



Final

Record of Decision

Solid Waste Management Unit (SWMU) 1

Atlantic Fleet Weapons Training Area - Vieques

Former Vieques Naval Training Range

Vieques, Puerto Rico
September 2011

1 Declaration

1.1 Site Name and Location

This Record of Decision (ROD) presents the selected remedy for Solid Waste Management Unit (SWMU) 1, located at the Former Vieques Naval Training Range (VNTR) in Vieques, Puerto Rico. The former VNTR is part of the Atlantic Fleet Weapons Training Area- Vieques, which was placed on the National Priorities List (NPL) on February 11, 2005 (Comprehensive Environmental Response, Compensation, and Liability Information System [CERCLIS] National Superfund database identification number: PRN000204694).

1.2 Statement of Basis and Purpose

The remedy was selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The U.S. Department of the Navy (Navy) (Naval Facilities Engineering Command [NAVFAC] Atlantic Division), U.S. Environmental Protection Agency (EPA) Region 2, Puerto Rico Environmental Quality Board (PREQB), and the Department of Interior [DOI]) entered into a Federal Facility Agreement (FFA) for the former VNTR in 2007, as a result of the NPL listing and pursuant to CERCLA. The FFA establishes the procedural framework and schedule for implementing the CERCLA response actions for Vieques. The Navy is the lead agency and responsible for ensuring the appropriate CERCLA response alternatives are developed and implemented as necessary to protect public health, welfare, and the environment.

The Navy and EPA Region 2 jointly selected the remedy for SWMU 1, with the concurrence of PREQB. This decision is based on information contained in the Administrative Record file for the site. Information not specifically summarized in this ROD or its references, but contained in the Administrative Record has been considered and is relevant to the remedy selection at SWMU 1. Thus, the ROD is based upon and relies on those portions of the Administrative Record file for the site that pertain to SWMU 1 in making the decision. This ROD is presented in a format that is conducive for the general public to read and understand the information upon which the decision for SWMU 1 was made, while providing links to the technical details presented in the Administrative Record.

SWMU 1 is one of 35 sites within the former VNTR having been or currently being evaluated in accordance with CERCLA under the Navy's Environmental Restoration Program (ERP). The Site Management Plan (SMP) for Vieques further details the

investigation history and the schedule for CERCLA investigations/remediation activities at the former VNTR and is updated annually. This ROD solely addresses the final determination for SWMU 1 and does not include or affect any other sites at the former VNTR. The final determinations for the other sites within the former VNTR have been presented in past decision documents or will be presented separately in future decision documents.

1.3 Description of Selected Remedy

Based on the results of investigations conducted at SWMU 1, no unacceptable risks to human health or the environment were identified from potential exposures to current conditions at the site. In fact, unacceptable risks are a potential only if exposure to subsurface landfill debris and associated contamination occurs. Therefore, the finding of no unacceptable risks is based on the land use remaining the same and access to subsurface debris and associated contamination being restricted. The response action is intended to address potential exposure from direct contact with subsurface landfill debris and associated contamination, minimize the potential for erosion of landfill debris, and ensure that land use within the landfill boundaries is controlled. Long-term groundwater monitoring (LTM) will be conducted to determine if a future release from the landfill occurs that results in groundwater contamination that may necessitate a groundwater remedy.

The selected remedy for SWMU 1 is Enhanced Native Soil Cover and Institutional Controls, based on the results of the environmental investigations and the streamlined Feasibility Study (FS) completed at the site. The components of the remedy include inspecting the landfill cover conditions, adding soil cover in any areas of exposed debris, implementing physical barriers and institutional controls, and long-term monitoring of groundwater and operations and maintenance (O&M), including restrictive covenants if the property where the site is located is ever to be transferred out of U.S. government ownership. Such restrictions would restrict future residential or industrial land use and any unauthorized land surface activities that would expose waste materials or release associated contamination. The Navy and EPA, with concurrence from PREQB and DOI, have determined that the remedy selected under CERCLA is appropriate to ensure protection of human health and the environment.

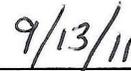
1.4 Statutory Determination

The selected remedy for SWMU 1 meets the statutory requirements and is protective of human health and the environment, complies with Federal and Commonwealth regulations that are applicable or relevant and appropriate to the remedial action, is cost-effective, and uses presumptive remedy and permanent solutions to the maximum extent practicable. Because the remedy will result in debris and pollutants or contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure, the Navy will conduct statutory reviews every five years after initiation of remedial action to ensure that the remedy remains protective of human health and the environment.

**1.5 Navy Authorizing Signature for the Record of Decision for SWMU 1,
Atlantic Fleet Weapons Training Area - Vieques**

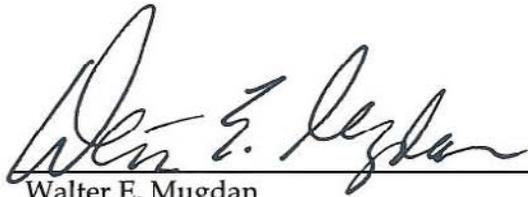


R. David Curfman, P.E.
Director, Environmental Programs
Naval Facilities Engineering Command, Atlantic



Date

**1.6 EPA Authorizing Signature for the Record of Decision for SWMU 1,
Atlantic Fleet Weapons Training Area - Vieques**

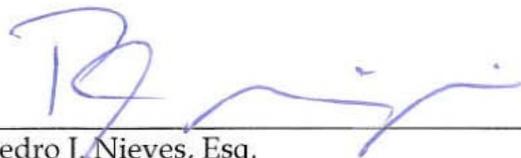


Walter E. Mugdan
Director, Emergency and Remedial Response Division
Environmental Protection Agency, Region 2

Sept. 29, 2011

Date

1.7 PREQB Concurrence Signature



9/16/11

Pedro J. Nieves, Esq.
Executive Director
Puerto Rico Environmental Quality Board

Date

2 Decision Summary

2.1 Site Description and History

Vieques Island is approximately 7 miles southeast of the eastern tip of the main island of Puerto Rico (**Figure 1**). Vieques is the largest island in the Commonwealth of Puerto Rico, encompassing 33,088 acres. The Navy purchased large portions of Vieques in the early 1940s to conduct activities related to military training. Operations within the Former Naval Ammunition Support Detachment (NASD; western one-third of Vieques) consisted mainly of ammunition loading and storage, vehicle and facility maintenance, and some training. Operations within the Former VNTR (eastern one-third of Vieques) comprised various aspects of naval gunfire training, including air-to-ground ordnance delivery and amphibious landings, as well as housing the main base of operations for these activities at Camp García. The VNTR is over 14,000 acres and comprises the Eastern Maneuver Area (EMA), Surface Impact Area (SIA), Live Impact Area (LIA), and Eastern Conservation Area (ECA) (**Figure 2**).

A Resource Conservation and Recovery Act (RCRA) Consent Order was signed in January 2000 to address known and potential environmental sites suspected of hazardous constituent releases. SWMU 1 was included in the RCRA Consent Order. The Navy ceased training exercises at the Former VNTR on April 30, 2003, in accordance with the Presidential Directive to the Secretary of Defense on January 30, 2000, when the land was transferred to the DOI, to be managed by the United States Fish and Wildlife Service (USFWS) as a National Wildlife Refuge. Although the DOI is directed to protect and conserve the transferred land as a wildlife refuge, the Navy retains the responsibility for conducting the environmental investigations and clean-up of the property, as warranted.

SWMU 1 is approximately 41 acres in size and located within a valley east of Camp García, on the EMA of the Former VNTR (**Figure 3**). SWMU 1 was an active landfill from 1954 to 1978 for the disposal of municipal waste from Camp García. Approximately 1,800 to 3,120 tons of waste was disposed in the landfill, but no hazardous materials reportedly were placed in the disposal area. During operation, materials were disposed in trenches, which were then covered with about 6 inches of soil to control blowing of litter. A final 2-foot (ft) thick soil cover, consisting of compacted native soils, was placed over the trenches. Currently, the landfill is densely vegetated and only small, isolated areas of landfill waste are exposed on the surface.

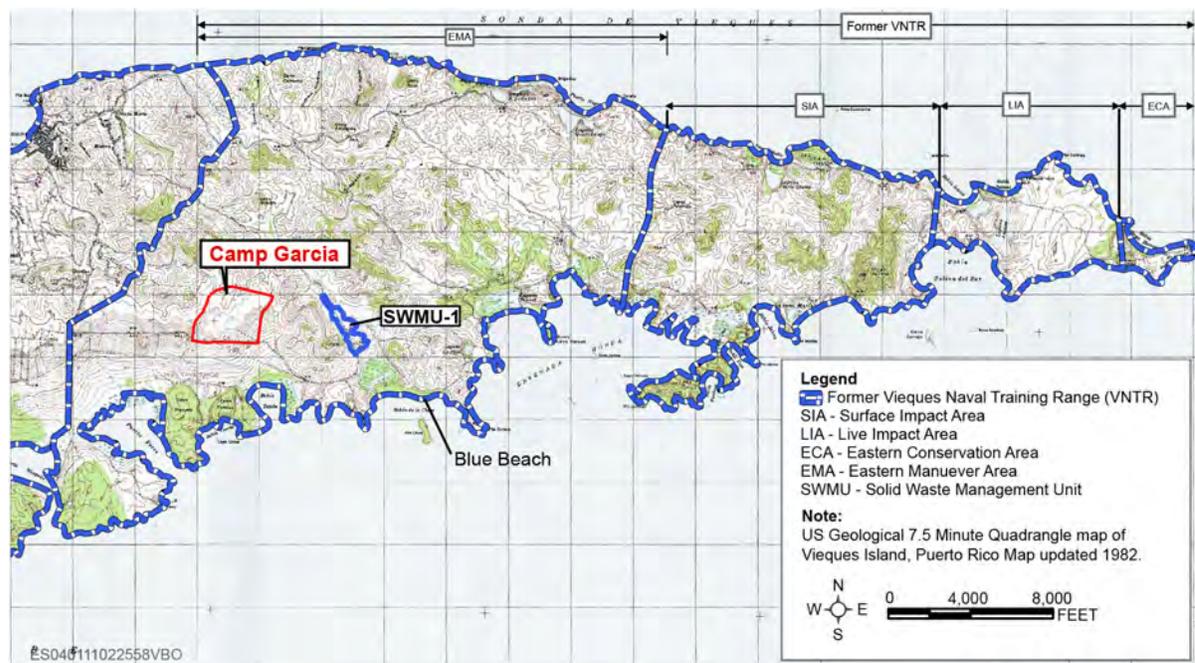
SWMU 1 is located on U.S. property managed by the DOI that has been designated as a wildlife refuge. As set forth in the land transfer agreement between the DOI and Navy, DOI agreed that use and access in areas that could potentially impact the remedy at environmental sites would be limited until CERCLA related activities are completed. Based on the above, access to SWMU 1 is restricted from the public.

FIGURE 1
Regional Location Map



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FIGURE 2
Former VNTR and SWMU 1 Location Map

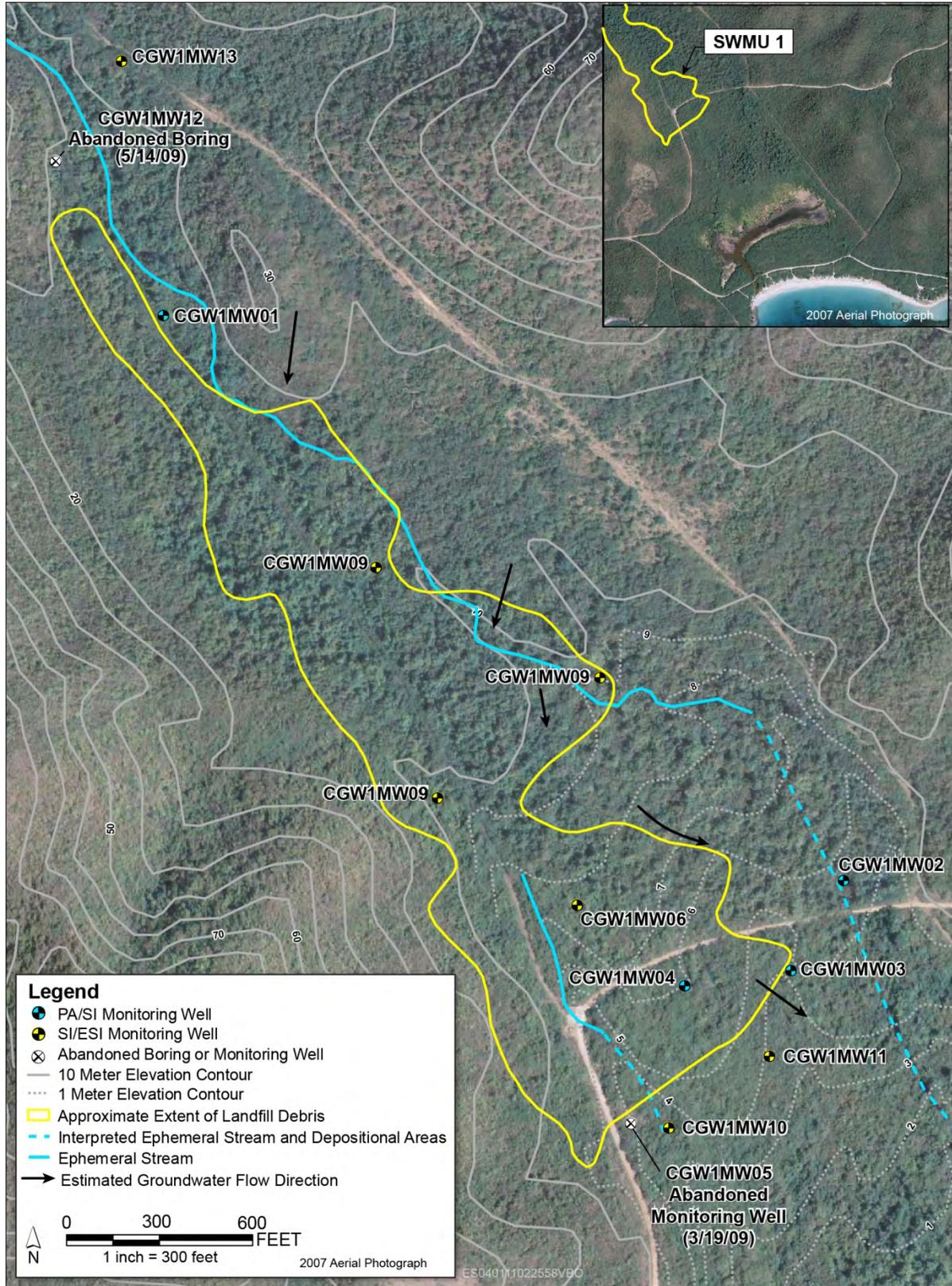


2.2 Site Characteristics

SWMU 1 is situated in a valley that gently slopes from the northwest to the southeast, with an approximate 55-ft elevation change (**Figure 3**). SWMU 1 is bounded by steep hills to the west and an ephemeral stream and steep hills to the east. The site is densely vegetated, dominated by thick thorn scrub. Surface water occurs within the ephemeral stream only during periods of heavy and prolonged rainfall.

Groundwater at SWMU 1 is within alluvial deposits (Qa), saprolite, and fractured volcanic bedrock (Kv) and ranges in elevation from 23 to 3 ft above mean sea level (amsl). Groundwater flows generally to the south in the northern portion of the site and to the southeast in the southern portion of the site, generally mimicking the land topography, at a velocity that ranges from 17 to 158 ft per year.

FIGURE 3
SWMU 1 Aerial Photograph



2.3 Previous Investigations

Environmental investigations at SWMU 1 were initiated with an Environmental Impact Statement (EIS), conducted in 1979 to evaluate environmental impacts of the continued use of Naval facilities on Vieques. Subsequent investigations, including a Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA), Environmental Baseline Survey (EBS), and a Streamlined Remedial Investigation/Feasibility Study (RI/FS) that incorporated a Human Health Risk Assessment (HHRA), an Ecological Risk Assessment (ERA), and an evaluation of presumptive remedies for the landfill, were conducted at the site. **Table 1** summarizes all previous investigations conducted at or associated with SWMU 1.

TABLE 1
Previous Investigations

Previous Investigation*	Date	Investigation Activities
Environmental Impact Statement	1979	An Environmental Impact Statement was conducted from 1978 to 1979 to evaluate the environmental impacts of the continued use of the Naval facilities on Vieques (Tippetts-Abbett-McCarthy-Stratton and Ecology and Environment, Inc. [TAMS/E&E], 1979). The EIS Report presents the history of military use and the types and quantities of munitions used on the VNTR. SWMU 1 is discussed briefly; the EIS notes <i>“The Navy has submitted an application for a permit and an operating plan for the sanitary landfill at Camp Garcia; however, a permit for this facility has not yet been issued by the PREQB.”</i>
Initial Assessment Study	1984	An Initial Assessment Study (IAS) was conducted in 1984 to identify and assess sites posing potential threats to human health or the environment. It was determined that SWMU 1 did not include hazardous materials and that the wastes did not present a threat to groundwater and wildlife at the site (Greenleaf/Telesca and E&E, 1984).
Phase II RCRA Facility Assessment	1988	A Phase II Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) was conducted in 1988 to evaluate past, present or potential future releases of hazardous waste or hazardous constituents from any unit or activity that involved management of solid waste (Kearney, 1988). Although historical information suggested hazardous materials were not disposed of at SWMU 1, the Phase II RFA Report recommended soil sampling at the site.
Revised RCRA Facility Assessment	1995	A Revised RFA, prepared by the Land Pollution Control Area Hazardous Waste Bureau of the Puerto Rico Environmental Quality Board (PREQB, 1995), identified SWMUs and Areas of Concern (AOCs) that could have potential releases of hazardous wastes or hazardous constituents at the former VNTR. Like the previous report, the revised report recommended soil sampling at SWMU 1.
Current Conditions Evaluation	2001	The Current Conditions Report (CH2M HILL, 2001) summarizes the Aerial Photographic Analysis study (Environmental Research, Inc. [ERI], 2000) and discusses the conditions at SWMU 1 and other sites, based on an archive records search and interviews with former employees. The aerial photographic analysis of the landfill indicated that the fill area extended over an area of approximately 55 acres. The analysis of aerial photographs from 1959, 1962, 1964, and 1970 identified several apparent trenches and landfill cells, as well as ground scarring and cleared vegetation. It is important to note that the size of the landfill and features identified by ERI on the aerial photographs are not necessarily accurate because a site visit was not performed to substantiate the features noted in the aerial photographs, and the photographic analysis was done many years after the aerial photographs were taken. However, the information garnered from the aerial photographs does provide a general indication of past practices associated with the landfill.
Environmental Baseline Survey	2003	An Environmental Baseline Survey (EBS) was conducted in 2003 to disclose relevant information regarding the conditions of the Former VNTR prior to property transfer (Naval Facilities Engineering Command, 2003). SWMU 1 was identified as requiring further investigation.

Previous Investigation*	Date	Investigation Activities
Environmental Impact Statement	1979	An Environmental Impact Statement was conducted from 1978 to 1979 to evaluate the environmental impacts of the continued use of the Naval facilities on Vieques (Tippetts-Abbett-McCarthy-Stratton and Ecology and Environment, Inc. [TAMS/E&E], 1979). The EIS Report presents the history of military use and the types and quantities of munitions used on the VNTR. SWMU 1 is discussed briefly; the EIS notes <i>“The Navy has submitted an application for a permit and an operating plan for the sanitary landfill at Camp Garcia; however, a permit for this facility has not yet been issued by the PREQB.”</i>
Phase I RCRA Facility Investigation	2004	During the Phase I RCRA Facility Investigation (RFI), a geophysical survey was conducted to identify where waste material was likely buried within SWMU 1. In addition, fifty surface soil samples were collected throughout the landfill, focusing primarily on the areas where geophysical anomalies were identified, and analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, herbicides, polychlorinated biphenyls (PCBs), dioxins/ furans, inorganics, and explosives. Five monitoring wells were installed at SWMU 1 to characterize groundwater conditions immediately downgradient of the landfill. Delineation of the northern and southern landfill boundaries was not completed during the Phase I RFI. The analytical results ¹ of the Phase I RFI were documented in a Preliminary Assessment/Site Inspection (PA/SI) report (CH2M HILL, 2008) because Vieques was placed on the NPL between the time the Phase I RFI was completed and the report was finalized. Additional data was recommended within and beneath the landfill and to delineate the northern and southern boundaries of the landfill.
Background Investigation	2007	A background study was conducted in 2007 in the eastern portion of Vieques to develop a set of background values for inorganic constituents in soil to help distinguish inorganic concentrations that may be present as a result of a site-related release from those not attributable to a site-related release (CH2M HILL, 2007). The background data were collected specifically from the eastern portion of Vieques to represent soil types similar to those where environmental sites are located in the Former VNTR. The background inorganic constituent concentrations ² were used for comparison with the soil inorganic constituent concentrations collected during the environmental investigations at SWMU 1.
Site Inspection/ Expanded Site Inspection	2009	A Site Inspection/Expanded Site Inspection (SI/ESI) was conducted from 2008 to 2009 to delineate the nature and extent of the landfill waste and if there had been contaminant release(s) at the site (CH2M HILL, 2010). A geophysical survey and forty-nine exploratory excavations resulted in a conclusion that the landfill is approximately 41 acres in size with landfill debris extending to varying depths of up to 10 ft below ground surface (bgs). Soil samples were collected within the landfill soil cover, within the landfill debris, beneath the landfill debris to assess the potential for leaching to groundwater, and within potential migration pathways such as the ephemeral stream. Seven additional monitoring wells were installed within, upgradient, and downgradient of the landfill. Samples ³ were analyzed for VOCs, SVOCs, pesticides, PCBs, explosives, and inorganics. A presumptive remedy was recommended for the site.
Streamlined Remedial Investigation/ Feasibility Study	2011	A Streamlined Remedial Investigation/Feasibility Study (RI/FS) was conducted to assess the nature and extent of contamination, assess potential risks to human health and the environment, and evaluate presumptive remedial alternatives** at SWMU 1. Data ⁴ collected as part of the Phase I RFI and the SI/ESI sufficiently characterized the site and were therefore used in the Streamlined RI/FS. No other environmental sample media were collected during the RI. The conclusion of the RI was that the landfill debris is primarily municipal-type debris overlain by a 2-ft thick soil cover with a few localized areas that have landfill debris exposed at the ground surface, and that there were no unacceptable risks to human health or the environment posed by contaminant levels identified at the site. However, this conclusion relied upon maintaining the current land use and controlling access to subsurface landfill debris and associated contamination. The findings of the SWMU 1 RI/FS were presented by the Navy to the Vieques Restoration Advisory Board (RAB) in April 2011.

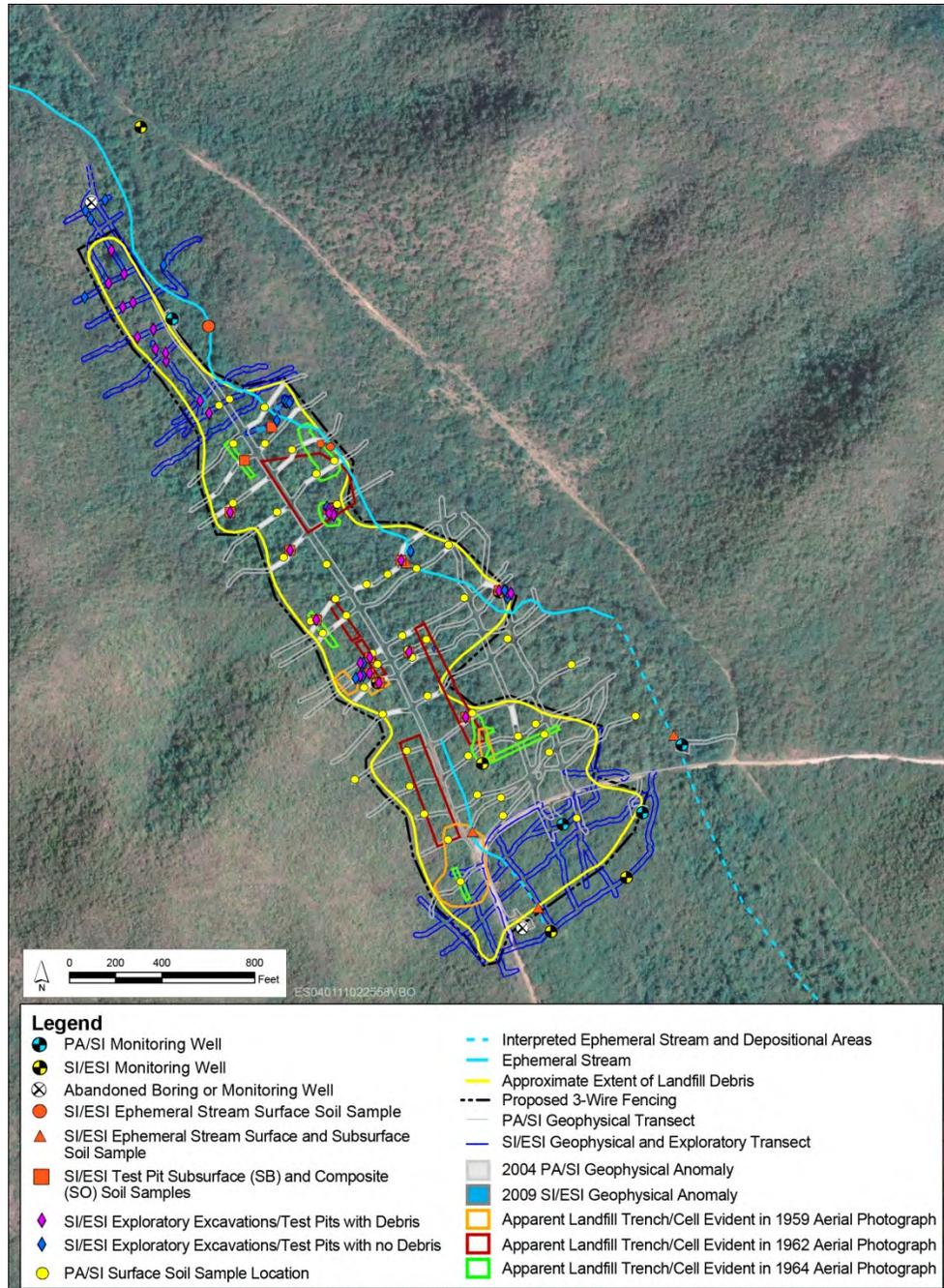
* Documentation associated with the listed activities is available in the Administrative Record and provides detailed information used to support the remedy selection for SWMU 1. The relevant referenced information is also accessible by the hyperlinks in this document.

** Presumptive remedy guidance can be found at <http://www.epa.gov/superfund/policy/remedy/presump/clms.htm> and <http://www.epa.gov/edfac/pdf/1296mem.pdf>.

2.4 Distribution of Contamination

Geophysical surveys, exploratory excavations, and media (soil and groundwater) analytical data collected during the PA/SI and SI/ESI (as documented in the Streamlined RI/FS Report) provide the primary basis for the evaluation of the nature and extent of the landfill debris and associated contamination (**Figure 4**). Chemical concentrations were compared to risk based screening criteria for human health and ecological receptors, and Federal and Commonwealth of Puerto Rico water quality standards.

FIGURE 4
Sample Locations



The landfill debris is primarily municipal-type debris, such as waste paper, corrugated containers, cans and food packaging material, rags, wood, scrap metal, and yard waste, that was disposed in trenches between 1954 and 1978. Several munitions-related debris (i.e., spent ammunition, small arm cartridges, and practice items) were also observed. The depth of the landfill debris is variable across the site; however, it was observed to a depth of about 10 feet bgs. Small, isolated, randomly distributed areas were observed to have landfill debris exposed on the surface, either from soil erosion, incomplete placement of the initial cover, or disturbance during the investigations.

In general, constituents detected above regulatory screening criteria and background concentrations in soil primarily occurred within the extent of the landfill. One SVOC, 3 pesticides, and 11 inorganic constituents were detected above screening criteria and background concentrations (for inorganics) in the surface soil landfill cover (**Table 2**). The detected concentrations are distributed relatively evenly across the landfill without any “hot spots” (isolated areas of significantly elevated concentrations) or discrete area of elevated concentrations. Six pesticides, one PCB, and 14 inorganic constituents were detected above screening criteria and background concentrations (for inorganics) in the subsurface soil within the landfill debris (**Table 2**).

Several inorganics were detected above background concentrations (ephemeral stream samples were compared to soil background data) and screening criteria in the subsurface soil beneath the landfill debris and within soil of the ephemeral stream (**Table 2**). Only lead in subsurface soil beneath the landfill debris is likely associated with a release; however, lead was not observed above screening criteria in groundwater. All other inorganic concentrations within the subsurface soil beneath the landfill debris and within soil of the ephemeral stream were at or only slightly exceeded background concentrations and are attributable to background. Groundwater data collected from beneath and downgradient of the landfill indicate that although some concentrations are above background, they are below EPA MCLs and Puerto Rico Water Quality Standards and do not indicate widespread leaching from the landfill has occurred (**Table 3**). Dissolved mercury was below the Puerto Rico Water Quality Standards in the most recent sample and the older thallium results were associated with a laboratory analytical method prone to falsely elevated results.

2.5 Current and Potential Future Land and Resource Uses

The former VNTR occupies over 14,000 acres, most of which are undeveloped. On April 30, 2003, the land containing SWMU 1 was transferred to the DOI. The site is located on a designated wildlife refuge where the future land use will remain the same and is restricted from the public. Groundwater beneath SWMU 1 is classified by the Commonwealth of Puerto Rico as SG, where groundwater may be intended for use as a source of drinking water supply, agricultural use, and/or flows into waters that support ecological communities of exceptional ecological value. However, groundwater is not used as a potable water source at or in the vicinity of SWMU 1, is generally brackish and becomes saline in the southern portion of the site because of its close proximity to the sea (total dissolved solids concentrations range from 1,400 to 18,000 mg/L as measured during the ESI), and there are no plans for future potable use of groundwater in this area. No archaeological or cultural resources are located within SWMU 1.

TABLE 2
Soil Exceedance Results

	Maximum Concentration Detected Above Screening Criteria and Background ¹					Screening Criteria				
	Cover Material Surface Soil	Ephemeral Stream Surface Soil	Subsurface Soil Within Landfill Debris	Subsurface Soil Beneath Landfill Debris	Ephemeral Stream Subsurface Soil	East Vieques Background Value ² (Kv)	East Vieques Background Value ² (Qa)	Background ² Range	May 2010 RSL for Residential Soil, Adjusted	Ecological
Semivolatile Organic Compounds (ug/kg)										
Benzo(a)pyrene	46J	--	--	--	--	--	--	--	15	--
Pesticides/Polychlorinated Biphenyls (ug/kg)										
4,4'-DDD	--	--	700,000	--	--	--	--	--	2,000	--
4,4'-DDE	190	--	71,000	--	--	--	--	--	1,400	21
4,4'-DDT	58J	--	38,000	--	--	--	--	--	1,700	21
Dieldrin	--	--	130,000	100J	--	--	--	--	30	--
Endrin	--	--	7,600	--	--	--	--	--	1,800	--
Endrin ketone	4.9J	--	--	--	--	--	--	--	1,800	1.95
gamma-Chlordane	--	--	35,000	--	--	--	--	--	1,600	--
Total Inorganics (mg/kg)										
Aluminum	--	--	42,500	45,400	48,000	35,000	35,000	2,340 - 41,500	7,700	--
Antimony	--	--	174J	--	--	5.8	5.8	--	3.1	--
Arsenic	4.3	3.6	35J	3.0	3.8	1.6	1.6	0.47 - 5	0.39	18
Barium	--	--	514	411J	--	212	212	21 - 344	1,500	--
Chromium	113J	--	2,320J	85	78	72	72	2.3 - 72	0.29	26
Cobalt	32J	28	43	43	35	26	16	2.4 - 19.4	2.3	13
Copper	145	--	23,400	57	--	94	53	3.3 - 102	310	28
Iron	--	50,100	153,000	56,500	50,000	43,200	38,100	1,500 - 38,100	5,500	--
Lead	37	--	1,860	117	--	5.4	5.4	0.98 - 4.5	400	11
Manganese	--	--	--	--	--	--	--	--	--	--
Mercury	0.19	--	--	--	--	0.057	0.057	0.05 - 0.11	0.78	0.10
Nickel	--	--	434J	--	--	41	22	0.87 - 40	150	--
Selenium	1.4	0.88	0.83J	0.83	--	0.51	0.51	0.32 - 0.51	39	0.52
Thallium	4.4J	--	--	--	--	0.13	0.13	0.013 - 0.41	--	1.0
Vanadium	192	196	530	225	154	144	144	13.4 - 142	39	7.8
Zinc	521J	--	--	--	--	32	32	4 - 122	2,300	46

¹ - values are only present if concentrations exceeded media specific screening values and background

² - background study was approved by EPA and PREQB

³ - only applicable to surface soils

UTL – upper tolerance limit µg/kg - micrograms per kilogram

RSL – Regional Screening Level mg/kg - milligrams per kilogram

SSL – soil screening level

TABLE 3
Groundwater Exceedance Results

COPC	Maximum Concentration Detected Above Screening Criteria and Background ¹	Screening Criteria			
		MW13 Background	May 2010 RSL for Tap Water, Adjusted	Puerto Rico Water Quality Standards - 2010	MCL - Groundwater
Volatile Organic Compounds (µg/L)					
Chloroform	3	--	0.19	57	--
Total Inorganics (µg/L)					
Antimony	3.3J	1.0 U	1.5	5.6	6.0
Arsenic	7.5	5.0 U	0.045	10	10
Chromium	29	3.0 U	0.043	100	100
Cobalt	41	1.0 U	1.1	--	--
Manganese	13,700	28	88	--	--
Mercury	1.9	0.20 U	0.37	0.05	2.0
Thallium	5.1J	1.0 U	--	0.24	2.0
Vanadium	32J	12	18	--	--
Dissolved Inorganics (µg/L)					
Antimony	2.8J	1.0 U	1.5	5.6	6.0
Arsenic	7.8	5.0 U	0.045	10	10
Chromium	9.9J	3.0 U	0.043	100	100
Cobalt	40	1.0 U	1.1	--	--
Manganese	13,500	28	88	--	--
Mercury	0.46	0.20 U	0.37	0.05	2.0
Thallium	3	1.0 U	--	0.24	2.0
Vanadium	23	11	18	--	--

¹ - values are only present if concentrations exceeded media specific screening values and background

RSL – Regional Screening Level

MCL – Maximum Contaminant Level

ug/L - micrograms per liter

2.6 Summary of Site Risks

The potential for migration of constituents in SWMU 1 environmental media from wind erosion, volatilization, surface runoff, leaching to groundwater, and from groundwater flow is minimal. The 2-ft thick soil cover and vegetation reduces the potential for wind erosion and surface runoff. Volatile constituents observed in groundwater were at low concentrations such that volatilization is likely negligible. The groundwater monitoring data, as well as the number of years that the waste has been in place (between 30 and 55 years), indicate that the potential for leaching from the landfill is minimal.

A conceptual site model (CSM) of SWMU 1 is provided as **Figure 5**. Potential human health and ecological risks were quantitatively evaluated based on the receptor scenarios and potentially impacted media identified in the CSM. A summary of the HHRA and ERA conducted for SWMU 1 during the RI/FS is included in the following subsections and in **Table 4**.

TABLE 4
SWMU 1 Risk Assessment Results

Media	Human Health Risk	
	Current/Future USFWS Worker	Current/Future USFWS Worker
Ephemeral Stream Surface Soil	ELCR = 1×10^{-6} and HI = 0.1 Acceptable	ELCR = 5×10^{-7} and HI = 0.003 Acceptable
Landfill Cover Surface Soil	ELCR = 6×10^{-7} and HI = 0.04 Acceptable	ELCR = 1×10^{-7} and HI = 0.001 Acceptable
Subsurface Soil	No Exposure Pathway ¹	No Exposure Pathway ¹
Groundwater	No Exposure Pathway ¹	No Exposure Pathway ¹
ELCR – excess lifetime cancer risk HI – hazard index ¹ – A Land Use Control will be implemented to restrict debris and subsurface soil disturbance, occupied buildings, and potable use of groundwater (data supports that the site's impacts to groundwater are negligible). The Land Use Control is a legal or administrative mechanism that restricts the use of or limits access to prevent or reduce risks to human health and the environment. The Land Use Control at SWMU 1 will prevent unauthorized and uncontrolled subsurface excavation and groundwater use, which will result in no potential exposure to debris, contaminated subsurface soil, or groundwater at the site.		
Media	Ecological Risk	
	All Receptors	
Surface Soil	Acceptable	

2.6.1 Human Health Risk Assessment

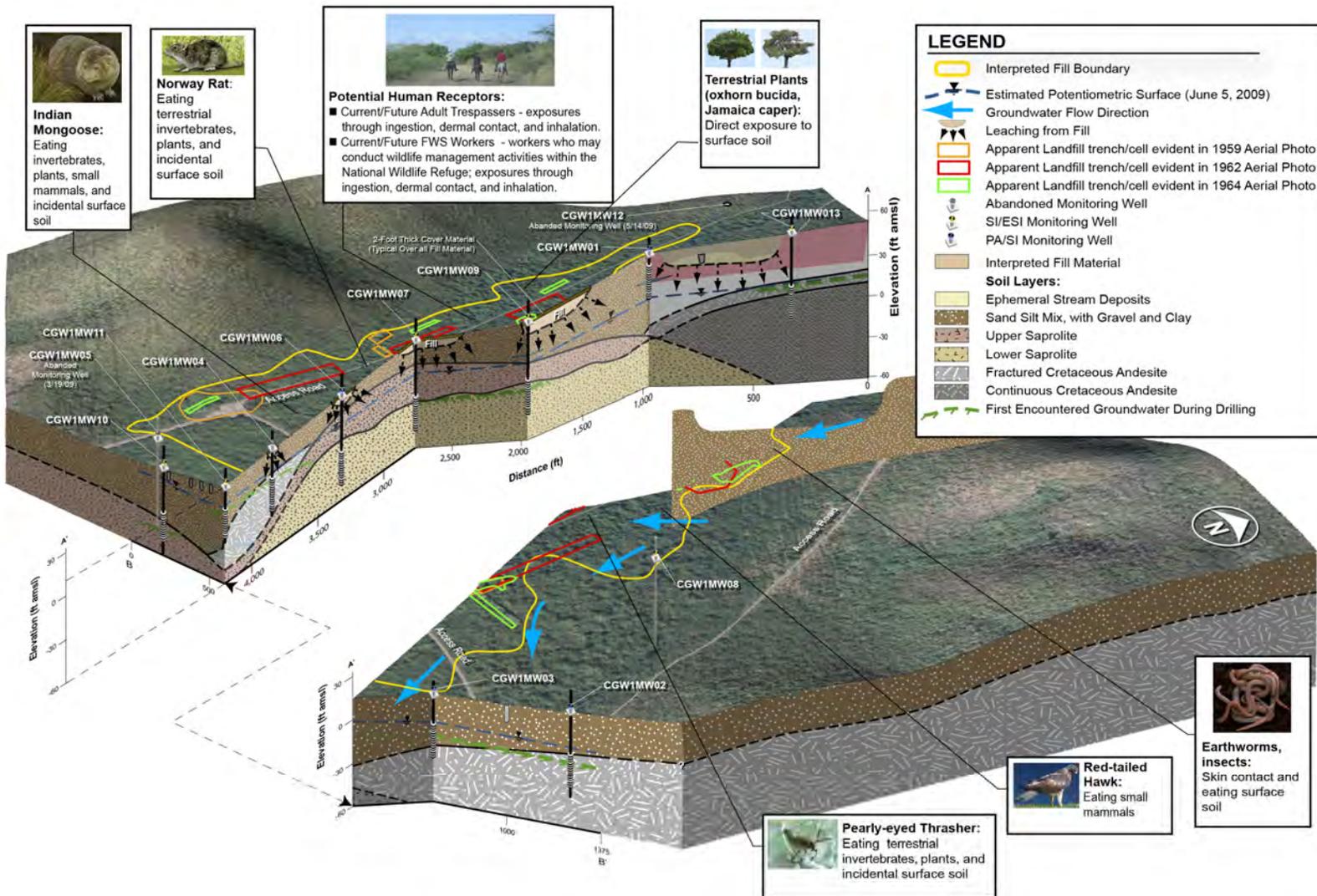
Based on the CSM, human health risks were quantitatively evaluated for **potential human receptors**⁵ exposed to ephemeral stream surface soil and landfill cover surface soil using reasonable maximum exposure (RME) concentrations. Receptors and media for which there are no potential exposures (based on current and future land use) were not quantitatively evaluated. The RME assumes the highest level of human exposure that could reasonably be expected to occur. The potential non-cancer hazards, expressed as the hazard index (HI), and cancer risk estimates were calculated using RME exposure assumptions. For non-cancer effects, a hazard quotient (HQ) represents the ratio between the reference dose and the RME dose for a person in contact with site constituents of potential concern (COPCs) and the HI

represents the sum of the HQs. An HI exceeding 1 indicates that adverse health effects may occur. For known or suspected carcinogens, acceptable exposure levels generally are concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6} (a 1 in 10,000 to 1 in 1,000,000 chance of developing cancer from site exposures) using information on the relationship between dose and response.

Surface soil samples collected during the PA/SI and the SI/ESI (as documented in the Streamlined RI/FS Report), were used to quantitatively evaluate potential human health risks due to potential exposure to site media. Exposure scenarios evaluated for site media comprised adult trespassers and USFWS workers, based on current and future land use. Conservative exposure pathways comprised ingestion, dermal contact, and inhalation of chemicals in ephemeral stream surface soil and landfill cover surface soil.

No unacceptable human health risks⁶ were identified based on exposure scenarios at SWMU 1. Potential cancer risks were below EPA's risk range of 10^{-4} to 10^{-6} and non-cancer hazards were below an HI of 1. This determination is based on the land use remaining the same and access to subsurface debris and associated contamination being restricted.

FIGURE 5
Conceptual Site Model



2.6.2 Ecological Risk Assessment

An ERA was conducted for SWMU 1, consisting of Steps 1 through 3A of the ERA process, in accordance with Navy ERA policy, and Navy and EPA ERA guidance. In Step 1 (preliminary problem formulation) the goals, scope, and focus of the ERA were established, and the environmental setting (i.e., habitats, vegetation, wildlife, protected species), types and concentrations of chemicals in surface soil, and potentially complete exposure pathways were described. This information was used to develop the **ecological CSM**⁷ and **ecological assessment and measurement endpoints**⁸. Potentially complete pathways were identified for lower trophic level receptors (plants and soil invertebrates) and upper-trophic level receptors (birds and mammals) exposed to surface soil. Due to the ephemeral nature of the adjacent stream, aquatic exposure pathways are not present. Therefore, the ephemeral stream was more appropriately evaluated as a terrestrial habitat.

In Step 2, hazard quotients (HQs) were calculated to characterize the potential for constituents to pose unacceptable ecological risk using conservative exposure assumptions. HQs represent a ratio of the exposure level to an ecological effect level, and are an estimate of potential risk. Maximum soil constituent concentrations in surface soil were used in Step 2 to estimate potential exposures to upper and lower trophic level ecological receptors selected to represent the assessment endpoints at SWMU 1. Upper trophic level effects were determined using a food web model that estimated the concentration of each **bioaccumulating chemical**⁹ in each relevant dietary component, and comparing the total dietary intake of the chemical to wildlife **toxicity reference values**¹⁰ (TRVs). TRVs were based on chronic No Observed Adverse Effect Levels (NOAELs) and chronic Lowest Observed Adverse Effect Levels (LOAELs) obtained from scientific literature. Only constituents with the potential to bioaccumulate were evaluated for food web exposures. For lower trophic level receptors, the exposure concentrations for soil were screened against **ecological soil screening levels**¹¹ (eco-SSLs) developed by EPA, or alternative regulatory-approved screening values as provided in the **Master Ecological Risk Assessment Protocol for Vieques**¹² if eco-SSLs were not available. Chemicals with HQs greater than 1 were identified as **ecological COPCs**¹³ for further evaluation in Step 3A of the ERA. Identified COPCs at Step 2 comprised VOCs, SVOCs, pesticides, dioxin, and inorganic constituents in surface soil.

In **Step 3A**¹⁴, the conservative exposure assumptions employed for Step 2 were refined and risk estimates were recalculated using more realistic assumptions including the use of mean values for soil concentrations, bioaccumulation factors, and exposure parameters. Other factors considered in Step 3A included comparison to background concentrations, other accepted ecological screening values in the scientific literature, frequency of detection, frequency and magnitude of screening value exceedance, and spatial distribution of the COPCs.

The Step 3A refinement resulted in no constituents of concern (COCs) being identified for either upper or lower trophic level receptors. Chemicals detected above ecological screening criteria were attributable to background or had infrequent detections. Thus, risks to ecological receptors are acceptable at SWMU 1 under current conditions.

2.6.3 Basis for Response Action

It is the judgment of the Navy and EPA, with the concurrence of PREQB and DOI, that the selected remedy identified in this ROD is appropriate to protect public health or welfare and the environment from debris and associated contamination within the landfill.

Although no unacceptable risks were identified for human health or ecological receptors, this determination is based on the land use remaining the same and access to subsurface debris and associated contamination being restricted. Therefore, the response action is intended to address potential exposure from direct contact with subsurface landfill debris and associated contamination, minimize the potential for erosion of landfill debris, and ensure that land use within the landfill boundaries is controlled. Long-term groundwater monitoring will be conducted to determine if a future release from the landfill occurs that results in groundwater contamination that may necessitate a groundwater remedy.

2.7 Principal Threat Waste

Principal threat wastes are generally considered to be hazardous or highly toxic source materials that result in ongoing contamination to surrounding media, generally cannot be reliably contained, or present a significant risk to human health or the environment should exposure occur. Although a remedial response action is necessary at SWMU 1, based on the results of the human health and ecological risk assessments and evaluation of the site conditions, there are no wastes that constitute a principal threat at SWMU 1.

2.8 Remedial Action Objectives

Remedial action objectives are established based on attainment of regulatory requirements, standards, and guidance; contaminated media; chemicals of concern; potential receptors and exposure scenarios; and human health and ecological risks, as applicable. The following RAOs were developed for the landfill debris, associated contamination, and potential exposure routes and receptors at SWMU 1:

- Prevent direct contact with surface and subsurface landfill debris and associated contamination that would potentially pose an unacceptable risk to exposed receptors.
- Minimize the potential for erosion of landfill debris.
- Ensure land use (including the use of groundwater) within the landfill boundaries is controlled, unless or until additional action is implemented that mitigates potentially unacceptable risks associated with unrestricted land use.

An RAO for groundwater is not necessary because there is no groundwater contamination requiring remediation and no evidence that leaching is a concern. However, long-term groundwater monitoring will be conducted to determine if a future release from the landfill occurs that results in groundwater contamination that may necessitate a groundwater remedy. If long-term monitoring indicates a groundwater remedy is warranted in the future, the ROD will be amended and a groundwater RAO(s) will be developed at that time. The long-term monitoring plan will include the details of the long-term groundwater monitoring, including the types of results that may trigger groundwater remediation, modification of the long-term monitoring plan, and long-term monitoring exit conditions.

Since the HHRA and ERA for SWMU 1 resulted in a conclusion that there are no unacceptable risks from exposure to surface soil at SWMU 1 and the existing land use is a wildlife refuge and because the future land use will remain the same, specific remediation goals (cleanup levels) are not necessary. However, exposed debris identified within the landfill boundaries will be covered to ensure direct contact is prevented and the potential for erosion is minimized. In addition, long-term monitoring of groundwater at SWMU 1 will be conducted to determine if a future release from the landfill occurs that results in groundwater contamination that may necessitate a groundwater remedy. The details of the long-term groundwater monitoring program will be articulated in the LTM and O&M prepared upon completion of the ROD.

2.9 Description and Comparative Analysis of Remedial Alternatives

Presumptive remedies are preferred technologies for common categories of sites (such as military landfills) and are expected to be used at applicable sites. The presumptive remedy approach has the advantage of streamlining the feasibility study and accelerating the final remedial determination and, ultimately, site cleanup, because it takes advantage of a process that has been applied consistently, historically, and successfully to many similar sites. Source containment is EPA's established presumptive remedy for municipal landfill sites regulated under CERCLA, which is also applicable to landfills at military sites such as SWMU 1. The municipal landfill presumptive remedy guidance and EPA's Office of Solid Waste and Emergency Response (OSWER) Directive 9355.0-67 FS can be found at:

<http://www.epa.gov/superfund/policy/remedy/presump/clms.htm>, and

<http://www.epa.gov/fedfac/pdf/1296mem.pdf>, respectively.

Presumptive remedial alternatives¹⁵ developed and evaluated to address the landfill debris and associated soil contamination at SWMU 1 are detailed in the Streamlined RI/FS Report. By accelerating the remedy selection process, presumptive remedies are expected to ensure the consistent selection of remedial actions and reduce the cost and time required to address similar sites. The EPA Directive 9355.0-67 FS establishes source containment as the presumptive remedy for CERCLA municipal landfills and similar military landfills.

2.9.1 Description of Remedial Alternatives

Three presumptive remedial alternatives were developed for detailed evaluation and are summarized in **Table 5** and shown in **Figures 6 and 7**. Each alternative, with the exception of the no-action alternative, was developed to meet the RAOs. Consistent with the NCP, a no action alternative was evaluated as a baseline for the comparative analysis.

TABLE 5
Remedial Alternatives

Alternative	Components	Details	Cost
<p>1. No Action</p> <p><i>No action and no restriction on activities.</i></p>	-N/A	<p>-No action</p> <p>-Perform 5-year reviews and reporting since debris and hazardous substances would remain at the site at concentrations that do not allow unlimited use and unrestricted exposure.</p>	<p>Total Present-Worth Cost: \$95,000</p> <p>Discount Rate: 2.7%</p> <p>Assumed timeframe: 30 years</p>
<p>2. Enhanced Native Soil Cover and Institutional Controls (ICs)</p> <p><i>Prevents direct contact with the landfill debris and associated soil contamination and minimizes potential for erosion. Ensures land use is controlled.</i></p>	<p>-Enhance existing soil cover</p> <p>-Institutional Controls (ICs)</p> <p>-LTM and O&M</p>	<p>-Enhancing the existing soil cover by covering the exposed waste areas with 18 inches of soil fill and 6 inches of top soil to promote vegetative growth. Re-vegetate work areas.</p> <p>-Implementing physical barriers (boundary survey, fencing, gates, and signage), and ICs (restrictive covenants) to control future residential or industrial land use, unauthorized and uncontrolled excavation and drilling at the site, and any land surface activities that permanently expose waste materials or release associated contamination. The IC boundary encompassing the landfill waste area would be surveyed by a professional land surveyor.</p> <p>-Perform LTM and O&M</p> <p>-Perform 5-year reviews and reporting since debris and hazardous substances would remain at the site at concentrations that do not allow unlimited use and unrestricted exposure.</p>	<p>Capital Cost: \$405,000</p> <p>Present Value of Future, Annual Operations and Maintenance (O&M) Costs: \$853,000</p> <p>Total Present-Worth Cost: \$1,258,000</p> <p>Discount Rate: 2.7%</p> <p>Assumed timeframe: 30 years</p>
<p>3. Additional Soil Cover and ICs</p> <p><i>Provides an additional protection against direct contact with the landfill debris and associated soil contamination and minimizes potential erosion. Ensures land use is controlled.</i></p>	<p>-Install additional 2-foot thick cover (41 acres)</p> <p>- ICs</p> <p>-LTM and O&M</p>	<p>-Installing an additional 2-foot thick soil cover (with 18 inches of soil fill and 6 inches of top soil) over the entire 41-acre landfill area.</p> <p>-Re-establishing the vegetation with sustainable native plant species for added benefits as wildlife habitats, without mowing requirements.</p> <p>-A perimeter zone of Rip Rap material would be established as a long-term erosion control. These engineering controls would provide run-on and run-off control and reduce infiltration.</p> <p>-Implementing physical barriers (boundary survey, fencing, gates, and signage) and ICs (restrictive covenants) to control future residential and industrial land use, unauthorized and uncontrolled excavation and drilling at the site, and any land surface activities that permanently expose waste materials or release associated contamination. The IC boundary encompassing the landfill waste area would be surveyed by a professional land surveyor.</p> <p>-Perform LTM and O&M</p> <p>-Perform 5-year reviews and reporting since debris and hazardous substances would remain at the site at concentrations that do not allow unlimited use and unrestricted exposure.</p>	<p>Capital Cost: \$5,758,000</p> <p>Present Value of Future, Annual O&M Costs: \$853,000</p> <p>Total Present-Worth Cost: \$6,611,000</p> <p>Discount Rate: 2.7%</p> <p>Assumed timeframe: 30 years</p>

2.9.2 Comparative Analysis of Remedial Alternatives

A **comprehensive analysis of each remedial alternative**¹⁶ with respect to the **nine evaluation criteria**¹⁷ was completed and is summarized below. **Table 6** depicts a comparison of the alternatives to the criteria to support ranking of the alternatives.

Threshold Criteria

Overall Protection of Human Health and the Environment. Alternative 1 (no action) does not achieve RAOs. Both of the other alternatives are protective of human health and the environment and reduce the exposure to waste and contaminated soil by controlling land use and access and either enhancing the existing soil cover or providing additional soil cover.

Compliance with Applicable or Relevant and Appropriate Requirements. All alternatives except Alternative 1 comply with the **Applicable or Relevant and Appropriate Requirements (ARARs)**¹⁸ (Attachment A, Tables A-1 through A-6).

Primary Balancing Criteria

Long-Term Effectiveness and Permanence. Each of the alternatives, with the exception of Alternative 1, is expected to achieve long-term effectiveness and permanence as long as the RAOs are met. Alternatives 2 and 3 use soil cover to minimize contact and rely on ICs to prevent disturbance to landfill debris and soil. The ICs for both alternatives are adequate and reliable, because there would be limited access and future excavations would be controlled. Since Alternative 3 provides additional 2-ft thick soil cover over the existing 2-ft native soil cover, Alternative 3 would theoretically provide additional long-term protection against erosion relative to Alternative 2. However, the long-term effectiveness of erosion control for Alternative 2 is adequate with proper inspection and maintenance.

FIGURE 6
 Conceptual Layout of Alternative 2 – Enhanced Native Soil Cover and Institutional Controls

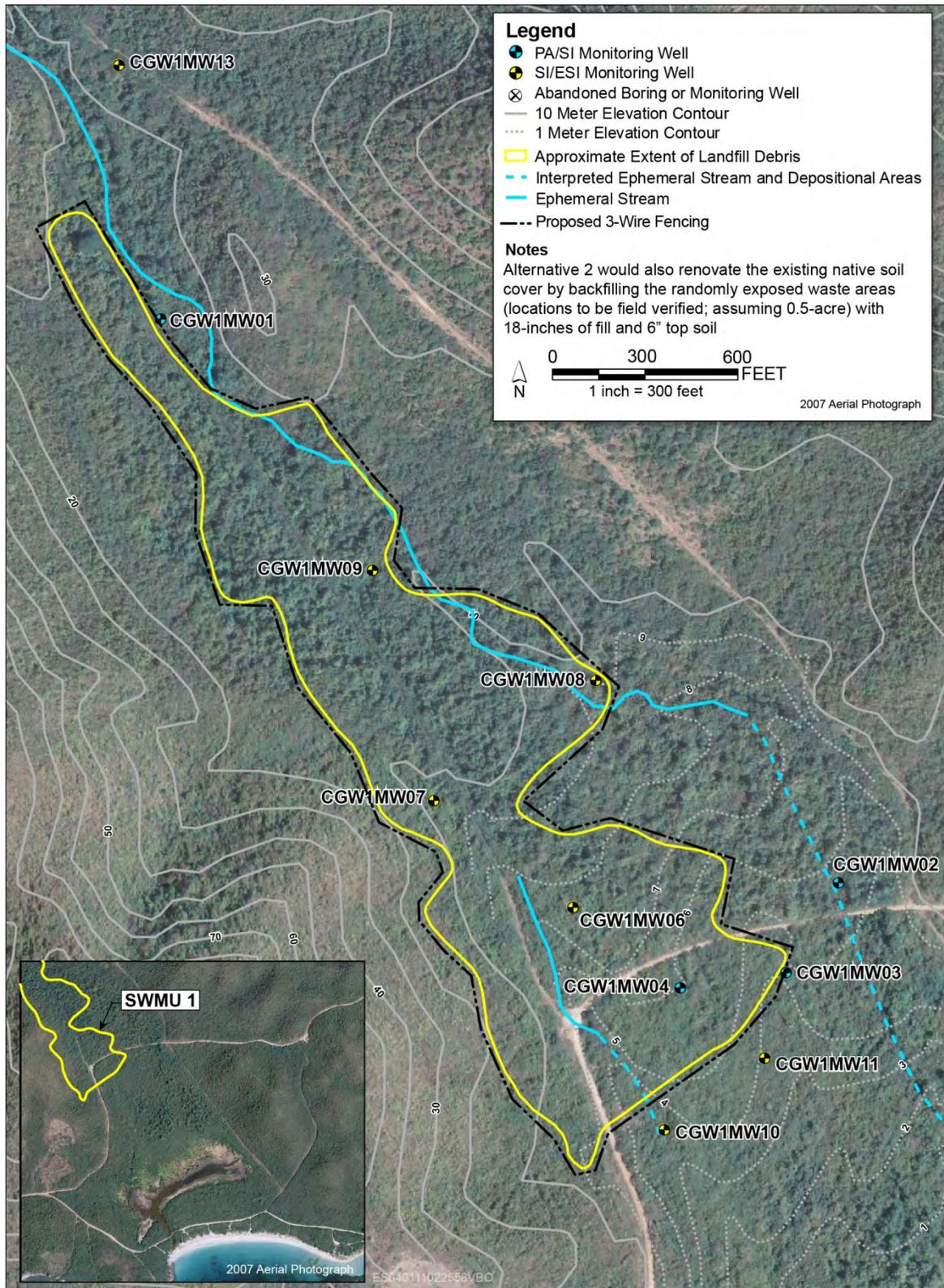


FIGURE 7
 Conceptual Layout of Alternative 3 - Additional Soil Cover and Institutional Controls

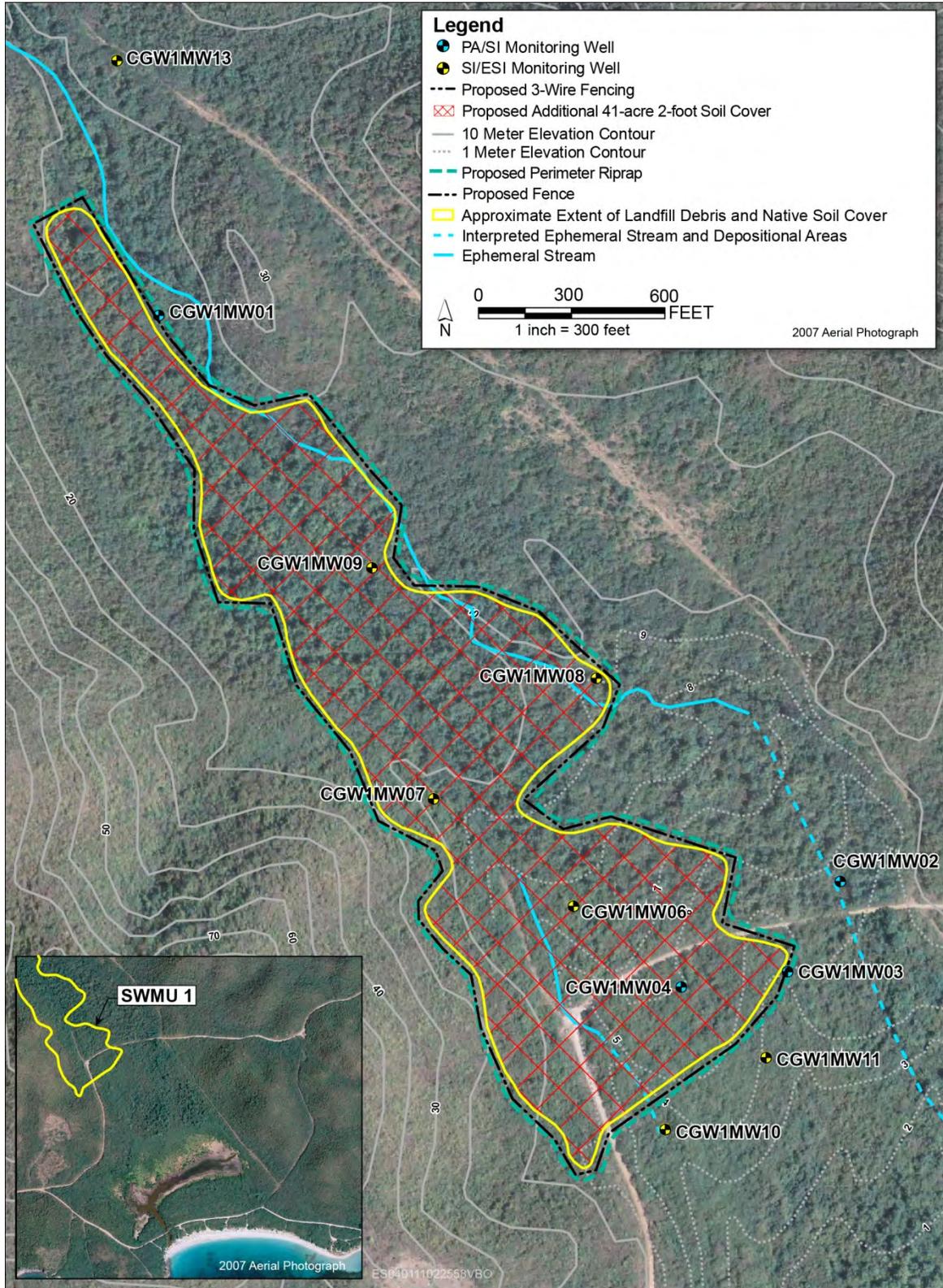


TABLE 6
Relative Ranking of Remedial Alternatives

CERCLA Criteria	Remedial Alternatives		
	1. No Action	2. Enhanced Soil Cover	3. Additional Soil Cover
Threshold Criteria			
Overall Protection of Human Health and the Environment	0	4	4
Compliance with ARARs	0	4	4
Balancing Criteria			
Long-Term Effectiveness and Permanence	1	3	4
Reduction in Toxicity, Mobility or Volume through Treatment	0	0	0
Short-Term Effectiveness	4	3	1
Implementability	0	4	2
Present-Worth Cost	4 (\$95,000)	4 (\$1,258,000)	1 (\$6,611,000)
OVERALL RANK	9	22	16

Ranking: Scores range from 0 to 5, with 0 being the least favorable and 5 being the most favorable.

Reduction in Toxicity, Mobility, or Volume through Treatment. No alternative would result in any reduction of volume, toxicity, or mobility by treatment. As a result there is no difference among Alternatives 1, 2, and 3 under this criterion.

Short-Term Effectiveness. A sustainability analysis was also conducted for each of the three remedial alternatives as part of this criterion for consideration. Sustainability is a greening process focused on energy and other resource conservation, reduction of green house gases, waste minimization, and re-use and recycling of materials. Alternative 1 has the least short-term construction impacts and the lowest environmental footprint since there would be no remedial construction activities. The other alternatives would include construction activities with varying levels of potential impacts to construction workers, the community, and the environment. The amount of impact is proportional to the amount of vegetation clearance, backfill and top soil, and truck traffic through the community. Alternative 2 has limited impacts to the landscape, because of the small area likely requiring enhanced soil cover. In fact, this alternative enhances areas where little or no soil is present over the landfill debris. Construction activities are estimated to occur over 1 month. Alternative 3 has significant impacts, including site clearing of existing vegetation over 41 acres and increased truck traffic through the community to transport vegetation and fill soil. Alternative 3 also has the highest green house gas emissions resulting from increased truck traffic. Construction activities are estimated to occur over 12 months.

Implementability. Alternative 1 would not obtain administrative approval since it does not meet the RAOs. Alternative 3 would be the most complex alternative to implement because of much larger scale of construction, compared to Alternative 2. In terms of administrative feasibility, Alternative 3 would involve more erosion control and implementation, since a 41-acre area would be disturbed.

Cost. Alternative 1 is the most cost effective, but does not meet the RAOs. Alternative 2 has a **present-worth cost**¹⁹ of \$1,258,000, which is substantially lower than Alternative 3, and still meets the RAOs. Alternative 3 is the least-cost effective alternative, with an estimated present-worth cost of \$6,611,000.

Modifying Criteria

Commonwealth Acceptance. Commonwealth involvement has been continual throughout the CERCLA process for SWMU 1 and PREQB supports the selected remedy.

Community Acceptance. The Proposed Plan was issued for public review from August 1 to September 15, 2011 and was discussed at a public meeting on August 17, 2011. Aside from questions and comments voiced and addressed at the public meeting, no other public comments on the Proposed Plan were received.

2.10 Selected Remedy

The selected remedy for SWMU 1 soil is Alternative 2, Enhanced Native Soil Cover and ICs. This selected remedy is the preferred alternative that was presented in the Proposed Plan.

2.10.1 Rationale for Selected Remedy

Based on the evaluation of the data and information currently available, the Navy and EPA Region 2, in consultation with the PREQB, assert the selected remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. Alternative 2 will be protective of human health and the environment under current and projected future land use as a wildlife refuge, prohibit future residential and industrial land use, and ensure the soil cover and ICs are adequate and maintained to minimize the potential for exposure to landfill debris and associated contamination.

2.10.2 Description of Selected Remedy

Alternative 2, Enhanced Soil Cover and ICs involves the implementation of a 2-foot soil cover over exposed landfill debris. The selected remedy will also include institutional controls, performance monitoring, and Five-Year Reviews. As mentioned above in Section 2.5, the site is located in a designated wildlife refuge where the future land use is anticipated to remain the same, and it is restricted from the public. However, if the property where the site is located is ever to be transferred out of U.S. government ownership, ICs in the form of restrictive covenants will be implemented to restrict future residential or industrial land use, unauthorized and uncontrolled excavation and drilling at the site, and any land surface activities that would expose waste materials or release associated contamination. Performance monitoring will be implemented at SWMU 1 to ensure there is not direct contact with subsurface landfill debris and associated contamination that would potentially pose an unacceptable risk to exposed receptors; ensure the potential for erosion of landfill debris is minimized; ensure land use (including groundwater) within the landfill boundaries is controlled, unless or until additional action is implemented that mitigates potentially unacceptable risks for unrestricted land use; and demonstrate the efficacy of institutional controls put in place to protect potential receptors. Long-term groundwater monitoring will be conducted to determine if a future release from the landfill occurs that results in groundwater contamination that may necessitate a groundwater remedy.

2.10.3 Expected Outcomes of the Selected Remedy

The expected outcome of the Selected Remedy is to prevent direct contact with subsurface landfill debris and associated contamination that would potentially pose an unacceptable risk to exposed receptors. In accordance with the RAOs, site access and use will be restricted at SWMU 1.

Within 90 days following signature of the ROD, the Navy will prepare, in accordance with EPA guidance, and submit to EPA, PREQB, and USFWS for review and approval, a Remedial Design workplan, including an O&M plan containing the soil cover and ICs implementation and maintenance actions, including periodic inspections, and a long-term groundwater monitoring plan. The Navy is responsible for implementing, maintaining, inspecting, reporting on, and enforcing the ICs in accordance with the ROD.

2.10.4 Statutory Determinations

In accordance with the NCP, the selected remedy meets the following statutory determinations.

- **Protection of Human Health and the Environment** - The selected remedy is appropriate to prevent direct contact with subsurface landfill debris and associated contamination that would potentially pose an unacceptable risk to exposed receptors. Exposed debris will be covered, ICs will be put in place and maintained, and performance monitoring would be conducted.
- **Compliance with ARARs** - The selected remedy will attain the Federal and Commonwealth ARARs presented herein (**Attachment A, Tables A-1 through A-6**).
- **Cost-Effectiveness** - The selected remedy provides the best value relative to the cost.
- **Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable** - The selected remedy represents the maximum extent to which permanent solutions and alternative treatment technologies can be used in a practicable manner at SWMU 1. An enhanced native soil cover and ICs will attain the RAOs.
- **Preference for Treatment as a Principal Element** - The selected remedy establishes source containment as the presumptive remedy, as established by the EPA directive for CERCLA municipal landfills and similar military landfills.
- **Five-Year Review Requirements** - This remedy will result in debris and hazardous substances, pollutants, or contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure. The Navy will maintain ICs and conduct a statutory remedy review every 5 years after initiating the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment. If the remedy is determined not to be protective of human health and the environment because, for example, ICs have failed, then additional ICs and/or remedial actions will be evaluated by the FFA parties and the Navy for potential implementation.

2.11 Documentation of Significant Changes

The Proposed Plan for SWMU 1 was released for public comment on August 1, 2011. The Navy reviewed all comments submitted during the public comment period, which extended

until September 15, 2011. It was determined that no changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

2.12 Community Participation

The Navy, in consultation with the EPA and PREQB, established a community relations program for the Vieques environmental restoration program in 2001. The program promotes communication regarding site investigations and remediation activities between the stakeholder agencies (Navy, EPA, PREQB, and the DOI) and the public. The community relations program formed a RAB in 2004 to encourage community involvement. RAB meetings are held approximately every 3 months and are open to the public for participation.

In accordance with Section 117(a) of CERCLA, the Navy provided a public comment period between August 1, 2011 and September 15, 2011, for the SWMU 1 Proposed Plan. A public meeting to present the Proposed Plan was held on August 17, 2011 at Jorge's Ice House in Barrio Martineau, Vieques, Puerto Rico. The meeting provided an additional opportunity for the public to submit comments on the Proposed Plan.

The Proposed Plan and previous investigation reports for SWMU 1 were available during the public comment period and are currently available in the former VNTR Administrative Record. The Administrative Record is accessible to the public via:

Biblioteca Electrónica
Benítez Guzmán Street, Corner with Baldorioty de Castro Street
Isabel Segunda
Vieques, PR 00765
Phone: (787) 741-2114

Hours of Operation:

Monday – Friday, 8:00 a.m. – 4:00 p.m.

Or online at:

<http://public.lantops-ir.org/sites/public/vieques/default.aspx>

3 Responsiveness Summary

The Responsiveness Summary is a concise summary of substantive comments received from the public during the public comment period and the associated responses. The Responsiveness Summary was prepared in accordance with guidance in *Community Relations in Superfund: A Handbook* (EPA, 1992) after the public comment period ended.

3.1 Overview

The Proposed Plan presented to the public identified that a remedial action, consisting of enhanced native soil cover and institutional controls, is warranted at SWMU 1 to protect human health and the environment.

3.2 Community Involvement Process

The public comment period for the proposed remedial action determination for SWMU 1 began on August 1, 2011, and ended on September 15, 2011. A public meeting/public availability session was held on August 17, 2011, at Jorge's Ice House, located at Carr. 200, Km 3, hm 2, in Vieques, Puerto Rico, to present information pertinent to the proposed remedial action determination and to accept comments and questions regarding this determination. Other than informational discussions, no formal comments or questions were submitted to the Navy, EPA, or PREQB during the public meeting/public availability session.

3.3 Summary of the Public Comment Period

No community members expressed opposition to the proposed remedial action determination for SWMU 1. No comments or questions were received by the Navy, EPA, or PREQB during the public comment period.



Acronyms and References

Acronyms

amsl	above mean sea level
AOC	area of concern
ARAR	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
COC	constituent of concern
COPC	constituent of potential concern
CSM	conceptual site model
DOI	Department of the Interior
EBS	Environmental Baseline Survey
ECA	Eastern Conservation Area
eco-SSL	ecological soil screening level
EIS	Environmental Impact Statement
EMA	Eastern Maneuver Area
EPA	United States Environmental Protection Agency
ERA	Ecological Risk Assessment
ERP	Environmental Restoration Program
FFA	Federal Facilities Agreement
FS	Feasibility Study
ft	feet
HHRA	Human Health Risk Assessment
HI	hazard index
HQ	hazard quotient
IAS	Initial Assessment Study
IC	Institutional Controls
LIA	Live Impact Area
LOAEL	lowest observed adverse effect level

NASD	Naval Ammunition Support Detachment
NAVFAC	Naval Facilities Engineering Command
Navy	U.S. Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOAEL	no observed adverse effect level
NPL	National Priorities List
O&M	Operation & Maintenance
PA	Preliminary Assessment
PA/SI	Preliminary Assessment/Site Inspection
PCB	polychlorinated biphenyl
PREQB	Puerto Rico Environmental Quality Board
RAB	Restoration Advisory Board
RAO	remedial action objectives
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RME	reasonable maximum exposure
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SI	Site Inspection
SI/ESI	Site Inspection/Expanded Site Inspection
SIA	Surface Impact Area
SMP	Site Management Plan
SSL	soil screening level
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TRV	toxicity reference value
µg/L	micrograms per liter
USFWS	United States Fish and Wildlife Service
VOC	volatile organic compound
VNTR	Vieques Naval Training Range

References

Item	Reference Phrase in ROD	Location in ROD	Identification of Referenced Document Available in the Administrative Record
Ref. 1	Results	Section 2.3	CH2M HILL, 2008. <i>Preliminary Assessment/Site Inspection Report, 12 Consent Order Sites and 8 PI/PAOC Sites, Former Vieques Naval Training Range, Vieques, Puerto Rico</i> . June. Tables 3-1 and 3-2.
Ref. 2	background inorganic constituent concentrations	Section 2.3	CH2M HILL, 2007. <i>East Vieques Background Soil Inorganics Investigation Report, Former Vieques Naval Training Range, Vieques, Puerto Rico</i> . October. Table 3-11.
Ref. 3	Samples	Section 2.3	CH2M HILL, 2010. <i>Final Site Inspection / Expanded Site Inspection Report, 7 Consent Order Sites and 16 PI/PAOC Sites, Former Vieques Naval Training Range, Vieques, Puerto Rico</i> . August. Tables 3-1 through 3-3.
Ref. 4	Data	Section 2.3	CH2M HILL, 2011. <i>Final Streamlined Remedial Investigation/Feasibility Study, Solid Waste Management Unit (SWMU) 1, Former Vieques Naval Training Range, Vieques, Puerto Rico</i> . April. Tables 3-1 through 3-5 and Figures 3-1 through 3-14.
Ref. 5	potential human receptors	Section 2.6.1	CH2M HILL, 2011. <i>Final Streamlined Remedial Investigation/Feasibility Study, Solid Waste Management Unit (SWMU) 1, Former Vieques Naval Training Range, Vieques, Puerto Rico</i> . April. Figure 5-1.
Ref. 6	No unacceptable human health risks	Section 2.6.1	CH2M HILL, 2011. <i>Final Streamlined Remedial Investigation/Feasibility Study, Solid Waste Management Unit (SWMU) 1, Former Vieques Naval Training Range, Vieques, Puerto Rico</i> . April. Sections 5.3 and 5.4.
Ref. 7	ecological CSM	Section 2.6.2	CH2M HILL, 2011. <i>Final Streamlined Remedial Investigation/Feasibility Study, Solid Waste Management Unit (SWMU) 1, Former Vieques Naval Training Range, Vieques, Puerto Rico</i> . April. Section 6.2.
Ref. 8	ecological assessment and measurement endpoints	Section 2.6.2	CH2M HILL, 2011. <i>Final Streamlined Remedial Investigation/Feasibility Study, Solid Waste Management Unit (SWMU) 1, Former Vieques Naval Training Range, Vieques, Puerto Rico</i> . April. Appendix D, Table 3.

Item	Reference Phrase in ROD	Location in ROD	Identification of Referenced Document Available in the Administrative Record
Ref. 9	bioaccumulating chemical	Section 2.6.2	CH2M HILL, 2011. <i>Final Streamlined Remedial Investigation/Feasibility Study, Solid Waste Management Unit (SWMU) 1, Former Vieques Naval Training Range, Vieques, Puerto Rico</i> . April. Appendix D, Table 4.
Ref. 10	toxicity reference values	Section 2.6.2	CH2M HILL, 2011. <i>Final Streamlined Remedial Investigation/Feasibility Study, Solid Waste Management Unit (SWMU) 1, Former Vieques Naval Training Range, Vieques, Puerto Rico</i> . April. Appendix D, Tables 15 and 16.
Ref. 11	ecological soil screening levels	Section 2.6.2	CH2M HILL, 2011. <i>Final Streamlined Remedial Investigation/Feasibility Study, Solid Waste Management Unit (SWMU) 1, Former Vieques Naval Training Range, Vieques, Puerto Rico</i> . April. Appendix D, Table 10.
Ref. 12	Master Ecological Risk Assessment Protocol for Vieques	Section 2.6.2	CH2M HILL, 2010. <i>Master Standard Operating Procedures, Protocols, and Plans. Environmental Restoration Program. Vieques, Puerto Rico</i> . Final. April. Table 18. CH2M HILL. 2010. <i>Master Ecological Risk Assessment Protocol for Vieques Environmental Restoration Program – Update 1 (Addendum)</i> . Draft. August. Table 18.
Ref. 13	Step 3A	Section 2.6.2	CH2M HILL, 2011. <i>Final Streamlined Remedial Investigation/Feasibility Study, Solid Waste Management Unit (SWMU) 1, Former Vieques Naval Training Range, Vieques, Puerto Rico</i> . Section 1.5.3.2 and Table 18.
Ref. 14	ecological COPCs	Section 2.6.2	CH2M HILL, 2011. <i>Final Streamlined Remedial Investigation/Feasibility Study, Solid Waste Management Unit (SWMU) 1, Former Vieques Naval Training Range, Vieques, Puerto Rico</i> . April. Appendix D, Tables 18 and 19.
Ref. 15	Presumptive remedial alternatives ¹²	Section 2.9	CH2M HILL, 2011. <i>Final Streamlined Remedial Investigation/Feasibility Study, Solid Waste Management Unit (SWMU) 1, Former Vieques Naval Training Range, Vieques, Puerto Rico</i> . April. Table 7-2.
Ref. 16	comprehensive analysis of each remedial alternative	Section 2.9.2	CH2M HILL, 2011. <i>Final Streamlined Remedial Investigation/Feasibility Study, Solid Waste Management Unit (SWMU) 1, Former Vieques Naval Training Range, Vieques, Puerto Rico</i> . April. Table 9-1.
Ref. 17	nine evaluation criteria	Section 2.9.2	CH2M HILL, 2011. <i>Final Streamlined Remedial Investigation/Feasibility Study, Solid Waste Management Unit (SWMU) 1, Former Vieques Naval Training Range, Vieques, Puerto Rico</i> . April. Section 9.1.

Item	Reference Phrase in ROD	Location in ROD	Identification of Referenced Document Available in the Administrative Record
Ref. 18	Applicable or Relevant and Appropriate Requirements (ARARs)	Section 2.9.2	CH2M HILL, 2011. <i>Final Streamlined Remedial Investigation/Feasibility Study, Solid Waste Management Unit (SWMU) 1, Former Vieques Naval Training Range, Vieques, Puerto Rico.</i> April. Tables 7-1a through 7-1f.
Ref. 19	present-worth cost	Section 2.9.2	CH2M HILL, 2011. <i>Final Streamlined Remedial Investigation/Feasibility Study, Solid Waste Management Unit (SWMU) 1, Former Vieques Naval Training Range, Vieques, Puerto Rico.</i> April. Table 9-2.

Attachment A
Applicable or Relevant and Appropriate Requirements

TABLE A-1

Federal Chemical-Specific ARARs

Streamlined RI/FS Report for SMMWU 1 (Camp Garcia Landfill)

Former Vieques Naval Training Range

Vieques, Puerto Rico

Media	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Soil	U.S. Environmental Protection Agency (EPA) Regional Screening Levels (RSLs) or formerly EPA Region 9 Preliminary Remediation Goals (PRGs)	RSLs are conservative, risk-based criteria for evaluating and cleaning up contaminated CERCLA sites. EPA has developed these risk-based concentrations for many constituents associated with contaminated sites.	Puerto Rico Water Quality Standards Regulation, as amended March 2010, Article 3.1.8	Alternative 2 and 3	To be considered	RSLs are used in the risk assessments as a useful screening tool to identify chemicals of potential concerns (COPC) and for determining the area that may need to be remediated. Site concentrations are screened against RSLs as a preliminary indicator of the presence of potentially unacceptable risk. RSLs are also often used to determine the quality requirements of off-site borrow fill material and top soil during soil cover construction.
Groundwater	National primary drinking water standards are health-based standards for public water systems (maximum containment levels (MCLs)).	Public water system	40 CFR Part 141 Subparts B&G	1,2,3	Relevant and Appropriate	MCLs were used as comparison criteria during the risk assessments to help determine that groundwater impact from the landfill has been negligible and no groundwater remediation and monitoring is necessary.

TABLE A-2
 Federal Chemical-Specific ARARs
 Streamlined RI/FS Report for SMWU 1 (Camp Garcia Landfill)
 Former Vieques Naval Training Range
 Vieques, Puerto Rico

Media	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Surface Water and Groundwater	Surface Water and Groundwater Quality Standards	Maximum allowable concentrations in surface water, estuarine, and groundwater	Puerto Rico Water Quality Standards Regulation, as amended March 2010, Article 3.1.8	1,2,3	To be considered	SWMU 1 is not a RCRA-permitted landfill and surface water is not present at the site. This ARAR was used to help determine that long-term groundwater sampling is not a component of any of the alternatives, since groundwater data are representative of 30-year post-closure groundwater conditions and indicate that groundwater impact from the landfill has been negligible (i.e., no MCL exceedances) after 30 to 55 years of waste in place.

TABLE A-3

Federal Chemical-Specific ARARs

Streamlined RI/FS Report for SMWU 1 (Camp Garcia Landfill)

Former Vieques Naval Training Range

Vieques, Puerto Rico

Location	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
<i>Migratory Bird Treaty Act</i>						
Migratory bird area	Protects almost all species of native birds in the United States from unregulated taking which can include poisoning at hazardous waste sites or harassment by other means.	Presence of migratory birds.	<i>Migratory Bird Treaty Act</i> , 16 USC 703	2, 3	Applicable	The site is located in the Atlantic Americas Migratory Flyway. If migratory birds, or their nests or eggs, are identified at the site, operations will not destroy the birds, nests, or eggs.

TABLE A-4

Federal Chemical-Specific ARARs

Streamlined RI/FS Report for SMWU 1 (Camp Garcia Landfill)

Former Vieques Naval Training Range

Vieques, Puerto Rico

Location	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
No Puerto Rico Location-Specific ARARs apply.						

TABLE A-5
 Federal Chemical-Specific ARARs
 Streamlined RIFS Report for SMWU 1 (Camp Garcia Landfill)
 Former Vieques Naval Training Range
 Vieques, Puerto Rico

Action	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Storm Water Discharge from Construction activities	Requires the development and implementation of best management practices and erosion and sedimentation control measures during construction activity.	Construction activities that will disturb more than five acres of land	Puerto Rico Water Quality Standards Regulation, as amended March 2010, Article 3.1.8	3	To be considered	Alternative 3 involves covering 41 acres of land, which would require a Storm Water Pollution Prevention Plan.

TABLE A-6

Federal Chemical-Specific ARARs

Streamlined RI/FS Report for SMWU 1 (Camp Garcia Landfill)

Former Vieques Naval Training Range

Vieques, Puerto Rico

Action	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Control of Erosion and Prevention of Sedimentation						
Land disturbance	A Control of Erosion and Sediment (CES) Plan and a Work Plan must be prepared for any activities that involve the alteration of ground or soil conditions that have not been specifically excluded.	Disturbance of more than 40 cubic meters of soil during construction activity	Puerto Rico Regulation 5754.1230(B), (C)	2, 3	Applicable	Alternatives 2 and 3 involve the disturbance of more than 40 cubic meters of soil. A CES and Work Plan will be prepared for this activity.
Air Pollution Control						
Production of Fugitive Dust	Dust control measures must be implemented during construction activities to prevent emissions beyond the property boundary. These include, but are not limited to, the use of water or other chemicals on road ways to control dust, covering haul trucks, and cleaning tracked soil off of paved roads.	Construction activity causing particulate matter to become airborne	Puerto Rico Regulation 5300.404(A)(2), (4), (7); (B)	2, 3	Applicable	Alternatives 2 and 3 involve activities that produce dust. Dust control measures will be implemented.
Control of Noise Pollution						
Construction activity	No construction activity may be performed at night or in such a way that vibrations are produced that can be felt beyond the property boundary. If equipment used in construction is not manufactured in accordance with USEPA standards for newly manufactured equipment then it may not produce noise that exceeds 70 dBA.	Construction activity including earthwork	Puerto Rico Regulation 3418.3.1.5(A),(C);3.1.10; 3.1.13; 4.1	2, 3	Applicable	The site is considered to be in Zone II (Commercial) for noise production. Noise pollution during activities will be prevented.