PROPOSED PLAN for Soil, Sediment, and Surface Water at Site 12 – South Landfill
Former Naval Air Station Joint Reserve Base Willow Grove, Pennsylvania

Final August 2020

Navy Announces Proposed Plan

The purpose of this **Proposed Plan**[(1)] is to present the preferred alternative for the soil, sediment, and surface water remedial action at Site 12 – South Landfill, also known as **Operable Unit (OU)** 11, at the former Naval Air Station Joint Reserve Base (NAS JRB) Willow Grove in Horsham Township, Pennsylvania. The preferred alternative for the groundwater remedial action at Site 12 will be presented to the public in a separate Proposed Plan at a later date. The Navy's Proposed Plan recommends limited soil and sediment removal with on-site consolidation, soil cover, **land use controls** (**LUCs**), and long-term monitoring as the preferred remedial alternative to address risks associated with soil, sediment, and surface water at Site 12. The Navy expects the preferred alternative to satisfy statutory requirements; to be protective of human health and the environment; to be cost effective; and to utilize permanent solutions and alternative treatment technologies to the maximum extent practicable.

Proposed Plan Summary: Limited Soil Removal with On-Site Consolidation, Soil Cover, Land Use Controls, and Long-Term Monitoring

This Proposed Plan is issued by the Navy, the lead agency for the **Installation Restoration Program (IRP)** and **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)** activities at the NAS JRB Willow Grove facility; and by the lead regulatory agency, the United States Environmental Protection Agency (EPA). The Navy is issuing this Proposed Plan as part of its public participation responsibilities under Sections 113(k), 117(a), and 121(f) of CERCLA and 40 Code of Federal Regulations Section 300.430(f)(2) of the **National Oil and Hazardous Substances Pollution Contingency Plan (NCP)**. Background information for the site and the rationale for choosing the preferred alternatives are included in this plan.

A final decision on the remedial approach for Site 12 soil, sediment, and surface water will be made after review and consideration of all information submitted during the 45-day Public **Comment Period**. The Navy and EPA, in consultation with the Pennsylvania Department of Environmental Protection (PADEP), will select the final remedy in a **Record of Decision (ROD)**.

Public Comment Period

Public Comment Period

September 10, 2020 to October 25, 2020

Submit Written Comments

The Navy will accept written comments on the Proposed Plan during the public comment period. Send written comments postmarked no later than October 25, 2020 to the address on the back page.

Attend the Public Meeting

The Navy will host a virtual public meeting for the Proposed Plan for Site 12 on September 23, 2020 between 6:00 to 8:00 p.m. The virtual public meeting will utilize a webinar tool known as WebEx. The link to the WebEx and phone number are provided below.

HTTPS://TINYURL.COM/WGPP3-12

Phone access: 1-408-418-9388 (toll free)

Access code: 132 480 1632

[(1)]A glossary of relevant technical and regulatory terms is provided at the end of this Proposed Plan. Terms included in the glossary are initially indicated in **boldface** within this Proposed Plan.

The Navy and EPA may modify the preferred remedy in the Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all of the remedial alternatives presented in this Proposed Plan.

This Proposed Plan summarizes the findings of the Site 12 - South Landfill Phase II **Remedial Investigation (RI)**, and outlines the alternatives presented in the **Feasibility Study (FS)**. In addition, this Proposed Plan explains how the public can participate in the decision-making process and provides addresses for the appropriate Navy and EPA contacts.

The Proposed Plan also summarizes information from other documents that are contained in the **Administrative Record** file for this site: https://www.bracpmo.navy.mil/brac_bases/northeast/reserve_base_willow_grove/documents.html.

An **Information Repository** is also available for site history and report information and is located at the Horsham Township Public Library, 435 Babylon Road, Horsham, Pennsylvania.

The website address for the information repository is: http://oldhtl.mclinc.org/WillowGroveNASindex.html.

The Navy invites the public to review the available materials and to comment on this Proposed Plan during the public comment period.

Site Background

Former NAS JRB Willow Grove is located in Horsham Township, Montgomery County in southeastern Pennsylvania, approximately 20 miles north of Philadelphia. The former Base occupies approximately 900 acres of flat to slightly rolling terrain and is generally bounded by State Route 611 to the east, State Route 463 to the southwest, and Keith Valley Road to the north (Figure 1).

Site 12 - the South Landfill occupies approximately 11 acres of an undeveloped area southwest of the runway in the southern portion of the Base, immediately northeast of Site 2 – Antenna Field Landfill (see Figures 1 and 2). Between 1948 and 1960, the landfill was the principal disposal area for the solid waste generated by the facility. Landfill activities consisted of trench excavation with subsequent burning and burial of waste material disposed within the trenches. Wastes reportedly disposed in the landfill include general refuse, paint wastes, sewage and industrial pretreatment plant sludges, trichloroethene (TCE), and carbon tetrachloride.

In 2005, NAS JRB Willow Grove was designated for closure under the authority of the Defense Base Closure and Realignment Act (BRAC) of 1990, Public Law 101-510 as amended. Under BRAC, as amended, the Base was officially disestablished on March 30, 2011 and closed in September 2011, at which time it was transferred to the BRAC Program Management Office and entered caretaker status. Decisions regarding the future use of the land are coordinated by the Horsham Land Redevelopment Authority.

Environmental investigations at Site 12 include the **Initial Assessment Study (IAS)**, **Site Investigation (SI)**, Phase I and Phase II RI, and Phase II follow-on RI. These investigations were performed as part of the CERCLA process identified in Figure 3. The IAS (also known as the Preliminary Assessment) assessed 17 identified sites at the Base. Based on IAS findings, SI sampling was performed at 12 of the 17 sites in 1990. RI/FS activities have subsequently been completed or are underway at eight of these sites.

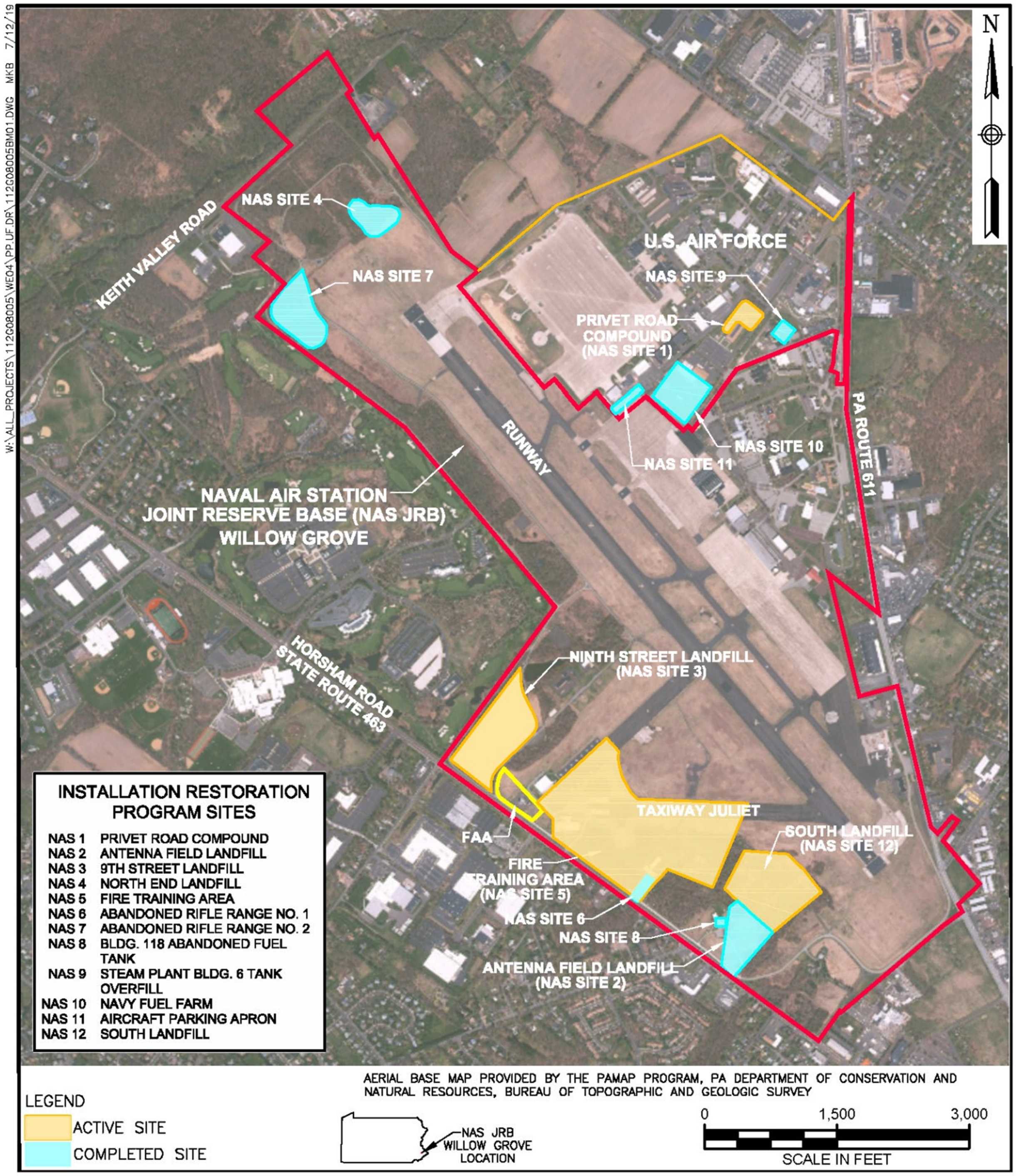


Figure 1: NAS JRB Willow Grove CERCLA Sites

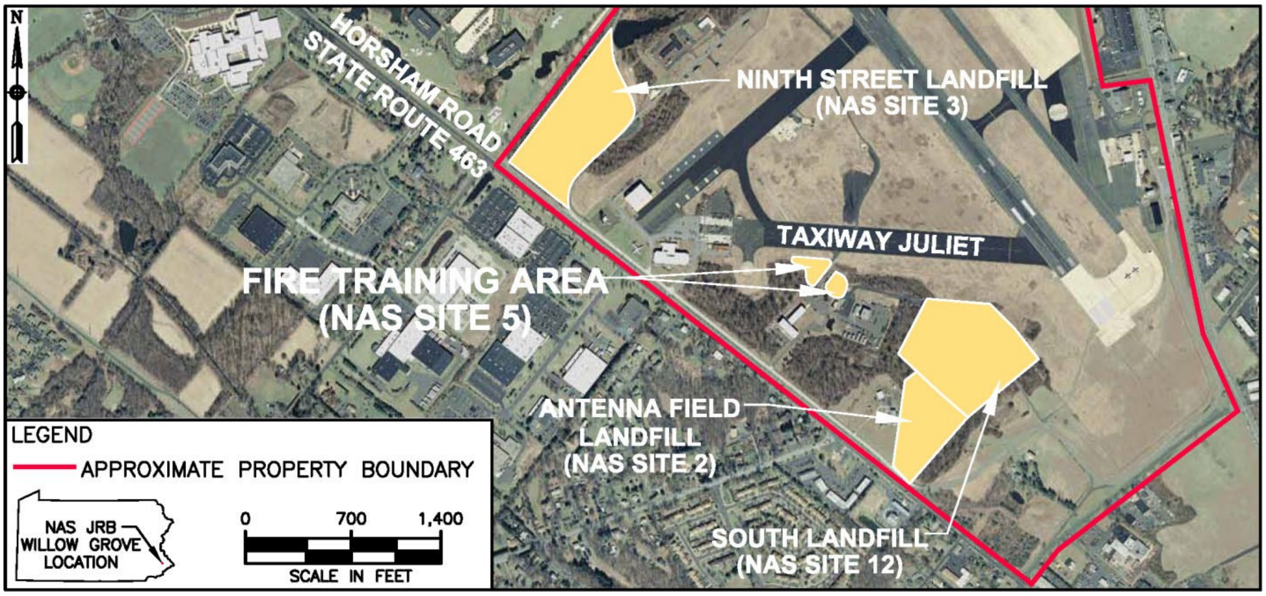
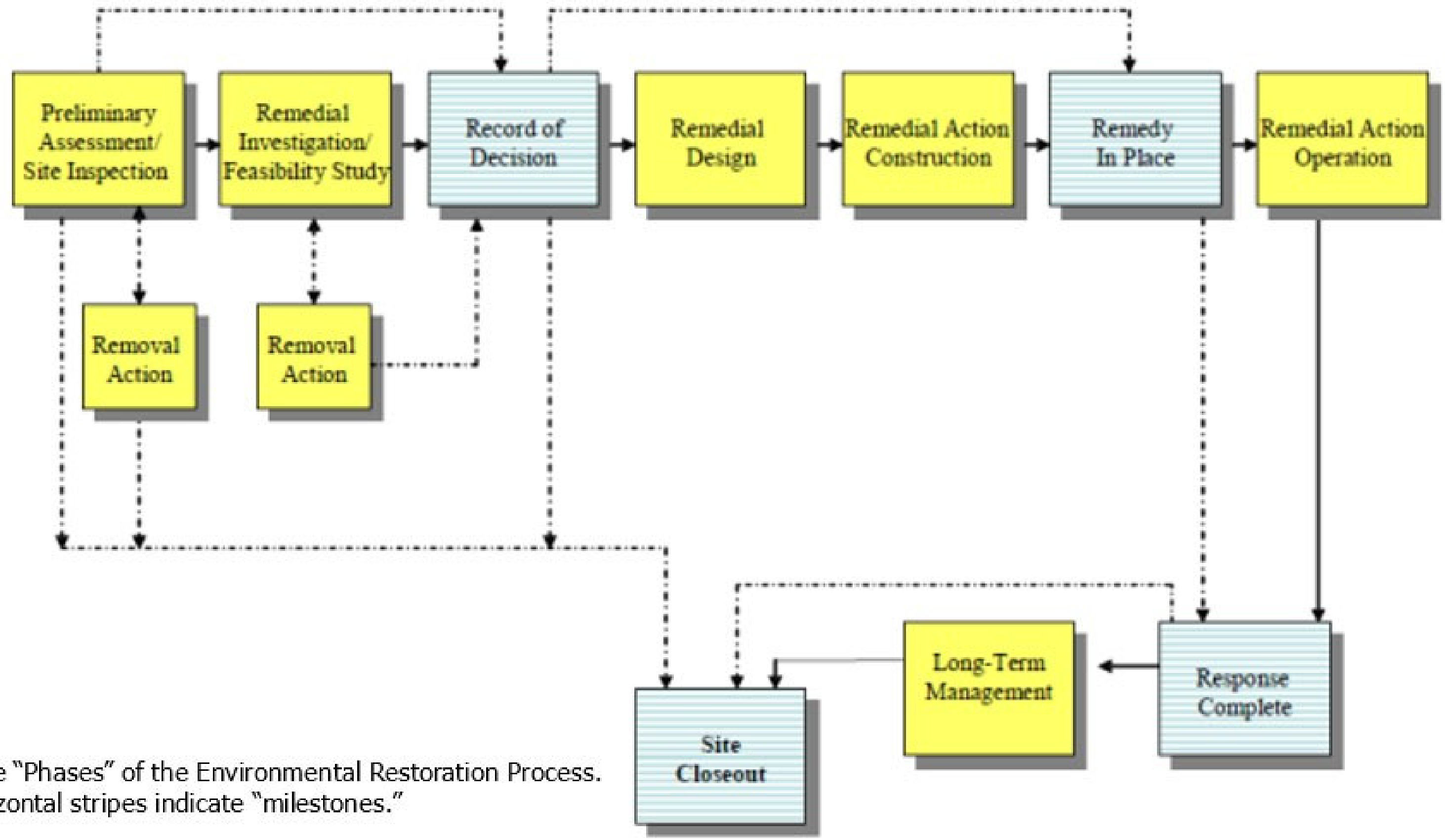


Figure 2: Site 12 General Location and Nearby Features

The Phase I RI, performed in 1993, characterized the physical and chemical nature of several sites and identified data gaps requiring further study. Recommendations for further investigation led to Phase II RI activities that began in 1997. The April 1998 draft Phase II RI Report covered four IRP sites at NAS JRB Willow Grove and included a **human health risk assessment (HHRA)** completed in 1997 for each site. After the draft Phase II RI Report was submitted in April 1998, the Navy in agreement with EPA and PADEP, administratively separated the RI reporting process to allow each of the four remaining Navy IRP sites to progress independently.

Portions of Site 12 were investigated in 1997 as part of the RI for Site 2 – Antenna Field Landfill, which is adjacent to Site 12 to the southwest. A draft RI report for Site 2 was completed in 2002. During this time, the Navy discovered debris and empty discarded drums in an area between Site 2 and Site 5, and subsequently designated this area as site screening area (SSA) 12. The Navy contractor, Resources Management Concepts, Inc. (RMC), removed drums and debris and sampled soil at SSA 12 in 2003. The results of the RMC investigation indicated that **semivolatile organic compounds (SVOCs)**, pesticides, and **metals** were present at some locations. In December 2007, Tetra Tech collected confirmation samples at the locations previously sampled during the RMC Investigation. SVOCs, pesticides, and metals were detected at concentrations greater than the EPA Region 3 Risk-Based Concentrations (RBCs) for residential soil. Based on the observations made during the confirmation sampling investigation, the Navy directed Tetra Tech to perform an electromagnetic (EM) geophysical survey of SSA 12 to locate potential buried waste materials and to delineate the lateral extent of these materials. The EM survey was conducted in April 2008. Various anomalies were detected and mapped during the survey which confirmed the presence of buried waste at the site (see Figure 4). SSA 12 was renamed Site 12 – South Landfill.

The Site 12 Phase I RI field work was completed in January 2010. The work consisted of the excavation of 15 test pits and the collection of 40 surface soil samples, 31 subsurface soil samples, 7 surface water samples, and 8 sediment samples. The surface and subsurface soil samples were biased towards areas that



Notes:
Yellow boxes indicate "Phases" of the Environmental Restoration Process.
Boxes with blue horizontal stripes indicate "milestones."

Figure 3: CERCLA Process

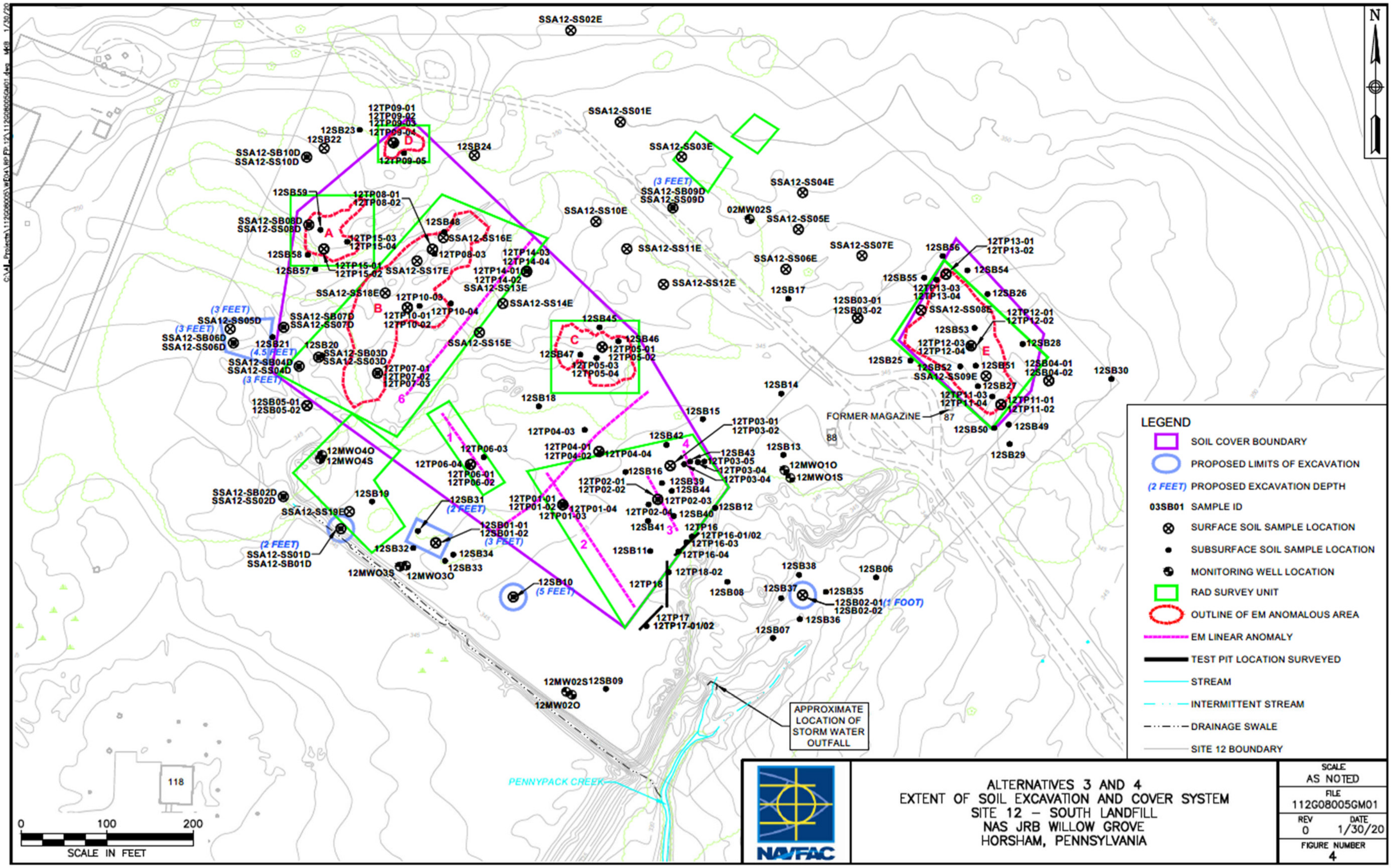


Figure 4: Alternatives 3 and 4 - Extent of Soil Excavation and Cover System

contained buried waste, based on the results of the EM survey. In June 2010, Tetra Tech submitted the Draft Phase I RI Data Report. Contaminants exceeding Project Screening Levels (PSLs) consisted of SVOCs, pesticides, and metals in surface soil; SVOCs, pesticides, **dioxins**, and metals in subsurface soil; SVOCs, pesticides, and metals in surface water; and **volatile organic compounds (VOCs)**, SVOCs, pesticides, and metals in sediment. Test pit sample analyses and visual observations confirmed the presence of buried waste and associated soil contamination at the locations of EM anomalies. The test pit excavations confirmed that the suspected disposal areas identified by EM survey were in fact well-defined pits containing waste and debris.

The Navy, in conjunction with EPA, decided that additional surface and subsurface soil samples and monitoring well groundwater samples were needed to further delineate the nature and extent of target analytes that exceeded risk-based benchmarks in the Phase I investigation, and that an HHRA and an **Ecological Risk Assessment (ERA)** were necessary.

The Phase II RI field work commenced in December 2011. Soil sampling was completed in January 2012 and the groundwater monitoring well construction and sampling were completed in March 2012. A Phase II RI report for Site 12 was finalized in February 2014.

In accordance with Navy policy, a **Historical Radiological Assessment (HRA)** was performed to identify potential, likely, or known sources of radioactive material and radioactive contamination based on existing or derived information. The HRA is a screening tool to determine sites or areas that need further action or pose no threat to human health. The Final HRA was issued in July 2013.

As recommended in the HRA, a **Radiological Scoping Survey** was conducted at each area potentially impacted by use or disposal of radioactive materials to evaluate surficial radiological conditions and identify the need for additional actions if necessary. Ten **survey units** were determined based on evaluations of geophysical survey and test pit results from RI activities. The Scoping Survey for Site 12, completed in March 2017, found no radiological risks associated with surface soils at the site.

Site Characteristics

Surface soils in Site 12 were found to be contaminated with **polycyclic aromatic hydrocarbons (PAHs)** and metals; and subsurface soils were found to be contaminated with PAHs, dioxins, and metals. **Polychlorinated biphenyls (PCBs)** were also detected sporadically. PAHs were detected at concentrations greater than screening levels in the majority of the surface and subsurface soil samples. In general, the highest concentrations were detected in samples collected within areas of buried waste. Site-related metals contamination consisted mainly of lead. Dioxins/furans were detected at concentrations greater than screening levels in all six of the subsurface soil samples analyzed for these chemicals. These samples were collected from charred waste encountered in several test pits. There were no VOCs detected at concentrations greater than screening levels in site soils.

Surface water and sediment show PAHs, pesticides, and metals contamination. PAHs exceeded screening levels in three out of seven surface water samples, and all but two of the sediment samples.

The highest surface water PAH concentrations were detected in the drainage ditch that forms the southern boundary of the site. The highest PAH concentrations in sediment were detected at the storm water outfall and in the intermittent stream downstream from the storm water outfall. Total PAHs exceeded the ecological **probable effects concentration (PEC)** of 22,800 micrograms per kilogram (µg/kg) in samples 12SD01, 12SD02, and 12SD03, all of which were collected downgradient of Outfall 2 (see Figure 5). It is unclear whether these elevated PAH sediment concentrations are the result of the landfill wastes or migration from a source upstream from the landfill via the storm water outfall. There was no pattern to the distribution of metals or pesticide exceedances in surface water or sediment samples.

The distribution of PAHs, pesticides, PCBs, dioxins/furans, and metals detected in soils and sediment at Site 12 at concentrations greater than regulatory screening values is sporadic, indicating localized disposal practices over time. Because of their partition coefficients, PAHs, pesticides, PCBs, and dioxins/furans in the environment will partition primarily to soils and sediments. Leaching to groundwater is not a dominant transport pathway for these large organic molecules. The principal mode of transport of PAHs and other organics-contaminated soils is via overland transport of eroded soil particles during runoff. Microbial degradation is the primary degradation mechanism affecting organic chemicals in soils.

Metals in soils are typically tightly adsorbed to the soil organic matter or mineral fractions but may be converted into soluble forms, which are susceptible to leaching and transport to groundwater. Adsorbed metals may migrate from a contaminated source via erosion of surface soils. Soluble forms of metals may dissolve in infiltrating precipitation and eventually impact groundwater. Metals do not tend to be degraded by microbial action but can change oxidation state (and toxicity) depending on conditions in their environment.

Based on the results of the Radiological Scoping Survey within the potentially impacted areas of Site 12, there is no radiological risk associated with surface soils. Subsurface soils were not assessed and would require screening if disturbed.

Two monitoring wells contained the VOCs, TCE, carbon tetrachloride, and chloroform at concentrations exceeding screening levels. The locations of these wells indicate that the landfill is the likely source of the contamination, although soil sample results do not show the precise location of the source within the landfill. Most of the monitoring wells contained metals at concentrations exceeding screening levels. The groundwater metals contamination consisted mainly of aluminum, manganese, and chromium. No VOCs were detected in concentrations above screening levels in groundwater during the most recent groundwater sampling event conducted in September 2019. As previously discussed, the preferred alternative for the groundwater remedial action at Site 12 will be included in a separate submittal at a later date.

Scope and Role

In 1995, NAS JRB Willow Grove was placed on the **National Priorities List (NPL)**, which is a list of sites where uncontrolled hazardous substance releases may potentially present serious threats to human health and the environment. Federal and state environmental laws govern cleanup activities at federal facilities. CERCLA, better known as **Superfund**, provides procedures for investigation and cleanup of environmental problems. Under this law, the Navy is pursuing cleanup of designated sites at NAS JRB Willow Grove to return the property to a condition that protects human health and the environment.

Site 12 is one of several sites being addressed at NAS JRB Willow Grove under CERCLA. Soil, sediment, surface water and groundwater at Site 12 were studied together during the RI and FS stages; however, this Proposed Plan addresses only soil, sediment, and surface water at Site 12 (OU11). A Proposed Plan for groundwater at Site 12 (OU11 groundwater) will be presented to the public in the future. Note that Site 1 – Privet Road Compound (OU1 for soil and OU3 for groundwater), Site 9 (Building 6 Tank Overfill), Site 10 (Navy Fuel Farm), and Site 11 (Aircraft Parking Apron) have been transferred to the Air Force. The following sites remain on Navy property and have completed the CERCLA process and require no further action: Site 2 (Antenna Field Landfill: OU5 for soil and OU9 for groundwater), Site 4 (North End Landfill: OU6 for soil and OU10 for groundwater), Site 6 (Abandoned Rifle Range No. 1), Site 7 (Abandoned Rifle Range No. 2), and Site 8 (Building 118).

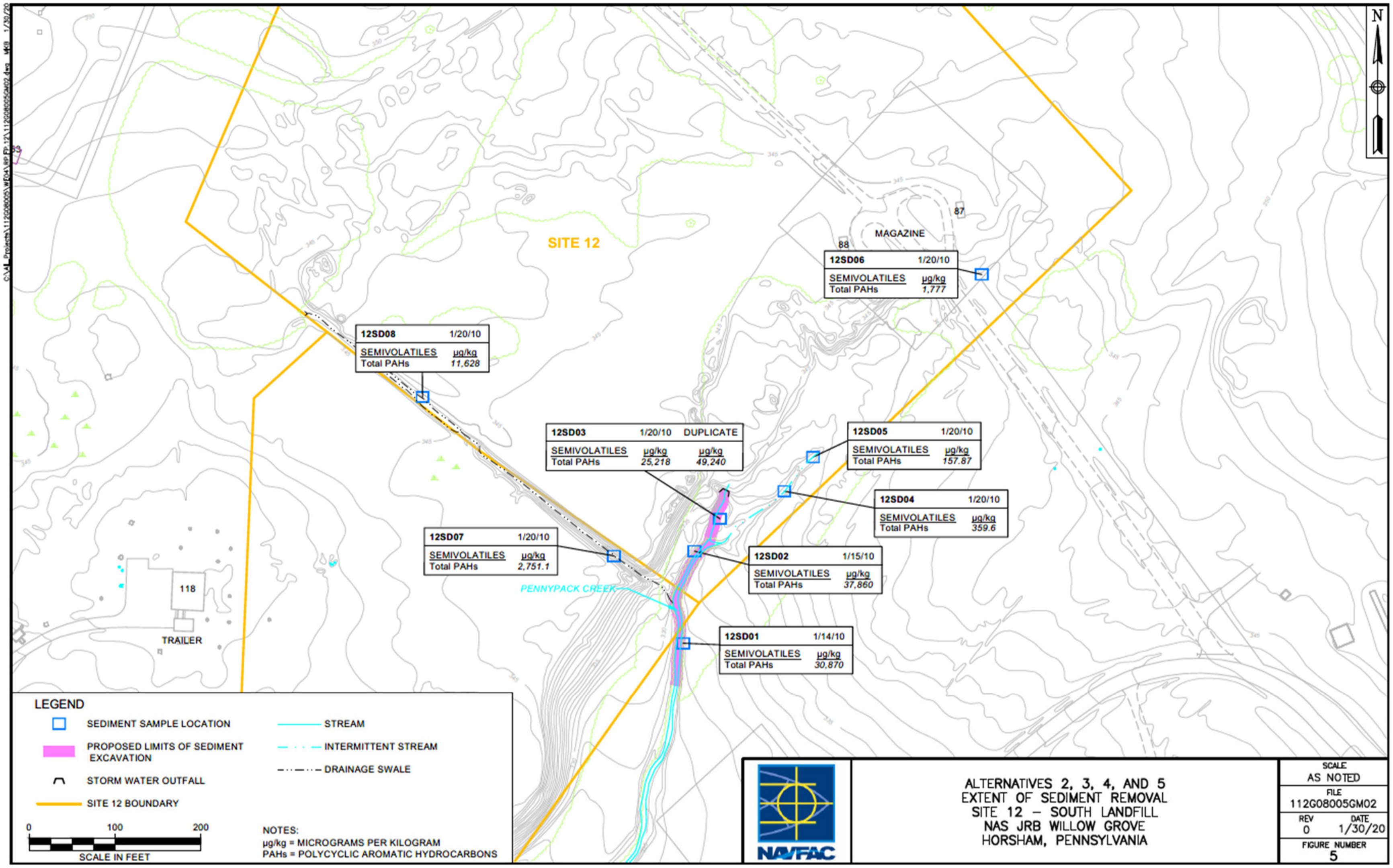


Figure 5: Alternatives 2, 3, 4, and 5 - Extent of Sediment Removal

A Proposed Plan for Site 3 (Ninth Street Landfill) is currently in preparation. Site 5 (Fire Training Area: OU5 for soil and OU2 for groundwater) has a ROD and the remedy is in place. A base-wide groundwater investigation for **per- and polyfluoroalkyl substances (PFAS)**, known as OU12, is currently in the RI/FS process. Although Site 12 groundwater is included within the OU12 area, the OU12 investigation is being conducted separately from Site 12 and is not included in this Proposed Plan. Each site or OU progresses through the CERCLA process independently of each other. The Proposed Plan for this site is not expected to have an impact on the strategy or progress of cleanup at any of the other NAS JRB Willow Grove sites or OUs. Figure 1 presents the location of the sites located within the facility.

Summary of Site Risks

An HHRA for Site 12 was performed to characterize the potential risks to human **receptors** exposed to groundwater, surface soil, total (surface and subsurface) soil, surface water, and sediment media under current and potential land uses. As stated in the scope and role, Site 12 groundwater will be addressed separately. An ERA was conducted to evaluate the potential for adverse ecological impacts of site-related contamination at Site 12. Detailed information for each **risk assessment** is included in the Site 12 Phase II RI Report.

Summary of Human Health Risk Assessment

The HHRA is a multi-step process to evaluate the baseline risk, which is the likelihood of adverse health effects if no cleanup actions were taken at the site. The HHRA for Site 12 was conducted in accordance with EPA's applicable CERCLA guidance.

Step 1 – Identify Chemicals of Potential Concern

Chemicals of Potential Concern (COPCs) for each medium were selected based on a toxicity screening step to compare detected concentrations to toxicity-based benchmark concentrations. COPCs for soil, sediment, surface water, and groundwater exposure for all receptors were selected in a conservative manner, in most cases by comparing data to EPA or state risk-based screening criteria. The screening values selected for comparison were based on residential exposure which is the most conservative site use. A chemical is selected as a COPC if levels detected at the site exceed the screening criteria.

Step 2 – Conduct an Exposure Assessment

This step considers the way that humans may come into contact with contaminants at the site. Potential receptors evaluated in the HHRA included current and future child recreational users, current and future adult recreational users, current and future lifetime recreational users, future child residents, future adult residents, future lifetime residents, future construction workers, and current and future industrial workers. The risk evaluation assumed that potential human receptors would be exposed to COPCs in each medium at Site 12 via the potential exposure routes of ingestion, dermal (skin) contact, and inhalation.

Step 3 – Complete a Toxicity Assessment

At this step, possible harmful effects from exposure to COPCs are evaluated. Generally, these chemicals are separated into two groups, **carcinogens** (chemicals that may cause cancer) and **non-carcinogens** (chemicals that may cause adverse health effects other than cancer). Chemicals that have both types of effects were evaluated for carcinogenic and non-carcinogenic effects in the HHRA. Further details are provided in the text box.

Step 4 – Characterize the Risk

The results from Steps 2 and 3 were combined to estimate the overall risk from exposure to chemicals at Site 12.

The results of the HHRA at Site 12 indicate the following:

- **Estimated Reasonable Maximum Exposure** cancer risks for the most restrictive land use scenario (future lifetime resident) exceeded EPA's acceptable risk range for surface soil, total soil, and groundwater.
- Estimated **cancer risk** for the lifetime recreational scenario was within the EPA acceptable risk range for surface soil and sediment, but exceeded the EPA acceptable risk range for total soil and surface water.
- The primary contributors to cancer risk for the lifetime resident for surface soil were arsenic, chromium, and PAHs; for total soil were arsenic, chromium, PAHs, PCBs, and dioxin; and for surface water were chromium, dieldrin, and PAHs. Note that after further evaluation during the FS, PCBs and arsenic were excluded as risk drivers for surface soil, although arsenic is considered as a risk driver for total soil which includes subsurface soils.
- The non-cancer **hazard index (HI)** developed for the most conservative future land use scenario (future child resident) exceeded 1 (the EPA acceptable level) for surface soil, and total soil. Thallium and dioxin were the risk drivers for soils.
- Non-cancer HI for all receptors exposed to surface water were within acceptable limits.
- Non-cancer HIs for the recreational child scenario and the construction worker exceeded 1 (the EPA acceptable level) for sediment. Manganese and thallium were the risk drivers for sediment.

EXPRESSING ESTIMATED HUMAN HEALTH RISKS

Human Health Risk Assessment: When evaluating the risk to humans, the risk estimates for carcinogens (chemicals that may cause cancer) and non-carcinogens (chemicals that may cause adverse effects other than cancer) are expressed differently.

Carcinogens: For cancer-causing chemicals, risk estimates are expressed in terms of probability. For example, exposure to a particular carcinogenic chemical may present a 1 in 10,000 increased chance of causing cancer over an estimated lifetime of 70 years. This can also be expressed as $1x10^{-4}$. The EPA acceptable risk range for carcinogens is $1x10^{-4}$ to $1x10^{-6}$ or a 1 in 10,000 to 1 in 1 million increased chance of getting cancer. In general, calculated risks greater than this range would require consideration of the development and implementation of cleanup alternatives.

Non-Carcinogens: For non-cancer-causing chemicals, exposures are first estimated and then compared to a **reference dose (RfD)** for each chemical. The reference dose is developed by EPA scientists to estimate the amount of a chemical a person (including the most sensitive person) could be exposed to over a lifetime without developing adverse (non-cancer) health effects. The ratio of exposure level to RfD for a single chemical is known as a **hazard quotient (HQ).** The measure for multiple chemicals effecting the same target organ is known as **a hazard index (HI)**. A HQ or a HI for a target organ greater than 1 suggests that adverse effects are possible, and the risk is deemed unacceptable.

COPCs were further evaluated to determine if they are within **background** or other conditions apply that would eliminate the COPC from being related to site contaminants. This refinement selects the **chemicals of concern (COCs)** driving the site risk. In summary, COCs are COPCs that have been shown through analysis to be those contaminants that are likely to drive risk to potential receptors.

Summary of Ecological Risk Assessment

An ERA was conducted for Site 12 to characterize the potential risks from site-related contaminants to potential ecological receptors including terrestrial invertebrates, terrestrial plants, aquatic and benthic (bottom dwelling) organisms living in sediment, birds and mammals that consume terrestrial invertebrates and plants, and birds and mammals that consume aquatic/benthic organisms.

Step 1 – Screening-Level Problem Formulation and Ecological Effects Evaluation

The problem formulation phase addresses the environmental setting, ecological receptors, contaminant fate and transport, mechanisms of ecotoxicity, complete exposure pathways, and selection of endpoints.

Step 2 – Screening-Level Exposure Estimate and Risk Calculation

The screening level ecological effects evaluation is an investigation of the relationship between the magnitude of exposure to a chemical and the nature and magnitude of adverse effects resulting from exposure. In this step, exposure levels that represent conservative thresholds for adverse ecological effects are established. The screening level risk calculation compares exposure concentrations to ecological screening values and estimated doses to toxicity reference values.

Step 3A – Refinement of Preliminary Chemicals of Potential Concern

Several chemicals that were detected in surface soil, surface water, and sediment at Site 12 were retained as ecological COPCs because: (1) their concentrations detected exceeded screening values; (2) screening values were not available; or (3) the chemicals were bioaccumulative, meaning they are absorbed at a rate faster than that at which the substance is broken down within ecological receptors. These chemicals were then evaluated in the Step 3 of ERA to determine which chemicals have the greatest potential for causing risks to ecological receptors.

The results of the ERA at Site 12 indicate the following:

- Surface soil concentrations indicate that COPCs posing the greatest potential risks to invertebrates and/or plants are copper, zinc, selenium, lead, and PAHs. Copper-related potential risks to soil invertebrates and plants are limited to a small area where concentrations exceeded the invertebrate and plant ecological screening values.
- PAH concentrations were elevated in some surface soil samples and pose risks to soil invertebrates at several locations.
- Soil concentrations of other metals, SVOCs, pesticides and VOCs tended to be low and pose negligible or minor potential risks to soil invertebrates and plants, or pose risks that are similar to risks posed by background conditions. The risks for some of the soil contaminants could not be evaluated because of the absence or uncertainty of ecological screening values.
- Sediment concentrations of metals tended to be low and pose negligible potential risks to benthic organisms, or do not appear to be related to former activities at the landfill. However, cumulative toxicity to benthic receptors from multiple metals is possible where concentrations of several metals were greatest. The sediment data indicate that COPCs posing the greatest potential risks to benthic receptors are PAHs. Sediment concentrations of total PAHs exceeded the PEC of 22,800 μg/kg in three samples (Figure 5). The PEC is a derived ecological risk-based screening level in which toxic effects are expected to occur. Potential risks to benthic invertebrates from other COPCs are minor or uncertain because of sediment concentrations

that are between the threshold effects concentration and the PEC.

- Food chain modeling indicates that mercury poses potential risk to herbivorous mammals with small home ranges (such as voles) in a few localized areas of the site. In addition, PAHs in soil might pose risks to herbivorous mammals with small home ranges (such as voles) and to insectivorous mammals with small home ranges (such as shrews) in a few localized areas of the site. Bioaccumulative COPCs in sediment and surface water pose minor risks via the food chain.
- Surface water concentrations may have been calculated to be higher than actually present in the surface water because of confounding factors such as filtered versus unfiltered sample concentrations for organics and blank contamination (aluminum). There is also uncertainty regarding whether concentrations of some COPCs are related to the former landfill. Concentrations of most surface water COPCs were highest in two samples, which were collected in stagnant water with high turbidity. Concentrations of five PAHs exceeded their ecological screening values in one sample. PAHs were not detected in the sample downstream from the detected location, suggesting that PAHs in surface water are not significantly migrating off-site to downstream locations.

WHAT IS AN ECOLOGICAL RISK ASSESSMENT AND HOW IS IT CALCULATED?

An ERA evaluates the potential adverse effects human activities have on the plants and animals that make up ecosystems. The ERA process follows a phased approach similar to the HHRA. The risk assessment results are used to help determine what measures, if any, are necessary to protect plants and animals.

ERA includes three steps:

Step 1: Problem Formulation
Step 2: Analysis
Step 3: Risk Characterization

In **Step 1**, the problem formulation includes:

- Compiling and reviewing existing information on the site habitat, plants, and animals that are present
- Evaluating how plants and animals may be exposed
- Identifying and evaluating area(s) where site-related chemicals may be found
- Evaluating potential movement of chemicals in the environment
- Evaluating routes of exposure (for example, ingestion)
- Identifying receptors (plants and animals that could be exposed)
- Identifying exposure media (soil, air, water)
- Developing how the risk will be measured for all complete pathways (determining the risk where plants and/or animals can be exposed to chemicals)

In **Step 2**, the potential exposures to plants and animals are estimated and the concentrations of chemicals at which an effect may occur are evaluated.

In **Step 3**, all the information identified in the first two steps is used to estimate the risk to plants and animals. Also included is an evaluation of the uncertainties (potential degree of error) that are associated with the predicted risk evaluation and their effects on the conclusions that have been made.

Summary of Risk

As a result of past activities at Site 12, concentrations of PAHs in soil and select metals in soil and surface water could result in unacceptable future risks. Therefore, it is the current judgement of the Navy, with concurrence from EPA and PADEP, that the preferred alternative, or one of the other active measures identified in this Proposed Plan, is necessary to protect human health and the environment from actual or threatened releases of hazardous substances into the environment.

The selected remedy to protect human health will also effectively reduce potential ecological risks originating from Site 12 soil, surface water, and sediment.

The Navy acknowledges that concentrations of dioxin, select metals and TCE in groundwater could also result in unacceptable future risks. An evaluation of remedial alternatives for groundwater is ongoing. The results of this evaluation and the preferred remedial alternatives for groundwater will be provided in a separate Proposed Plan at a later date.

Remedial Action Objectives

Remedial action objectives (RAOs) are medium-specific goals that define the objective of conducting remedial actions to protect human health and the environment. RAOs have been developed for soil at Site 12.

The RAOs for Site 12 soil are:

- Prevent contact with surface soil and subsurface soil contaminated with COCs at concentrations greater than **remediation goals (RGs)** and prevent contact with landfill waste materials present within the landfill area.
- Reduce the potential erosion of contaminated surface soils, and transport of contaminants to surface water.
- Prevent further degradation of groundwater quality by reducing potential contaminant migration from buried landfill wastes and contaminated soils into groundwater.
- Improve site drainage and minimize contact by ecological receptors to concentrations of PAHs in sediment greater than the PEC.

Remediation Goals

Data from the RI and HHRA, together with the **Applicable or Relevant and Appropriate Requirements (ARARs)** were reviewed to identify the Site 12 COCs that would be used to determine the appropriate RGs. An RG is the concentration of a contaminant in an environmental medium that when attained, should achieve RAOs. COCs for soil were identified since site-related contaminants are present at concentrations that pose potentially unacceptable human health and ecological risks. Tables 1 and 2 provide the proposed total soil and surface soil RGs for Site 12 along with the basis for selection. These proposed soil RGs are developed to ensure that contaminant concentrations remaining on site are protective of human health and environment. Note that risk-based **Preliminary Remediation Goals (PRGs)** are not ARARs. However, risk-based PRGs have been selected, where indicated in Tables 1 and 2, as RGs to ensure the protection of human health and the environment.

Table 1: Proposed Total Soil Remediation Goals[1]

COC[2]	95% UTL Background Concentration (mg/kg)	Maximum Detected Site Concentration (mg/kg)	Proposed Remediation Goal[3] (mg/kg)	Rationale for Remediation Goal
Total 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) Equivalents	NA	6.0305E-7	5E-5	Risk-Based PRG
Arsenic	6.65	108 L	6.8	Risk-Based PRG
Chromium	15.3	192	15.3	Background
Benzo(a)anthracene	0.306	22 J	0.4	Risk-Based PRG
Benzo(a)pyrene	0.394	16 J	0.394	Background
Benzo(b)fluoranthene	0.507	15	0.4	Risk-Based PRG
Benzo(k)fluoranthene	0.307	18 J	4.0	Risk-Based PRG
Dibenz(a,h)anthracene	0.161	4.1 J	0.32	Risk-Based PRG
Indeno(1,2,3-cd)pyrene	0.251	10	0.4	Risk-Based PRG

Notes:

1. Total soil exposure considers surface soil and subsurface soil.

2. PCBs were identified as a COPC; however, based on further evaluation, the risks associated with PCBs (1.58E-6) do not significantly contribute to overall risk and have not been retained as a COC.

3. PRG numerical values for carcinogens and non-carcinogens are based on residential exposure. When COCs share the same target organ effects, the HQ goal for an individual COC must be less than 1. Risk goals are selected so each chemical contributes the cancer risk fraction shown to a total target risk less than or equal to 1E-4.

UTL = Upper Tolerance Limit
J = estimated value
L = Positive detection - biased low
mg/kg = milligram per kilogram
NA = Not applicable

Table 2: Proposed Surface Soil Remediation Goals

COC[1]	95% UTL Background Concentration (mg/kg)	Maximum Detected Site Concentration (mg/kg)	Proposed Remediation Goal[3] (mg/kg)	Rationale for Remediation Goal
Chromium	15.3	38.5	15.3[2]	Background
Copper	10.7	458	70	Ecological PRG[2]
Lead	30.6	1,410	120	Ecological PRG[2]
Selenium	0.226	2.6 L	0.52	Ecological PRG[2]
Zinc	90.1	731	120	Ecological PRG[2]
Benz(a)anthracene	0.306	21 J	0.4	Risk-Based PRG
Benzo(a)pyrene	0.394	21 J	0.394	Background
Benzo(b)fluoranthene	0.507	19 J	0.507	Background
Benzo(k)fluoranthene	0.370	30	4.0	Risk-Based PRG[2]
Dibenz(a,h)anthracene	0.161	12	0.32	Risk-Based PRG[2]
Indeno(1,2,3-cd)pyrene	0.251	30	0.4	Risk-Based PRG[2]

Notes:

1. PRG numerical values for carcinogens and non-carcinogens are based on residential exposure. When COCs share the same target organ effects, the HQ goal for an individual COC must be less than 1. Risk goals selected so each chemical contributes the cancer risk fraction shown to a total target risk less than or equal to 1E-4.
2. Arsenic was identified in the risk assessment as a COPC; however, upon further evaluation, arsenic has been shown to be within background levels and has been removed for consideration as a COC. Thallium was also identified as a risk driver, but further evaluation indicated that thallium results were based on a laboratory error and are not site related.
3. Ecological PRGs were based on EPA Ecological Soil Screening Levels. The chromium PRG concentration applies to total chromium levels and assumes less than 2.2% of chromium is the hexavalent species.

UTL = Upper Tolerance Limit
J = Estimated value
L = Positive detection - biased low
mg/kg = milligram per kilogram

Remedial Alternatives Considered

The purpose of the alternatives development and screening process was to assemble an appropriate range of possible remedial options to achieve the RAOs identified for Site 12 soil.

In this process, technically feasible technologies and retained process options, which are subsets of feasible technologies, were combined to form remedial alternatives that provide varying levels of risk reduction. Several remedial alternatives were developed to address risks from contaminated soil in accordance with the NCP and are detailed in the Site 12 FS dated August 2019.

Summary of Remedial Alternatives

Alternative 1: No Action

The no action alternative was developed as a baseline case, as required by the NCP. Under this alternative, no containment, removal, or treatment of soil contaminants would be conducted. The alternative would provide no mechanism to minimize potential risks to receptors and no LUCs would be established. There would be no reduction in toxicity, mobility, or volume of the contaminants other than what would result from natural dispersion, dilution, biodegradation, and other attenuating factors.

There are no costs associated with Alternative 1 because no remedial actions or measures would occur.

Alternative 2: Soil Cover, Land Use Controls, and Long-Term Monitoring

Alternative 2 relies on containment and LUCs to achieve soil RAOs. A soil cover with vegetation would be constructed over all areas with unacceptable soil risks to prevent exposure of human and ecological receptors to contaminated soils and landfill waste materials, to prevent migration of contaminated surface soils to surface water, and reduce infiltration into the landfill and subsequent leaching of contaminants to groundwater. The soil cover would be designed to meet the minimum federal Resource Conservation and Recovery Act Subtitle D requirements for a municipal solid waste landfill. Alternative 2 also relies on LUCs to limit potential exposure to contaminated landfill contents. LUCs would be implemented to prevent intrusive activities within the landfill boundaries, and to prevent disturbance of subsurface soils beneath the survey units established during the radiological investigation. Periodic monitoring would be conducted to assess the alternative’s effectiveness and potential threats to human health and the environment. Site conditions and risks would be reviewed every 5 years because contaminants would be left in place.

The capital cost for Alternative 2 is estimated to be $3,653,000. During Years 1 to 10, the annual operation and maintenance (O&M) costs including monitoring costs would be $11,600. In Years 11 through 30, annual O&M and monitoring costs would be $11,600. Five-year reviews would cost $35,000 per event. Over a 30-year period, the present worth value for Alternative 2 based on a 2.8 percent discount rate is estimated to be $4,020,000.

Alternative 3: Limited Soil and Sediment Removal with On-Site Consolidation, Soil Cover, Land Use Controls and Long-Term Monitoring

Alternative 3 relies on containment and LUCs to achieve soil RAOs. Alternative 3 includes limited soil and sediment removal, and incorporates all components of Alternative 2 except the soil cover areas are smaller than that of Alternative 2. Soil covers would be installed to prevent exposure of human and ecological receptors to contaminated soils and landfill waste materials, prevent erosion and migration of COCs from the surface of Site 12, and reduce infiltration of precipitation into the landfill. The contaminated soils of hot spots located outside of the cover areas would be removed and placed under one of two cover systems. Alternative 3 also relies on LUCs to prevent disturbance of survey units established during the radiological investigation. Since contaminants would remain at the site, monitoring and five-year reviews would be required to assess site conditions and risks.

The capital cost for Alternative 3 is estimated to be $3,067,000. During Years 1 to 10, the annual O&M costs including monitoring costs would be $11,600. In Years 11 through 30, annual O&M and monitoring costs would be $11,600. Five- year reviews would cost $35,000 per event. The present value of the total cost for Alternative 3, based on a 30-year period and a 2.8 percent discount rate, is estimated to be $3,434,000.

Alternative 4: Limited Soil and Sediment Removal with Off-Site Disposal, Soil Cover, Land Use Controls and Long-Term Monitoring

Alternative 4 relies on containment and LUCs to achieve soil RAOs. Two soil covers would be installed over two areas of landfill waste to prevent exposure of human and ecological receptors to contaminated soils and landfill waste materials, prevent erosion and migration of COCs from the surface of Site 12, and reduce infiltration of precipitation into the landfill just as Alternatives 2 and 3. The contaminated soils and sediments of hot spots located outside of the capped areas would be removed and sent to appropriate off-site disposal facilities for disposal. Alternative 4 incorporates all other components of Alternative 3 with the exception of on-site waste consolidation.

The capital cost for Alternative 4 is estimated to be $3,238,000. During Years 1 to 10, the annual O&M costs including monitoring costs would be $11,600. In Years 11 through 30, annual O&M and monitoring costs would be $11,600. Five- year reviews would cost $35,000 per event. Over a 30-year period, the net present-worth cost is estimated to be $3,605,000 based on a percent discount rate.

Alternative 5: Complete Soil Removal with Off-Site Disposal, Land Use Controls and Long-Term Monitoring

Alternative 5 would involve the excavation of all landfill waste materials and contaminated soils and sediments with COC concentrations greater than surface soil, total soil, and sediment RGs. Excavation in 6-inch lifts, followed by a radiological survey of each lift would be required as the radiological scoping survey only cleared surface soils. All excavated materials would be transported off-site for appropriate disposal. For purposes of this Proposed Plan, it is assumed that 5 percent of the excavated waste materials and contaminated soils would be handled as **low-level radioactive waste (LLRW)** and sent for disposal to a licensed LLRW facility. Per the radiological scoping survey, radiological land use controls will be instituted if any intrusive activities are performed below the top 6 inches of soil within the survey unit footprints. Monitoring and five-year reviews would be required to assess site conditions and risks.

The capital cost for Alternative 5 is estimated to be $8,120,000. During Years 1 to 10, the annual O&M costs including monitoring costs would be $6,600. In Years 11 through 30, annual O&M and monitoring costs would be $6,600. Five-year reviews would cost $35,000 per event. The present value of the total cost for Alternative 5, based on a 30-year period and a 2.8 percent discount rate, is estimated to be $8,310,000.

Evaluation of Alternatives

As part of the FS, remedial alternatives were evaluated using nine evaluation criteria, as established by the NCP. The criteria are:

- Overall Protection of Human Health and the Environment.
- Compliance with ARARs.
- Long-term Effectiveness and Permanence.

- Reduction of Toxicity, Mobility, and Volume through Treatment.
- Short-Term Effectiveness.
- Implementability.
- Cost.
- State Acceptance.
- Community Acceptance.

The remedial alternatives were compared to each other based on the first seven criteria to identify differences among the alternatives and discuss how site contaminant threats are addressed. Public comments on this Proposed Plan will help address the two remaining criteria: state and community acceptance.

(1) Overall protection of human health and the environment

Alternative 1 would not be protective of human health and the environment since no actions would be taken to prevent exposure to landfill waste materials. Alternatives 2, 3, and 4 would provide protection of human health and the environment and satisfy the RAOs because they all have containment measures preventing direct contact with contaminants, and reduce infiltration and off-site migration of contaminants. All three alternatives would also employ LUCs to prevent damage of or intrusion into the soil cover systems, and prevent disturbance of survey units established during the radiological investigation. Alternative 5 would provide the greatest overall protection of human health and the environment because all the landfill waste materials and contaminated soils would be excavated and all landfill waste and contaminated soils would be sent for off-site disposal. LUCs would effectively prevent unacceptable risk from exposure to potential LLRW in survey units.

(2) Compliance with ARARs

Alternative 1 would not comply with ARARs. Alternatives 2, 3, 4, and 5 would comply with applicable chemical-specific, location-specific and action-specific ARARs.

(3) Long-term effectiveness and permanence

Alternative 1 would not provide any long-term protection of human health or the environment. Alternatives 2, 3, and 4 are considered effective alternatives to prevent direct contact of receptors with site contaminants, reduce infiltration of precipitation, and would satisfy all the RAOs. Each uses common and proven technology that is reliable and would be effective in the long-term. Alternatives 2, 3, and 4 would require periodic monitoring, inspection and maintenance to ensure their integrity, performance, and long-term reliability. Alternative 5 would remove all contaminated soils and landfill waste materials, and result in permanent reduction of all potential soil risks.

(4) Reduction of toxicity, mobility, and volume through treatment

Alternatives 2, 3, 4, and 5 would not reduce the toxicity, mobility, or volume of contamination through treatment, because no treatment is used to address the contaminated soils in these alternatives.

(5) Short-term effectiveness

Under Alternative 1, no short-term impacts would be anticipated. Alternatives 2, 3, 4, and 5 would be equally effective in the short term, although more local truck traffic would be associated with implementing Alternative 5 than Alternatives 2, 3, and 4. There would be minimal risks, if any, to the community, workers, or the environment in implementing these alternatives.

Construction would be restricted to agreed-upon hours, and dust would be controlled using engineering controls such as dust suppression by wetting. Coordination and scheduling of truck and heavy equipment traffic on public roads would be required to manage increased vehicular activity. All workers would require training and medical monitoring in accordance with Occupational Safety and Health Standards. Workers' exposure to contaminants and other site hazards can be minimized by wearing personal protective equipment and following health and safety procedures of the Health and Safety Plan. Other hazards to remediation workers related to standard construction risks would be addressed using standard safety practices. No permanent adverse impacts to human health or the environment would be anticipated to result from implementation of Alternatives 2, 3, 4, and 5.

(6) Implementability

Alternative 1 would be readily implementable since no remedial actions or measures would occur. Alternatives 2, 3, and 4 include construction of a soil cover and implementation of LUCs. In general, major engineering, administrative, and construction difficulties would not be anticipated. The implementation of these alternatives involves standard construction techniques and equipment. Experienced and Occupational Safety and Health Administration-certified workers and companies are readily available to implement these alternatives.

Alternative 5, would be somewhat more difficult to implement because it would require radiological surveys for the potential LLRW and off-site disposal. However, no significant engineering or administrative difficulties are anticipated, although construction delays could be expected as radiological surveys would be conducted after excavation of each 6-inch lift. The labor, equipment, materials and disposal facilities necessary to implement this alternative are readily available.

(7) Cost

Estimated costs are summarized in Table 3. Alternative 1 would be the least expensive to implement. Alternative 3 would be the least expensive alternative that is protective of human health and the environment. Alternative 2 would be more expensive than Alternatives 3 and 4 due to larger area of soil cover. Alternative 4 has a higher cost than Alternative 3 because of off-site waste disposal. Alternative 5 would be the most expensive alternative.

(8) State acceptance

PADEP has been a partner in the development and review of the remedial action decision-making process. Formal agreement from PADEP (in the form of a concurrence letter) on this Proposed Plan will be issued before the ROD for Site 12 is finalized.

(9) Community acceptance

This criterion will be addressed following the receipt of public comments on this Proposed Plan and will be discussed in the responsiveness summary in the ROD that will document the selection of a remedial action for the soil, sediment and surface water of Site 12.

Preferred Remedial Alternative

The Navy and EPA prefer Alternative 3, which consists of limited soil and sediment removal with on-site consolidation, soil cover, LUCs and monitoring for the remediation of contaminated soil at Site 12.

Soil covers as illustrated on Figure 4 would be installed to prevent exposure of human and ecological receptors to contaminated soils and landfill waste materials, prevent erosion and migration of COCs from the surface of Site 12, and reduce infiltration of precipitation into the landfill. The contaminated soils and sediments of hot spots located outside of the cover areas would be removed and placed under one of two cover systems.

Table 3: Comparative Analysis of Remedial Alternatives

Criteria	Alternative 1	Alternative 2	**Alternative 3**	Alternative 4	Alternative 5
Overall Protectiveness of Human Health and the Environment	X	●	●	●	●
Compliance with ARARs	X	●	●	●	●
Long-Term Effectiveness and Permanence	X	●	●	●	●
Reduction of Toxicity, Mobility, or Volume Through Treatment	X	X	X	X	X
Short-Term Effectiveness	●	●	●	●	●
Implementability	●	●	●	●	●
Cost	$0	$4,020,000	$3,434,000	$3,605,000	$8,310,000
State Acceptance	X	●	●	●	●
Community Acceptance	TBD	TBD	TBD	TBD	TBD

Notes: ● – Satisfies Criterion ¤ – Partially Satisfies Criterion X – Does Not Satisfy Criterion
TBD – To Be Determined
Cost is the total present worth value including the capital costs, annual O&M and monitoring costs, and five-year reviews costs. Cost accuracy ranges from -30% to +50%.

Since the elevated metals in surface water are likely related to runoff, it is expected that the soil cover and limited soil and sediment removal will address the surface water in the drainage ditch.

LUCs would be established to prevent damage of or intrusion into the cover system, and to prevent disturbance of subsurface soils beneath the survey units established during the radiological investigation. This alternative would mitigate the potential exposure scenarios, which are direct exposure to landfill contents (via ingestion, dermal contact, and inhalation) and would be protective of human health and the environment.

Periodic monitoring would be conducted to assess the alternative's effectiveness and potential threats to human health and the environment. Site conditions and risks would be reviewed every 5 years as required by CERCLA Section 121(c) because contaminants would be left in place.

Based on available information, the Navy and EPA believe the preferred alternative would satisfy the following statutory requirements of CERCLA Section 121(b): be protective of human health and the environment, be in compliance with ARARs; be cost effective, and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable.

Community Participation

Community acceptance of the preferred remedial action will be evaluated at the conclusion of the public comment period and will be described in the ROD. The ROD is the document that will present the remedy selected by the Navy and EPA for Site 12 soil, sediment, and surface water.

The Navy encourages written comments from the community on the Proposed Plan for Site 12 - South Landfill. The public comment period is from **September 10, 2020 to October 25, 2020** to encourage public participation in the decision process.

The Navy will hold a public meeting during the comment period. At the public meeting, the Navy, with input from EPA, will present the Proposed Plan, and solicit both oral and written questions. **The public meeting is scheduled for September 23, 2020 between 6:00 to 8:00 p.m. The virtual public meeting will utilize a webinar tool known as WebEx.** The link to the WebEx is HTTPS://TINYURL.COM/WGPP3-12.
The phone number is 1-408-418-9388 (toll free)
and the access code is 132 480 1632.

Comments received during the public comment period will be summarized and responses will be provided in the Responsiveness Summary section of the ROD.

Please send written comments via U.S. Mail, or via email to:

Mr. Willington Lin, BRAC Environmental Coordinator
Base Closure and Realignment
Program Management Office Northeast
4911 South Broad Street
Philadelphia, PA 19112-1303
Phone: (215) 897-4900
Email: willie.lin@navy.mil

For further information, contact:

Ms. Sarah Kloss, Remedial Project Manager
U.S. Environmental Protection Agency, Region III
1650 Arch Street (Mail Code: 3SD11)
Philadelphia, PA 19103
Phone: (215) 814-3379
Fax: (215) 814-3025
Email: kloss.sarah@epa.gov

Please note that all comments must be submitted and postmarked on or before October 25, 2020*.*

Terms Used in the Proposed Plan

Administrative Record: An official compilation of site-related documents that were considered or relied upon by the Navy and EPA in, e.g., selecting a remedial action for CERCLA. The public has access to this material through the following website: https://www.bracpmo.navy.mil/brac_bases/northeast/reserve_base_willow_grove/documents.html.

Applicable or Relevant and Appropriate Requirements (ARARs): The federal and state requirements that a selected remedy must attain. These requirements may vary among sites and remedial activities.

Background: Concentrations of chemicals that would be found in the environment even if there had been no man-made sources or releases of chemicals at the site.

Cancer Risk: A type of risk resulting from exposure to chemicals that may cause cancer in one or more organs.

Carcinogen: A substance capable of causing cancer.

Chemicals of Concern (COCs): Subset of COPCs (see below) which through evaluation are expected to drive risk associated with contaminants at the site.

Chemicals of Potential Concern (COPCs): Chemicals found at the site at concentrations greater than federal and state risk screening levels and therefore are included in the risk assessment evaluations.

Comment Period: A time for the public to review and comment on various documents and actions taken, either by the Navy, EPA, or PADEP. A minimum 30-day comment period is held to allow community members to review the Administrative Record and review and comment on the Proposed Plan.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The Act created a trust fund, known as the Superfund, to investigate and clean up abandoned or uncontrolled hazardous substance facilities.

Dioxin: Any of several persistent toxic heterocyclic hydrocarbons that occur especially as by-products of various industrial processes (such as pesticide manufacture and papermaking) and waste incineration.

Ecological Risk Assessment (ERA): Evaluation and estimation of the current and future potential for adverse ecological effects from exposure to contaminants.

Feasibility Study (FS): Report identifying and evaluating alternatives for addressing the contamination present at a site or group of sites.

Hazard Index (HI): The sum of chemical-specific Hazard Quotients. An HI greater than 1 is considered to indicate the likelihood that adverse non-cancer health effects may occur.

Hazard Quotient (HQ): A comparison of the level of exposure to a substance in contact with the body per unit time to a chemical-specific Reference Dose to evaluate potential non-cancer health effects. Exceedance of an HQ of 1 is associated with an increased level of concern about adverse non-cancer health effects.

Historical Radiological Assessment (HRA): A screening tool used to determine sites or areas that need further action or pose no threat to human health based on the potential for radioactive contamination.

Human Health Risk Assessment (HHRA): An evaluation and estimation of the current and future potential for adverse human health effects from exposure to contaminants.

Information Repository: A file containing information, technical reports, and reference documents regarding an NPL site. This file is usually maintained in a place with easy public access, such as a library.

Initial Assessment Study (IAS): A preliminary investigation usually consisting of a review of available data and information on a site, interviews, and a non-sampling site visit to observe areas of potential waste disposal and migration pathways.

Installation Restoration Program (IRP): Navy program to restore old waste sites for reuse and to protect human health and the environment.

Land Use Controls (LUCs): Non-engineered instruments, such as administrative and legal controls or certain engineered and physical barriers, such as fences and security guards, to minimize the potential for exposure to contamination and/or protect the integrity of a response action. Engineered components of the remedy such as the landfill cap are not considered LUCs. LUCs help to minimize the potential for exposure to contamination and/or protect the integrity of a response action and are typically designed to work by limiting land and/or resource use or by providing information that helps modify or guide human behavior at the site.

Low-Level Radioactive Waste (LLRW): Materials that have become contaminated with radioactive material or have become radioactive through exposure to neutron radiation.

Metals: Metals are naturally occurring elements. Some metals such as arsenic and mercury can have toxic effects. Other metals such as iron are essential to the metabolism of humans. Metals are classified as inorganic because they are of mineral and not biological origin.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): The purpose of the NCP is to provide the organizational structure and procedures for preparing and responding to discharges of oil and releases of hazardous substances, pollutants, or contaminants.

National Priorities List (NPL): A list of sites where uncontrolled hazardous substance releases may potentially present serious threats to human health and the environment.

Non-carcinogen: A substance that is not known to cause cancer but may cause other adverse health effects.

Operable Unit (OU): Complex sites may be divided into several distinct areas to make the response more efficient. These areas, known as OUs, may address geographic areas, specific problems, or medium (e.g., groundwater, soil) where a specific action is required.

Per- and polyfluoroalkyl Substances (PFAS): A group of man-made chemicals that have been in use since the 1940s, and are (or have been) found in many consumer products like cookware, food packaging, and stain repellants. PFAS manufacturing and processing facilities, airports, and military installations that use firefighting foams are some of the main sources of PFAS.

Preliminary Remediation Goal (PRG): The average concentration of a chemical in an exposure area that will yield the specified target risk in an individual who is exposed at random within the exposure area. A PRG is not an ARAR, but is a consideration in the establishment of a remedial goal.

Polychlorinated biphenyls (PCBs): A chemical mixture commonly used in electrical transformers and other electrical components because they are heat resistant and are good electrical insulators. The sale and reuse of PCBs was banned in 1979.

Polycyclic aromatic hydrocarbons (PAHs): A group of over 100 chemicals, a subgroup of SVOCs, that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these chemicals.

Probable Effects Concentration (PEC): Concentration at which an adverse effect is likely to occur.

Proposed Plan: Also known as a Proposed Remedial Action Plan, this document is a public participation requirement of CERCLA and the NCP in which the lead agency summarizes the preferred cleanup strategy and rationale. The document also summarizes the alternatives presented in the detailed analysis of the feasibility study, if prepared. The Proposed Plan may be prepared either as a fact sheet or as a separate document. In either case, it must actively solicit public comment on all alternatives under consideration.

Radiological Scoping Survey: Survey that provides site-specific information based on field measurements of residual radioactivity levels.

Reasonable Maximum Exposure: Human health risk assessment calculation approach using 90th percentile receptor risk behavior patterns to estimate a conservative expectation of receptor risk.

Receptor: An individual, either a human, plant, or animal, that may be exposed to chemicals present at the site.

Record of Decision (ROD): An official public document that selects the cleanup alternative(s) that will be used at an NPL site. The ROD is based on information and technical analysis generated during the RI/FS and consideration of public comments and community concerns. The ROD is a legal document and explains the remedy selection process and is issued by the Navy following the public comment period.

Reference Dose (RfD): An estimate developed by EPA scientists of the amount of a chemical a person (including the most sensitive person) could be exposed to over a lifetime without developing adverse (non-cancer) health effects.

Remedial Action Objective (RAO): Medium-specific or OU-specific goals for protecting human health and the environment.

Remediation Goal (RG): Concentration of a contaminant in an environmental medium that must be attained, to achieve RAOs.

Remedial Investigation (RI): Study that determines the nature and extent of contamination at a site.

Risk Assessment: Evaluation and estimation of the current and future potential for adverse human health and/or ecological effects from exposure to contaminants.

Semivolatile organic compounds (SVOCs): A group of organic (carbon-containing) chemicals that evaporate less readily at ordinary room temperature than VOCs.

Site Investigation (or Inspection) (SI): Sampling investigation with the goal of identifying potential sources of contamination, types of contaminants, and potential migration pathways of contaminants. The SI is conducted prior to the RI.

Superfund: See Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

Survey unit (SU): A specific area where a scoping survey will be conducted to determine potential residual radioactivity levels from historical operations.

Volatile organic compounds (VOCs): A group of organic (carbon-containing) chemicals that evaporate readily at ordinary room temperature. Typical VOCs include the light fraction of gasoline (benzene, toluene, xylenes) and low-molecular weight solvents such as TCE and vinyl chloride.

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The Navy encourages your written comments on the Proposed Plan; this form can be used to provide written comments. If you have questions about how to comment, please contact the BRAC Environmental Coordinator, Mr. Willington Lin, at (215) 897-4900 or via email at willie.lin@navy.mil. E-mailed comments are also accepted.

Use this space to write your comments or to be added to the mailing list. Please provide your comments, postmarked or e-mailed **no later than October 25, 2020**, to the address shown below:

COMMENT SHEET

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Commenter name: ____

Address: ____

Please provide comments (postmarked or e-mailed by October 25, 2020) to:

Mr. Willington Lin, BRAC Environmental Coordinator

Base Closure and Realignment
Program Management Office Northeast
4911 South Broad Street
Philadelphia, PA 19112-1303
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