	N	7/19/2018	1	2	mg/kg	11	
A5-543	A5-543-2-3	N	7/19/2018	2	3	mg/kg	13	
A5-543	A5-543-3-4	N	7/19/2018	3	4	mg/kg	4	
A5-544	A5-544-0-1	N	7/19/2018	0	1	mg/kg	100	
A5-544	A5-544-1-2	N	7/19/2018	1	2	mg/kg	100	
Area 6								
A6-601	A6-601-0-1	N	7/18/2018	0	1	mg/kg	16	
A6-601	A6-601-1-2	N	7/18/2018	1	2	mg/kg	7.2	
A6-602	A6-602-0-1	N	7/18/2018	0	1	mg/kg	14	
A6-602	A6-602-1-2	N	7/18/2018	1	2	mg/kg	9.5	
A6-603	A6-603-0-1	N	7/18/2018	0	1	mg/kg	10	
A6-603	A6-603-1-2	N	7/18/2018	1	2	mg/kg	20	
A6-604	A6-604-0-1	N	7/18/2018	0	1	mg/kg	14	
A6-604	A6-604-1-2	N	7/18/2018	1	2	mg/kg	7.5	
A6-605	A6-605-0-1	N	7/18/2018	0	1	mg/kg	5.1	
A6-605	A6-605-1-2	N	7/18/2018	1	2	mg/kg	14	
A6-605	A6-605-1-2-1	FD	7/18/2018	1	2	mg/kg	11	
A6-606	A6-606-0-1	N	7/18/2018	0	1	mg/kg	99	
A6-606	A6-606-1-2	N	7/18/2018	1	2	mg/kg	5.4	
A6-607	A6-607-0-1	N	7/18/2018	0	1	mg/kg	12	
A6-607	A6-607-1-2	N	7/18/2018	1	2	mg/kg	13	
A6-608	A6-608-0-1	N	7/18/2018	0	1	mg/kg	23	
A6-608	A6-608-1-2	N	7/18/2018	1	2	mg/kg	16	
A6-609	A6-609-0-1	N	7/18/2018	0	1	mg/kg	4.9	
A6-609	A6-609-1-2	N	7/18/2018	1	2	mg/kg	3.9	
A6-609	A6-609-1-2-1	FD	7/18/2018	1	2	mg/kg	3.6	
A6-610	A6-610-0-1	N	7/18/2018	0	1	mg/kg	18	
A6-610	A6-610-1-2	N	7/18/2018	1	2	mg/kg	17	
A6-611	A6-611-0-1	N	7/18/2018	0	1	mg/kg	9.8	
A6-611	A6-611-1-2	N	7/18/2018	1	2	mg/kg	5.2	
A6-612	A6-612-0-1	N	7/18/2018	0	1	mg/kg	3.7	
A6-612	A6-612-1-2	N	7/18/2018	1	2	mg/kg	2.7	
A6-613	A6-613-0-1	N	7/18/2018	0	1	mg/kg	12	
A6-613	A6-613-1-2	N	7/18/2018	1	2	mg/kg	8.8	
A6-614	A6-614-0-1	N	7/18/2018	0	1	mg/kg	6.2	
A6-614	A6-614-1-2	N	7/18/2018	1	2	mg/kg	13	
A6-615	A6-615-0-1	N	7/18/2018	0	1	mg/kg	5	
A6-615	A6-615-1-2	N	7/18/2018	1	2	mg/kg	2.8	
A6-616	A6-616-0-1	N	7/18/2018	0	1	mg/kg	4.8	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
A6-616	A6-616-1-2	N	7/18/2018	1	2	mg/kg	5.9	
A6-617	A6-617-0-1	N	7/18/2018	0	1	mg/kg	5	
A6-617	A6-617-1-2	N	7/18/2018	1	2	mg/kg	1.6	
A6-618	A6-618-0-1	N	7/18/2018	0	1	mg/kg	4.6	
A6-618	A6-618-1-2	N	7/18/2018	1	2	mg/kg	4.9	
A6-619	A6-619-0-1	N	7/18/2018	0	1	mg/kg	7.3	
A6-619	A6-619-1-2	N	7/18/2018	1	2	mg/kg	23	
Area 9								
A9-901	A9-901-0-1	N	7/13/2018	0	1	mg/kg	**340**	
A9-901	A9-901-1-2	N	7/13/2018	1	2	mg/kg	71	
A9-902	A9-902-0-1	N	7/24/2018	0	1	mg/kg	**240**	
A9-902	A9-902-1-2	N	7/24/2018	1	2	mg/kg	20	
A9-903	A9-903-0-1	N	7/24/2018	0	1	mg/kg	**270**	
A9-903	A9-903-1-2	N	7/24/2018	1	2	mg/kg	70	
A9-904	A9-904-0-1	N	7/24/2018	0	1	mg/kg	25	
A9-904	A9-904-0-1-1	FD	7/24/2018	0	1	mg/kg	44	
A9-904	A9-904-1-2	N	7/24/2018	1	2	mg/kg	19	
A9-905	A9-905-0-1	N	7/24/2018	0	1	mg/kg	170	
A9-905	A9-905-1-2	N	7/24/2018	1	2	mg/kg	15	
A9-906	A9-906-0-1	N	7/24/2018	0	1	mg/kg	92	
A9-906	A9-906-1-2	N	7/24/2018	1	2	mg/kg	12	
A9-907	A9-907-0-1	N	7/24/2018	0	1	mg/kg	21	
A9-907	A9-907-1-2	N	7/24/2018	1	2	mg/kg	10	
A9-908	A9-908-0-1	N	7/24/2018	0	1	mg/kg	79	
A9-908	A9-908-1-2	N	7/24/2018	1	2	mg/kg	12	
A9-909	A9-909-0-1	N	7/24/2018	0	1	mg/kg	47	
A9-909	A9-909-1-2	N	7/24/2018	1	2	mg/kg	13	
Seawall Samples								
SEW-SB-01	SEW-SB-01-0-1	N	7/5/2018	0	1	mg/kg	**3700**	
SEW-SB-01	SEW-SB-01-1-2	N	7/5/2018	1	2	mg/kg	140	
SEW-SB-01	SEW-SB-01-2-3	N	7/5/2018	2	3	mg/kg	12	
SEW-SB-01	SEW-SB-01-3-4	N	7/5/2018	3	4	mg/kg	11	
SEW-SB-01	SEW-SB-01-4-5	N	7/5/2018	4	5	mg/kg	17	
SEW-SB-01	SEW-SB-01-5-6	N	7/5/2018	5	6	mg/kg	9.9	
SEW-SB-01	SEW-SB-01-6-7	N	7/5/2018	6	7	mg/kg	8.9	
SEW-SB-01	SEW-SB-01-7-8	N	7/5/2018	7	8	mg/kg	9.2	
SEW-SB-01	SEW-SB-01-8-9	N	7/5/2018	8	9	mg/kg	8.8	
SEW-SB-01	SEW-SB-01-9-10	N	7/5/2018	9	10	mg/kg	9.9	
SEW-SB-02	SEW-SB-02-0-1	N	7/5/2018	0	1	mg/kg	**660**	
SEW-SB-02	SEW-SB-02-1-2	N	7/5/2018	1	2	mg/kg	**320**	
SEW-SB-02	SEW-SB-02-2-3	N	7/5/2018	2	3	mg/kg	**270**	
SEW-SB-02	SEW-SB-02-3-4	N	7/5/2018	3	4	mg/kg	3.7	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		LEAD	
					Cas Number		7439-92-1	
					Remediation Cleanup Level (mg/kg)		400	
					Half of Remediation Cleanup Level (mg/kg)		200	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
SEW-SB-02	SEW-SB-02-4-5	N	7/5/2018	4	5	mg/kg	4.3	
SEW-SB-02	SEW-SB-02-5-6	N	7/5/2018	5	6	mg/kg	2.9	
SEW-SB-02	SEW-SB-02-6-7	N	7/5/2018	6	7	mg/kg	6.7	
SEW-SB-02	SEW-SB-02-7-8	N	7/5/2018	7	8	mg/kg	3.7	
SEW-SB-02	SEW-SB-02-8-9	N	7/5/2018	8	9	mg/kg	5	
SEW-SB-02	SEW-SB-02-9-10	N	7/5/2018	9	10	mg/kg	110	
SEW-SB-03	SEW-SB-03-1-2	N	7/10/2018	1	2	mg/kg	**39000**	
SEW-SB-03	SEW-SB-03-2-3	N	7/10/2018	2	3	mg/kg	**600**	
SEW-SB-03	SEW-SB-03-3-4	N	7/10/2018	3	4	mg/kg	160	
SEW-SB-03	SEW-SB-03-4-5	N	7/10/2018	4	5	mg/kg	7.1	
SEW-SB-03	SEW-SB-03-5-6	N	7/10/2018	5	6	mg/kg	4.4	
SEW-SB-03	SEW-SB-03-5-6-1	FD	7/10/2018	5	6	mg/kg	4.9	
SEW-SB-03	SEW-SB-03-6-7	N	7/10/2018	6	7	mg/kg	8.4	
SEW-SB-03	SEW-SB-03-7-8	N	7/10/2018	7	8	mg/kg	**410**	
SEW-SB-03	SEW-SB-03-8-9	N	7/10/2018	8	9	mg/kg	27	
SEW-SB-03	SEW-SB-03-9-10	N	7/10/2018	9	10	mg/kg	16	
SEW-SB-04	SEW-SB-04-1-2	N	7/11/2018	1	2	mg/kg	**390**	
SEW-SB-04	SEW-SB-04-2-3	N	7/11/2018	2	3	mg/kg	4.1	
SEW-SB-04	SEW-SB-04-3-4	N	7/11/2018	3	4	mg/kg	2.8	
SEW-SB-04	SEW-SB-04-4-5	N	7/11/2018	4	5	mg/kg	8	
SEW-SB-04	SEW-SB-04-5-6	N	7/11/2018	5	6	mg/kg	6	
SEW-SB-04	SEW-SB-04-6-7	N	7/11/2018	6	7	mg/kg	4.3	
SEW-SB-04	SEW-SB-04-7-8	N	7/11/2018	7	8	mg/kg	3.6	
SEW-SB-04	SEW-SB-04-8-9	N	7/11/2018	8	9	mg/kg	5.8	
SEW-SB-04	SEW-SB-04-9-10	N	7/11/2018	9	10	mg/kg	12	
SEW-SB-05	SEW-SB-05-1-2-A	N	7/12/2018	1	2	mg/kg	**19000**	
SEW-SB-05	SEW-SB-05-2-3-A	N	7/12/2018	2	3	mg/kg	**340**	
SEW-SB-05	SEW-SB-05-3-4-A	N	7/12/2018	3	4	mg/kg	16	
SEW-SB-05	SEW-SB-05-3-4-A-1	FD	7/12/2018	3	4	mg/kg	14	
SEW-SB-05	SEW-SB-05-4-5-A	N	7/12/2018	4	5	mg/kg	12	
SEW-SB-05	SEW-SB-05-5-6-A	N	7/12/2018	5	6	mg/kg	**15000**	
SEW-SB-05	SEW-SB-05-6-7-A	N	7/12/2018	6	7	mg/kg	8.5	
SEW-SB-05	SEW-SB-05-7-8-A	N	7/12/2018	7	8	mg/kg	12	
SEW-SB-05	SEW-SB-05-8-9-A	N	7/12/2018	8	9	mg/kg	3.4	
SEW-SB-05	SEW-SB-05-9-10-A	N	7/12/2018	9	10	mg/kg	3.8	
SEW-SB-06	SEW-SB-06-1-2	N	7/12/2018	1	2	mg/kg	**3900**	
SEW-SB-06	SEW-SB-06-2-3	N	7/12/2018	2	3	mg/kg	**1700**	
SEW-SB-06	SEW-SB-06-3-4	N	7/12/2018	3	4	mg/kg	140	
SEW-SB-06	SEW-SB-06-4-5	N	7/12/2018	4	5	mg/kg	**790**	
SEW-SB-06	SEW-SB-06-5-6	N	7/12/2018	5	6	mg/kg	92	
SEW-SB-06	SEW-SB-06-6-7	N	7/12/2018	6	7	mg/kg	7.9	
SEW-SB-06	SEW-SB-06-7-8	N	7/12/2018	7	8	mg/kg	13	

Table 2-2 Summary of Soil/Sediment Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

					Analyte		**LEAD**	
					Cas Number		**7439-92-1**	
					Remediation Cleanup Level (mg/kg)		**400**	
					Half of Remediation Cleanup Level (mg/kg)		**200**	
Location ID	**Sample ID**	**Sample Type**	**Sample Date**	**Start Depth (ft bgs)**	**End Depth (ft bgs)**	**Units**	**Result**	**Qua.**
SEW-SB-06	SEW-SB-06-8-9	N	7/12/2018	8	9	mg/kg	11	
SEW-SB-06	SEW-SB-06-9-10	N	7/12/2018	9	10	mg/kg	14	
SEW-SB-07	SEW-SB-07-1-2	N	7/13/2018	1	2	mg/kg	10	
SEW-SB-07	SEW-SB-07-2-3	N	7/13/2018	2	3	mg/kg	5.9	
SEW-SB-07	SEW-SB-07-3-4	N	7/13/2018	3	4	mg/kg	8.1	
SEW-SB-07	SEW-SB-07-3-4-1	FD	7/13/2018	3	4	mg/kg	6.8	
SEW-SB-07	SEW-SB-07-4-5	N	7/13/2018	4	5	mg/kg	4.3	
SEW-SB-07	SEW-SB-07-5-6	N	7/13/2018	5	6	mg/kg	15	
SEW-SB-07	SEW-SB-07-6-7	N	7/13/2018	6	7	mg/kg	13	
SEW-SB-07	SEW-SB-07-7-8	N	7/13/2018	7	8	mg/kg	25	
SEW-SB-07	SEW-SB-07-8-9	N	7/13/2018	8	9	mg/kg	2.8	
SEW-SB-07	SEW-SB-07-9-10	N	7/13/2018	9	10	mg/kg	4	
SEW-SB-08	SEW-SB-08-1-2	N	7/13/2018	1	2	mg/kg	6.6	
SEW-SB-08	SEW-SB-08-2-3	N	7/13/2018	2	3	mg/kg	4.6	
SEW-SB-08	SEW-SB-08-3-4	N	7/13/2018	3	4	mg/kg	6.8	
SEW-SB-08	SEW-SB-08-4-5	N	7/13/2018	4	5	mg/kg	55	
SEW-SB-08	SEW-SB-08-5-6	N	7/13/2018	5	6	mg/kg	23	
SEW-SB-08	SEW-SB-08-5-6-1	FD	7/13/2018	5	6	mg/kg	20	
SEW-SB-08	SEW-SB-08-6-7	N	7/13/2018	6	7	mg/kg	20	
SEW-SB-08	SEW-SB-08-7-8	N	7/13/2018	7	8	mg/kg	10	
SEW-SB-08	SEW-SB-08-8-9	N	7/13/2018	8	9	mg/kg	22	
SEW-SB-08	SEW-SB-08-9-10	N	7/13/2018	9	10	mg/kg	6.8	

Notes:

1. Analytical result data are preliminary

390 Bold results are greater than the 200 mg/kg Half of Remediation Cleanup Level

19000 Results with yellow highlight are greater than the 400 mg/kg Remediation Cleanup Level

EPA - United States Environmental Protection Agency

FD - Field duplicate

ft bgs - Feet below ground surface

ID - Identification

L - The identification of the analyte is acceptable; the reported value may be low

mg/kg - Milligrams per kilogram

N - Normal

NA - Not applicable

Qua. - Qualifier

TCLP - Toxicity characteristic leaching procedure

U - The analyte was not detected at or above the Reporting Limit

Table 2-3 - Summary of TCLP and Total Metals Soil Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

			Location ID	SEW-SB-01		SEW-SB-01		SEW-SB-01		SEW-SB-01		SEW-SB-01		SEW-SB-01		SEW-SB-02		SEW-SB-02		SEW-SB-02		SEW-SB-02	
			Sample ID	SEW-SB-01-1-2		SEW-SB-01-1-2-A		SEW-SB-01-2-3		SEW-SB-01-2-3-A		SEW-SB-01-3-4		SEW-SB-01-3-4-A		SEW-SB-02-1-2		SEW-SB-02-1-2-A		SEW-SB-02-2-3		SEW-SB-02-2-3-A		SEW-SB-02-3-4	
			Sample Date	7/5/2018		7/6/2018		7/5/2018		7/6/2018		7/5/2018		7/6/2018		7/5/2018		7/6/2018		7/5/2018		7/6/2018		7/5/2018	
			Sample Depth (ft bgs)	1-2		1-2		2-3		2-3		3-4		3-4		1-2		1-2		2-3		2-3		3-4	
			Analytical Method	Total Metals		TCLP		Total Metals		TCLP		Total Metals		TCLP		Total Metals		TCLP		Total Metals		TCLP		Total Metals	
Analyte	Cas Number	NJRDCSRS (mg/kg)	TCLP Crieria (mg/l)	Result (mg/kg)	Qua.	Result (mg/l)	Qua.	Result (mg/kg)	Qua.	Result (mg/l)	Qua.	Result (mg/kg)	Qua.	Result (mg/l)	Qua.	Result (mg/kg)	Qua.	Result (mg/l)	Qua.	Result (mg/kg)	Qua.	Result (mg/l)	Qua.	Result (mg/kg)	Qua.
Aluminum	7429-90-5	78,000	N/A	500		N/A		920		N/A		1300		N/A		490		N/A		740		N/A		580	
Antimony	7440-36-0	**31**	N/A	6.7		N/A		5.5		N/A		2.6		N/A		6		N/A		5		N/A		2.1	
Arsenic	7440-38-2	**19**	5	2.3		0.08	U	1.2		0.08	U	2.4		0.08	U	2.5	J	0.08	U	1.3		0.08	U	0.72	
Barium	7440-39-3	16,000	100	8.7	U	1	U	9.1	U	1	U	9.2	U	1	U	8.4	U	1	U	8.6	U	1	U	8.6	U
Beryllium	7440-41-7	16	N/A	0.26	U	N/A		0.45		N/A		0.46		N/A		0.25	U	N/A		0.26	U	N/A		0.26	U
Cadmium	7440-43-9	78	1	0.26	U	0.03	U	0.27	U	0.03	U	0.27	U	0.03	U	0.25	U	0.03	U	0.26	U	0.03	U	0.26	U
Calcium	7440-70-2	N/A	N/A	110		N/A		280		N/A		230		N/A		77		N/A		110		N/A		110	
Chromium, Total	7440-47-3	N/A	5	2.3		0.05	U	6.4		0.05	U	7.7		0.05	U	3		0.05	U	3.6		0.05	U	2.4	
Cobalt	7440-48-4	1,600	N/A	1.7	U	N/A		1.8	U	N/A		1.8	U	N/A		1.7	U	N/A		1.7	U	N/A		1.7	U
Copper	7440-50-8	**3,100**	N/A	5.7		N/A		2.9		N/A		4.9		N/A		20		N/A		4.9		N/A		1.7	
Iron	7439-89-6	N/A	N/A	1700		N/A		2400		N/A		5000		N/A		2500		N/A		2800		N/A		1700	
Lead	7439-92-1	**400**	**5**	140		0.341		12		0.08	U	11		0.08	U	320		3.06		270		0.08	U	3.7	
Magnesium	7439-95-4	N/A	N/A	240		N/A		390		N/A		310		N/A		210		N/A		310		N/A		310	
Manganese	7439-96-5	11,000	N/A	4.4		N/A		4.4		N/A		7.5		N/A		8.3		N/A		8.4		N/A		4.3	
Nickel	7440-02-0	1,600	N/A	2.1		N/A		3.6		N/A		3.2		N/A		4.8		N/A		9.7		N/A		6	
Potassium	7440-09-7	N/A	N/A	110		N/A		140		N/A		140		N/A		110		N/A		130		N/A		130	
Selenium	7782-49-2	390	1	1.7	U	0.2	U	1.8	U	0.2	U	1.8	U	0.2	U	1.7	U	0.2	U	1.7	U	0.2	U	1.7	U
Silver	7440-22-4	390	5	0.44	U	0.05	U	0.45	U	0.05	U	0.46	U	0.05	U	0.42	U	0.05	U	0.43	U	0.05	U	0.43	U
Sodium	7440-23-5	N/A	N/A	1500		N/A		1800		N/A		890		N/A		1500		N/A		1600		N/A		1800	
Thallium	7440-28-0	N/A	N/A	1.7	U	N/A		1.8	U	N/A		1.8	U	N/A		1.7	U	N/A		1.7	U	N/A		1.7	U
Vanadium	7440-62-2	N/A	N/A	5		N/A		9.4		N/A		12		N/A		6		N/A		6.3		N/A		4.7	
Zinc	7440-66-6	23,000	N/A	11		N/A		17		N/A		16		N/A		10		N/A		18		N/A		13	

Notes:

1. Analytical result data are preliminary

400 - Results with yellow highlight are greater than the NJRDCSRS

5 - Results with orange highlight are greater than TCLP Criteria

ft bgs - Feet below ground surface

ID - Identification

J - The identification of the analyte is acceptable; the reported value is an estimate

mg/kg - Milligrams per kilogram

mg/l - Milligrams per liter

N/A - Not available

NJRDCSRS - NJDEP Residential Direct Contact Soil Remediation Standard

Qua. - Qualifier

TCLP - Toxicity characteristic leaching procedure

U - The analyte was not detected at or above the Reporting Limit

Table 2-3 - Summary of TCLP and Total Metals Soil Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

			Location ID	SEW-SB-02		SEW-SB-03		SEW-SB-03		SEW-SB-03		SEW-SB-03		SEW-SB-03		SEW-SB-04		SEW-SB-04		SEW-SB-04	
			Sample ID	SEW-SB-02-3-4-A		SEW-SB-03-1-2		SEW-SB-03-1-2-A		SEW-SB-03-2-3		SEW-SB-03-2-3-A		SEW-SB-03-3-4		SEW-SB-03-3-4-A		SEW-SB-04-1-2		SEW-SB-04-1-2		SEW-SB-04-2-3		SEW-SB-04-2-3	
			Sample Date	7/6/2018		7/10/2018		7/11/2018		7/10/2018		7/11/2018		7/10/2018		7/11/2018		7/11/2018		7/11/2018		7/11/2018		7/11/2018	
			Sample Depth (ft bgs)	3-4		1-2		1-2		2-3		2-3		3-4		3-4		1-2		1-2		2-3		2-3	
			Analytical Method	TCLP		Total Metals		TCLP		Total Metals		TCLP		Total Metals		TCLP		Total Metals		TCLP		Total Metals		TCLP	
Analyte	**Cas Number**	**NJRDCSRS (mg/kg)**	**TCLP Crieria (mg/l)**	**Result (mg/l)**	**Qua.**	**Result (mg/kg)**	**Qua.**	**Result (mg/l)**	**Qua.**	**Result (mg/kg)**	**Qua.**	**Result (mg/l)**	**Qua.**	**Result (mg/kg)**	**Qua.**	**Result (mg/l)**	**Qua.**	**Result (mg/kg)**	**Qua.**	**Result (mg/l)**	**Qua.**	**Result (mg/kg)**	**Qua.**	**Result (mg/l)**	**Qua.**
Aluminum	7429-90-5	78,000	N/A	N/A		1400		N/A		470		N/A		380		N/A		1900		N/A		570		N/A	
Antimony	7440-36-0	**31**	N/A	N/A		**15000**		N/A		**100**		N/A		14		N/A		**70**		N/A		12		N/A	
Arsenic	7440-38-2	**19**	5	0.08	U	**4600**		0.884		**25**		0.08	U	3.3		0.08	U	**37**		0.08	U	1.8		0.08	U
Barium	7440-39-3	16,000	100	1	U	23		1	U	8.5	U	1	U	8.5	U	1	U	8	U	1	U	8.4	U	1	U
Beryllium	7440-41-7	16	N/A	N/A		0.23	U	N/A		0.26	U	N/A		0.26	U	N/A		0.29		N/A		0.25	U	N/A	
Cadmium	7440-43-9	78	1	0.03	U	16		0.03	U	0.26	U	0.03	U	0.26	U	0.03	U	1.3		0.03	U	0.25	U	0.03	U
Calcium	7440-70-2	N/A	N/A	N/A		530		N/A		84		N/A		53		N/A		280		N/A		200		N/A	
Chromium, Total	7440-47-3	N/A	5	0.05	U	18		0.05	U	3.3		0.05	U	2.1		0.05	U	16		0.05	U	3.5		0.05	U
Cobalt	7440-48-4	1,600	N/A	N/A		59		N/A		1.7	U	N/A		1.7	U	N/A		6.6		N/A		1.7	U	N/A	
Copper	7440-50-8	**3,100**	N/A	N/A		**3900**		N/A		44		N/A		10		N/A		150		N/A		6		N/A	
Iron	7439-89-6	N/A	N/A	N/A		280000		N/A		4900		N/A		1800		N/A		47000		N/A		4200		N/A	
Lead	7439-92-1	**400**	**5**	0.08	U	**39000**		**1050**		**600**		**15.1**		160		2.1		390		1.04		4.1		0.08	U
Magnesium	7439-95-4	N/A	N/A	N/A		280		N/A		230		N/A		160		N/A		550		N/A		420		N/A	
Manganese	7439-96-5	11,000	N/A	N/A		270		N/A		10		N/A		6.4		N/A		58		N/A		6.6		N/A	
Nickel	7440-02-0	1,600	N/A	N/A		310		N/A		4.2		N/A		1.9		N/A		16		N/A		3.4		N/A	
Potassium	7440-09-7	N/A	N/A	N/A		150		N/A		110		N/A		84		N/A		270		N/A		150		N/A	
Selenium	7782-49-2	390	1	0.2	U	16		0.2	U	1.7	U	0.2	U	1.7	U	0.2	U	1.6	U	0.2	U	1.7	U	0.2	U
Silver	7440-22-4	390	5	0.05	U	3.5		0.05	U	0.43	U	0.05	U	0.43	U	0.05	U	0.4	U	0.05	U	0.42	U	0.05	U
Sodium	7440-23-5	N/A	N/A	N/A		1000		N/A		1200		N/A		830		N/A		1400		N/A		1700		N/A	
Thallium	7440-28-0	N/A	N/A	N/A		1.8		N/A		1.7	U	N/A		1.7	U	N/A		1.6	U	N/A		1.7	U	N/A	
Vanadium	7440-62-2	N/A	N/A	N/A		42		N/A		6.6		N/A		4.1		N/A		47		N/A		6.1		N/A	
Zinc	7440-66-6	23,000	N/A	N/A		510		N/A		30		N/A		15		N/A		130		N/A		16		N/A	

Notes:

1. Analytical result data are preliminary

400 - Results with yellow highlight are greater than the NJRDCSRS

5 - Results with orange highlight are greater than TCLP Criteria

ft bgs - Feet below ground surface

ID - Identification

J - The identification of the analyte is acceptable; the reported value is an estimate

mg/kg - Milligrams per kilogram

mg/l - Milligrams per liter

N/A - Not available

NJRDCSRS - NJDEP Residential Direct Contact Soil Remediation Standard

Qua. - Qualifier

TCLP - Toxicity characteristic leaching procedure

U - The analyte was not detected at or above the Reporting Limit

Table 2-3 - Summary of TCLP and Total Metals Soil Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

			Location ID	SEW-SB-04		SEW-SB-04		SEW-SB-05		SEW-SB-05		SEW-SB-05		SEW-SB-05		SEW-SB-05		SEW-SB-05		SEW-SB-05		SEW-SB-06		SEW-SB-06	
			Sample ID	SEW-SB-04-3-4		SEW-SB-04-3-4		SEW-SB-05-1-2-A		SEW-SB-05-1-2		SEW-SB-05-2-3-A		SEW-SB-05-2-3		SEW-SB-05-3-4-A		SEW-SB-05-3-4-A-1		SEW-SB-05-3-4		SEW-SB-06-1-2		SEW-SB-06-1-2	
			Sample Date	7/11/2018		7/11/2018		7/12/2018		7/11/2018		7/12/2018		7/11/2018		7/12/2018		7/12/2018		7/11/2018		7/12/2018		7/12/2018	
			Sample Depth (ft bgs)	3-4		3-4		1-2		1-2		2-3		2-3		3-4		3-4		3-4		1-2		1-2	
			Analytical Method	Total Metals		TCLP		Total Metals		TCLP		Total Metals		TCLP		Total Metals		Total Metals		TCLP		Total Metals		TCLP	
Analyte	Cas Number	NJRDCSRS (mg/kg)	TCLP Crieria (mg/l)	Result (mg/kg)	Qua.	Result (mg/l)	Qua.	Result (mg/kg)	Qua.	Result (mg/l)	Qua.	Result (mg/kg)	Qua.	Result (mg/l)	Qua.	Result (mg/kg)	Qua.	Result (mg/kg)	Qua.	Result (mg/l)	Qua.	Result (mg/kg)	Qua.	Result (mg/l)	Qua.
Aluminum	7429-90-5	78,000	N/A	380		N/A		1400		N/A		1500		N/A		630		2000		N/A		6400		N/A	
Antimony	7440-36-0	**31**	N/A	5.3		N/A		**610**		N/A		**44**		N/A		6.3		19		N/A		**530**		N/A	
Arsenic	7440-38-2	**19**	5	1.7		0.08	U	**160**		0.557		**22**		0.08	U	4.9		16		0.08	U	**280**		0.08	U
Barium	7440-39-3	16,000	100	8.3	U	1	U	16		1	U	8	U	1	U	8.1	U	8.3	U	1	U	80		1	U
Beryllium	7440-41-7	16	N/A	0.25	U	N/A		0.24	U	N/A		0.24	U	N/A		0.24	U	0.34		N/A		0.33		N/A	
Cadmium	7440-43-9	78	1	0.25	U	0.03	U	4.7		0.03	U	1.2		0.03	U	0.33		1.8		0.03	U	2		0.03	U
Calcium	7440-70-2	N/A	N/A	160		N/A		250		N/A		350		N/A		120		210		N/A		51000		N/A	
Chromium, Total	7440-47-3	N/A	5	3.8		0.05	U	11		0.05	U	18		0.05	U	11		21		0.05	U	15		0.05	U
Cobalt	7440-48-4	1,600	N/A	1.7	U	N/A		7.6		N/A		2.6		N/A		1.6	U	2.7		N/A		4.1		N/A	
Copper	7440-50-8	**3,100**	N/A	1.9		N/A		600		N/A		37		N/A		5.1		9.8		N/A		190		N/A	
Iron	7439-89-6	N/A	N/A	2800		N/A		41000		N/A		35000		N/A		12000		52000		N/A		20000		N/A	
Lead	7439-92-1	**400**	**5**	2.8		0.08	U	**19000**		**846**		340		1.84		16		14		0.175		**3900**		0.271	
Magnesium	7439-95-4	N/A	N/A	310		N/A		420		N/A		530		N/A		300		560		N/A		16000		N/A	
Manganese	7439-96-5	11,000	N/A	4.3		N/A		110		N/A		30		N/A		20		36		N/A		250		N/A	
Nickel	7440-02-0	1,600	N/A	2.2		N/A		33		N/A		25		N/A		6.6		22		N/A		20		N/A	
Potassium	7440-09-7	N/A	N/A	120		N/A		290		N/A		180		N/A		130		220		N/A		470		N/A	
Selenium	7782-49-2	390	1	1.7	U	0.2	U	1.6	U	0.2	U	1.6	U	0.2	U	1.6	U	1.7	U	0.2	U	1.5	U	0.2	U
Silver	7440-22-4	390	5	0.42	U	0.05	U	0.75		0.05	U	0.41		0.05	U	0.41	U	0.42	U	0.05	U	0.8		0.05	U
Sodium	7440-23-5	N/A	N/A	1400		N/A		1300		N/A		1600		N/A		1600		1800		N/A		210		N/A	
Thallium	7440-28-0	N/A	N/A	1.7	U	N/A		1.6	U	N/A		1.6	U	N/A		1.6	U	1.7	U	N/A		1.5	U	N/A	
Vanadium	7440-62-2	N/A	N/A	5.6		N/A		36		N/A		39		N/A		15		43		N/A		18		N/A	
Zinc	7440-66-6	23,000	N/A	13		N/A		210		N/A		130		N/A		27		72		N/A		88		N/A	

Notes:

1. Analytical result data are preliminary

400 - Results with yellow highlight are greater than the NJRDCSRS

5 - Results with orange highlight are greater than TCLP Criteria

ft bgs - Feet below ground surface

ID - Identification

J - The identification of the analyte is acceptable; the reported value is an estimate

mg/kg - Milligrams per kilogram

mg/l - Milligrams per liter

N/A - Not available

NJRDCSRS - NJDEP Residential Direct Contact Soil Remediation Standard

Qua. - Qualifier

TCLP - Toxicity characteristic leaching procedure

U - The analyte was not detected at or above the Reporting Limit

Table 2-3 - Summary of TCLP and Total Metals Soil Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

			Location ID	SEW-SB-06		SEW-SB-06		SEW-SB-06		SEW-SB-06		SEW-SB-06		SEW-SB-07		SEW-SB-07		SEW-SB-07		SEW-SB-07		SEW-SB-08		SEW-SB-08	
			Sample ID	SEW-SB-06-2-3		SEW-SB-06-2-3		SEW-SB-06-3-4		SEW-SB-06-3-4		SEW-SB-06-4-5		SEW-SB-07-1-2		SEW-SB-07-1-2		SEW-SB-07-2-3		SEW-SB-07-2-3		SEW-SB-08-1-2		SEW-SB-08-1-2	
			Sample Date	7/12/2018		7/12/2018		7/12/2018		7/12/2018		7/12/2018		7/13/2018		7/13/2018		7/13/2018		7/13/2018		7/13/2018		7/13/2018	
			Sample Depth (ft bgs)	2-3		2-3		3-4		3-4		4-5		1-2		1-2		2-3		2-3		1-2		1-2	
			Analytical Method	Total Metals		TCLP		Total Metals		TCLP		Total Metals		Total Metals		TCLP		Total Metals		TCLP		Total Metals		TCLP	
Analyte	**Cas Number**	**NJRDCSRS (mg/kg)**	**TCLP Crieria (mg/l)**	**Result (mg/kg)**	**Qua.**	**Result (mg/l)**	**Qua.**	**Result (mg/kg)**	**Qua.**	**Result (mg/l)**	**Qua.**	**Result (mg/kg)**	**Qua.**	**Result (mg/kg)**	**Qua.**	**Result (mg/l)**	**Qua.**	**Result (mg/kg)**	**Qua.**	**Result (mg/l)**	**Qua.**	**Result (mg/kg)**	**Qua.**	**Result (mg/l)**	**Qua.**
Aluminum	7429-90-5	78,000	N/A	6700		N/A		8200		N/A		10000		2100		N/A		2300		N/A		1800		N/A	
Antimony	7440-36-0	**31**	N/A	**84**		N/A		6.3		N/A		**38**		1.6	U	N/A		1.6	U	N/A		1.5	U	N/A	
Arsenic	7440-38-2	**19**	5	**53**		0.08	U	7.6		0.08	U	17		5.3		0.08	U	5.1		0.08	U	2.5		0.08	U
Barium	7440-39-3	16,000	100	90		1	U	49		1	U	49		9.7		1	U	10		1	U	11		1	U
Beryllium	7440-41-7	16	N/A	0.37		N/A		0.42		N/A		0.52		0.25	U	N/A		0.24	U	N/A		0.23	U	N/A	
Cadmium	7440-43-9	78	1	1.4		0.03	U	0.65		0.03	U	0.72		0.25	U	0.03	U	0.24	U	0.03	U	0.23	U	0.03	U
Calcium	7440-70-2	N/A	N/A	49000		N/A		63000		N/A		91000		150		N/A		55		N/A		200		N/A	
Chromium, Total	7440-47-3	N/A	5	13		0.05	U	16		0.05	U	24		15		0.05	U	11		0.05	U	6.8		0.05	U
Cobalt	7440-48-4	1,600	N/A	3.6		N/A		2.9		N/A		2.9		1.6	U	N/A		1.6	U	N/A		1.5	U	N/A	
Copper	7440-50-8	**3,100**	N/A	81		N/A		16		N/A		28		290		N/A		86		N/A		6.1		N/A	
Iron	7439-89-6	N/A	N/A	13000		N/A		15000		N/A		21000		14000		N/A		14000		N/A		9000		N/A	
Lead	7439-92-1	**400**	**5**	**1700**		0.08	U	140		0.08	U	**790**		10		0.08	U	5.9		0.08	U	6.6		0.08	U
Magnesium	7439-95-4	N/A	N/A	13000		N/A		5700		N/A		4200		80		N/A		59		N/A		100		N/A	
Manganese	7439-96-5	11,000	N/A	210		N/A		160		N/A		220		20		N/A		23		N/A		25		N/A	
Nickel	7440-02-0	1,600	N/A	14		N/A		6.6		N/A		8.8		1.6	U	N/A		1.6	U	N/A		1.5	U	N/A	
Potassium	7440-09-7	N/A	N/A	480		N/A		320		N/A		310		160		N/A		130		N/A		130		N/A	
Selenium	7782-49-2	390	1	1.6	U	0.2	U	1.5	U	0.2	U	1.5	U	1.6	U	0.2	U	1.6	U	0.2	U	1.5	U	0.2	U
Silver	7440-22-4	390	5	0.56		0.05	U	0.38	U	0.05	U	0.55		0.41	U	0.05	U	0.4	U	0.05	U	0.38	U	0.05	U
Sodium	7440-23-5	N/A	N/A	250		N/A		110		N/A		120		82	U	N/A		80	U	N/A		76	U	N/A	
Thallium	7440-28-0	N/A	N/A	1.6	U	N/A		1.5	U	N/A		1.5	U	1.6	U	N/A		1.6	U	N/A		1.5	U	N/A	
Vanadium	7440-62-2	N/A	N/A	24		N/A		22		N/A		22		25		N/A		19		N/A		11		N/A	
Zinc	7440-66-6	23,000	N/A	120		N/A		67		N/A		32		7.6		N/A		6.6		N/A		6.4		N/A	

Notes:

1. Analytical result data are preliminary

400 - Results with yellow highlight are greater than the NJRDCSRS

5 - Results with orange highlight are greater than TCLP Criteria

ft bgs - Feet below ground surface

ID - Identification

J - The identification of the analyte is acceptable; the reported value is an estimate

mg/kg - Milligrams per kilogram

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Qua. - Qualifier

TCLP - Toxicity characteristic leaching procedure

U - The analyte was not detected at or above the Reporting Limit

Table 2-3 - Summary of TCLP and Total Metals Soil Sample Analytical Results
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

			Location ID	SEW-SB-08		SEW-SB-08	
			Sample ID	SEW-SB-08-2-3		SEW-SB-08-2-3	
			Sample Date	7/13/2018		7/13/2018	
			Sample Depth (ft bgs)	2-3		2-3	
			Analytical Method	Total Metals		TCLP	
Analyte	**Cas Number**	**NJRDCSRS (mg/kg)**	**TCLP Crieria (mg/l)**	**Result (mg/kg)**	**Qua.**	**Result (mg/l)**	**Qua.**
Aluminum	7429-90-5	78,000	N/A	1400		N/A	
Antimony	7440-36-0	**31**	N/A	1.6	U	N/A	
Arsenic	7440-38-2	**19**	5	2.1		0.08	U
Barium	7440-39-3	16,000	100	18		1	U
Beryllium	7440-41-7	16	N/A	0.24	U	N/A	
Cadmium	7440-43-9	78	1	0.24	U	0.03	U
Calcium	7440-70-2	N/A	N/A	110		N/A	
Chromium, Total	7440-47-3	N/A	5	7		0.05	U
Cobalt	7440-48-4	1,600	N/A	1.6	U	N/A	
Copper	7440-50-8	**3,100**	N/A	4.7		N/A	
Iron	7439-89-6	N/A	N/A	13000		N/A	
Lead	7439-92-1	**400**	**5**	4.6		0.08	U
Magnesium	7439-95-4	N/A	N/A	53		N/A	
Manganese	7439-96-5	11,000	N/A	23		N/A	
Nickel	7440-02-0	1,600	N/A	1.6	U	N/A	
Potassium	7440-09-7	N/A	N/A	140		N/A	
Selenium	7782-49-2	390	1	1.6	U	0.2	U
Silver	7440-22-4	390	5	0.4	U	0.05	U
Sodium	7440-23-5	N/A	N/A	80	U	N/A	
Thallium	7440-28-0	N/A	N/A	1.6	U	N/A	
Vanadium	7440-62-2	N/A	N/A	16		N/A	
Zinc	7440-66-6	23,000	N/A	7.2		N/A	

Notes:

1. Analytical result data are preliminary

400 - Results with yellow highlight are greater than the NJRDCSRS

5 - Results with orange highlight are greater than TCLP Criteria

ft bgs - Feet below ground surface

ID - Identification

J - The identification of the analyte is acceptable; the reported value is an estimate

mg/kg - Milligrams per kilogram

mg/l - Milligrams per liter

N/A - Not available

NJRDCSRS - NJDEP Residential Direct Contact Soil Remediation Standard

Qua. - Qualifier

TCLP - Toxicity characteristic leaching procedure

U - The analyte was not detected at or above the Reporting Limit

Table 4-1
Influent Water Quality Estimates and Effluent Criteria
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

Parameter	Unit	Influent Concentration		NJPDES	NJPDES
		Surface Water [1]	Groundwater [2]	Monthly Average Limit [3]	Daily Max Limit [3]
VOCs					
Acrolein	µg/l	N/A	N/A	NC	100
Acrylonitrile	µg/l	N/A	N/A	NC	50
Benzene	µg/l	0.5	0.5	37	136
Bromoform	µg/l	0.5	0.5	29	58
Carbon Tetrachloride	µg/l	0.5	0.5	NC	8.8
Chlorobenzene	µg/l	0.5	0.5	15	28
Chlorodibromomethane	µg/l	N/A	N/A	NC	14
Chloroethane	µg/l	0.5	0.5	104	268
Chloroform	µg/l	0.5	0.5	21	46
Dichlorobromomethane	µg/l	0.5	N/A	NC	12
1,1-Dichloroethane	µg/l	0.5	0.5	22	59
1,2-Dichloroethane	µg/l	0.5	0.5	68	211
1,1-Dichloroethylene	µg/l	0.5	0.5	16	25
1,2-Dichloropropane	µg/l	0.5	0.5	153	230
1,3-Dichloropropylene	µg/l	N/A	N/A	29	44
Ethylbenzene	µg/l	0.55	0.5	32	108
Methyl Bromide	µg/l	N/A	N/A	20	40
Methyl Chloride	µg/l	N/A	N/A	86	190
Methylene Chloride	µg/l	0.5	0.5	40	89
1,1,2,2-Tetrachloroethane	µg/l	0.5	0.5	NC	10
Tetrachloroethylene	µg/l	0.5	3.8	22	56
Toluene	µg/l	2.4	0.5	26	80
1,2-Trans-Dichloroethylene	µg/l	N/A	N/A	21	54
1,1,1-Trichloroethane	µg/l	0.5	0.5	21	54
1,1,2-Trichloroethane	µg/l	0.5	0.5	21	54
Trichloroethylene	µg/l	0.5	0.5	21	54
Vinyl Chloride	µg/l	0.5	0.5	104	268
2-Chlorophenol	µg/l	5	5	31	98
2,4-Dichlorophenol	µg/l	5	5	39	112
2,4-Dimethylphenol	µg/l	5	5	18	36
4,6-Dinitro-O-Cresol	µg/l	N/A	N/A	78	277
2,4-Dinitrophenol	µg/l	10	10	71	123
2-Nitrophenol	µg/l	5	5	41	69
4-Nitrophenol	µg/l	10	10	72	124
Pentachlorophenol	µg/l	10	10	NC	30
Phenol	µg/l	5	5	15	26
2,4,6-Trichlorophenol	µg/l	0.58	5	NC	20

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Parameter	Unit	Influent Concentration		NJPDES	NJPDES
		Surface Water [1]	Groundwater [2]	Monthly Average Limit [3]	Daily Max Limit [3]
SVOCs					
Anthracene	µg/l	5	5	22	59
Benzidine	µg/l	N/A	N/A	NC	50
Benzo (a) Anthracene	µg/l	5	5	NC	10
Benzo (a) Pyrene	µg/l	5	5	NC	20
Benzo(b)fluoranthene	µg/l	5	5	NC	10
Benzo (k) Fluoranthene	µg/l	5	5	NC	20
Bis (2-Chloroethyl) Ether	µg/l	5	5	NC	10
Bis (2-Chloroisopropyl) Ether	µg/l	5	5	301	757
Bis (2-Ethylhexyl) Phthalate	µg/l	5	5	59	118
Butyl Benzyl Phthalate	µg/l	N/A	5	NC	24
Chrysene	µg/l	5	5	NC	20
Dibenzo (a,h) Anthracene	µg/l	5	5	NC	20
1,2-Dichlorobenzene	µg/l	0.5	0.5	77	163
1,3-Dichlorobenzene	µg/l	0.5	0.5	31	44
1,4-Dichlorobenzene	µg/l	0.5	0.5	NC	28
3,3'-Dichlorobenzidine	µg/l	5	5	NC	60
Diethyl Phthalate	µg/l	5	5	81	203
Dimethyl Phthalate	µg/l	5	5	19	47
Di-N-Butyl Phthalate	µg/l	5	5	27	57
2,4-Dinitrotoluene	µg/l	5	0.5	NC	18.2
2,6-Dinitrotoluene	µg/l	5	5	255	641
Fluoranthene	µg/l	5	5	25	68
Fluorene	µg/l	5	5	22	59
Hexachlorobenzene	µg/l	5	5	NC	10
Hexachlorobutadiene	µg/l	5	0.5	20	49
Hexachlorocyclopentadiene	µg/l	5	5	NC	1800
Hexachloroethane	µg/l	5	5	21	54
Indeno (1,2,3-cd) Pyrene	µg/l	5	5	NC	20
Isophorone	µg/l	5	5	NC	20
Naphthalene	µg/l	5	5	22	59
Nitrobenzene	µg/l	5	5	27	68
N-Nitrosodimethylamine	µg/l	N/A	N/A	NC	20
N-Nitrosodiphenylamine	µg/l	5	5	NC	20
Phenanthrene	µg/l	5	5	22	59
Pyrene	µg/l	5	5	25	67
1,2,4-Trichlorobenzene	µg/l	0.5	0.5	68	140

Table 4-1
Influent Water Quality Estimates and Effluent Criteria
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

Parameter	Unit	Influent Concentration		NJPDES	NJPDES
		Surface Water [1]	Groundwater [2]	Monthly Average Limit [3]	Daily Max Limit [3]
Inorganic Compounds (Metals)					
Aluminum	µg/l	5890	8360	NC	NC
Antimony	µg/l	60	5.4	NC	NC
Arsenic	µg/l	36.2	10	50	100
Barium	µg/l	200	421	NC	NC
Beryllium	µg/l	5	5.7	NC	NC
Cadmium	µg/l	5	3.2	50	100
Calcium	µg/l	230000	186000	NC	NC
Chromium	µg/l	25	162	50	100
Cobalt	µg/l	50	39.3	NC	NC
Copper	µg/l	82.6	41	50	100
Iron	µg/l	19300	84300	1000	2000
Lead	µg/l	1780	107	50	100
Magnesium	µg/l	714000	502000	NC	NC
Manganese	µg/l	382	2060	NC	NC
Mercury	µg/l	0.13	0.2	NC	1
Nickel	µg/l	50	214	72	144
Potassium	µg/l	367000	153000	NC	NC
Selenium	µg/l	35	35	50	100
Silver	µg/l	10	10	25	50
Sodium	µg/l	6050000	4420000	NC	NC
Thallium	µg/l	25	25	100	200
Vanadium	µg/l	53.8	50	NC	NC
Zinc	µg/l	278	107	100	200
Groundwater Wet Chemistry					
Alkalinity as CACO3	mg/l	N/A	26	NC	NC
Total Organic Carbon	mg/l	N/A	N/A	30	45
Biochemical Oxygen Demand	mg/l	N/A	N/A	30	45
Chemical Oxygen Demand	mg/l	N/A	NA	60	90
Total Dissolved Solids	mg/l	N/A	N/A	500 [4]	500 [4]
Total Suspended Solids	mg/l	55	N/A	30	45
Sulfate	mg/l	N/A	610	250 [4]	250 [4]

Table 4-1
Influent Water Quality Estimates and Effluent Criteria
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Parameter	Unit	Influent Concentration		NJPDES	NJPDES
		Surface Water [1]	Groundwater [2]	Monthly Average Limit [3]	Daily Max Limit [3]
pH	SU	8.24	N/A	6-9	6-9

Notes
1 - Maximum analyte concentration used for surface water samples (filtered and unfiltered) collected from Area 2 and 5.
2 - Maximum analyte concentration used for groundwater samples collected from monitoring wells: MW-6S/6D and MW-10S/10D.
3 - NJPDES effluent standards for site remediation project for SC, SE Water per NJAC 7:14A:12.
4 - Effluent standards for water quality parameters are listed from NJDEP standards for FW2 surface water per NJAC 7:9B because these parameters are not listed in NJAC 7:14A:12.
N/A - Not available
NC - Analyte criteria not available
µg/l - microgram per liter
mg/l - milligram per liter

Table 4-2
Approximate Extents of Vegetation Communities
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

Vegetation Community [1]		Approximate Total Acreage
MMU	Mowed / Maintained Uplands	7.97
ISS	Intertidal / Subtidal Shallows	0.75
SB	Sandy Beach	3.99
SW	Seawall	2.51
DSSF	Disturbed Secondary Successional Forest	0.90
ESM	Early Successional Meadow	0.58
ESS	Early Successional Scrub	0.25

Notes:
1) Approximate extents of vegetation communities were identified by Amy S. Green Environmental Consultants based on April 2020 wetland delineation field observations and aerial photography. The extents of vegetation communities were not field delineated.

Table 6-1
Summary of Permits and Approvals
Raritan Bay Seawall Slag Superfund Site - Seawall Sector
Townships of Old Bridge And Sayreville, Middlesex County, New Jersey

Permit/Approval	Authority	Contact Name/Number
CAFRA Coastal General Permit Flood Hazard Area Permit, Freshwater Wetlands General Permit	Division of Land Resource Protection (DLRP)	Coastal Bureau (609) 633-2289 Tidelands Bureau (609) 292-2573 General Information (609) 777-0454
NJPDES Discharge to Surface Water Permit	Bureau of Point Source Permitting, Division of Water Quality, NJDEP	Susan Rosenwinkel (609) 292-4860
Treatment Work Approval (TWA)	Bureau of Construction and Connection Permits, Division of Water Quality, NJDEP	Charles Jenkins (609) 984-4429
NJPDES RFA for Stormwater Discharge	Bureau of Nonpoint Pollution Control, Division of Water Quality, NJDEP	NJDEP Online E-Permitting System Gabriel Mahon (609) 633-7021
Temporary Dewatering Permit	Bureau of Water Allocation, Division of Water Supply, NJDEP	watersupply@dep.nj.gov (609) 292-2957
Well Drilling or Abandonment	Bureau of Water Systems and Well Permitting, Division of Water Supply, NJDEP	Wellpermitting@dep.nj.gov (609) 984-6831
Soil Erosion and Sediment Control Certification	Freehold Soil Conservation District	(732) 683-8500
Construction Permit	Department of Construction, Borough of Sayreville Department of Engineering, Old Bridge, NJ	(732) 390-7077 (732) 721-5600 x 2330
Utility Coordiantion - Force Main	Old Bridge Municipal Utilities Authority	Engineering (732) 679 8440