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**FINAL PROPOSED REMEDIAL ACTION PLAN UNEXPLODED ORDNANCES 12
AND 14 (UXO 12 AND UXO 14) ATLANTIC FLEET WEAPONS TRAINING
AREA, FORMER VIEQUES NAVAL TRAINING RANGE VIEQUES PUERTO RICO
(ENGLISH VERSION)**

03/01/2019
NAVFAC ATLANTIC

Approved for public release: distribution unlimited.



Naval Facilities Engineering Command Atlantic
Norfolk, Virginia

Final

**Proposed Remedial Action Plan
UXOs 12 and 14
(English Version)**

Atlantic Fleet Weapons Training Area – Vieques
Former Vieques Naval Training Range
Vieques, Puerto Rico

March 2019

Proposed Remedial Action Plan

UXOs 12 and 14
Atlantic Fleet Weapons Training Area —Vieques
Former Vieques Naval Training Range
Vieques, Puerto Rico
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1. Introduction

This **Proposed Plan** identifies the **preferred alternative** and associated rationale for UXO 12 and UXO 14, located at the former Vieques Naval Training Range (VNTR) in Vieques, Puerto Rico. UXOs 12 and 14 are also known as Operable Units (OUs) 23 and 25, respectively, in the Superfund Enterprise Management System (SEMS), which is a database maintained by the **U.S. Environmental Protection Agency (EPA)** to track the progress at hazardous waste sites. UXOs 12 and 14, together comprising just over 4,800 acres, make up the majority of the former Eastern Maneuver Area (EMA), which was established in 1947 to provide areas and ranges for the training of Marine amphibious units and battalion landing teams in exercises that included amphibious landings, small-arms fire, artillery and tank fire, shore fire control, and combat engineering tasks.

The Proposed Plan summarizes each OU's history, the results of previous environmental investigations and removal actions, and the preferred alternative to address the conditions at UXOs 12 and 14, and it solicits and facilitates public review of and comment on the preferred alternative as well as the other alternatives presented.

This document is issued by the Department of the Navy (Navy), Naval Facilities Engineering Command (NAVFAC) Atlantic, and EPA Region 2, in consultation with the **Department of the Interior (DOI)** and the

Mark Your Calendar for the Public Comment Period

March 18 – April 16, 2019



Submit Written Comments

The Navy and EPA will accept written comments on the Proposed Plan during the public comment period. To submit comments or obtain further information, please refer to the insert page.

Attend the Public Meeting



April 2, 2019 at 6:00 p.m.

Multiple Use Center (in front of the Public Square)
#6 Antonio G. Mellado Street, Isabel II
Vieques, PR

The Navy will hold a public meeting to present and discuss the preferred remedial alternative as well as the other alternatives considered. Verbal and written comments will also be accepted at this meeting.

Location of Administrative Record File

Online at: <https://go.usa.gov/xRHxY>

Puerto Rico Department of Natural and Environmental Resources (PRDNER).

The Proposed Plan fulfills the public participation requirements in Section 117(a) of the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)** and Section 300.430(f)(2) of the **National Oil and**

Hazardous Substances Pollution Contingency Plan (NCP).

Beginning in 2003, a number of investigations were conducted in UXOs 12 and 14 to determine the nature and extent of **munitions and explosives of concern (MEC)** and contaminants that may have been released to the environment because of historical training activities. Because of the nature of these training activities at UXOs 12 and 14, a relatively low quantity of MEC was anticipated to be present. This supposition was supported not only by the investigations, but by removal actions conducted across approximately 307 acres, during which only 49 MEC were identified within UXO 12 and only 4 MEC were identified within UXO 14.

Based upon the munitions removal activities already performed, current and anticipated future land use as a wildlife refuge area with localized recreational use, and the results of the **Remedial Investigation (RI)** at UXOs 12 and 14, the preferred alternative for UXOs 12 and 14 is Focused MEC Removal, **Land Use Controls (LUCs)**, and MEC Inspections.

The Navy and EPA, in consultation with DOI and PRDNER, will make the final decision on the preferred alternative for UXOs 12 and 14 after reviewing and considering all information submitted during the 30-day **public comment period**. If warranted, based on public comments and/or new information, the preferred alternative set forth in this document may be modified or another alternative described in the Proposed Plan may be considered.

This Proposed Plan summarizes information that can be found in greater detail in the **RI/Feasibility Study (FS)** Report (CH2M, 2018) and other documents associated with the various investigations and removal actions (see Sections 2.2.2 and 2.2.3), which are

contained in the **Administrative Record** for UXOs 12 and 14. A glossary of key terms (Section 10) used in this document is attached; these key terms are identified in bold print the first time they appear.

2. Site Background

2.1 Facility Description and History

Vieques is located in the Caribbean Sea approximately 7 miles southeast of the eastern tip of the island of Puerto Rico (Figure 1). Other than the main island of Puerto Rico itself, Vieques is the largest island of the Commonwealth. It is approximately 20 miles long and 4.5 miles wide and has an area of approximately 33,088 acres (51 square miles).

The Navy purchased portions of Vieques in the early 1940s to conduct activities related to military training. Operations within the former Naval Ammunition Support Detachment (NASD), the western one-third of Vieques, consisted mainly of ammunition loading and storage, vehicle and facility maintenance, and some training. Operations within the former VNTR, the eastern one-half 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. In accordance with the January 30, 2000, Presidential Directive to the Secretary of Defense, the Navy ceased training exercises at the former VNTR on April 30, 2003, at which time the land was transferred to the DOI to be managed by the **U.S. Fish and Wildlife Service (USFWS)** as a **National Wildlife Refuge**. The former VNTR is approximately 14,600 acres and comprises the EMA, Surface Impact Area (SIA), Live Impact Area (LIA), and Eastern Conservation Area (ECA) (Figure 2).

Figure 1 – Regional Location Map

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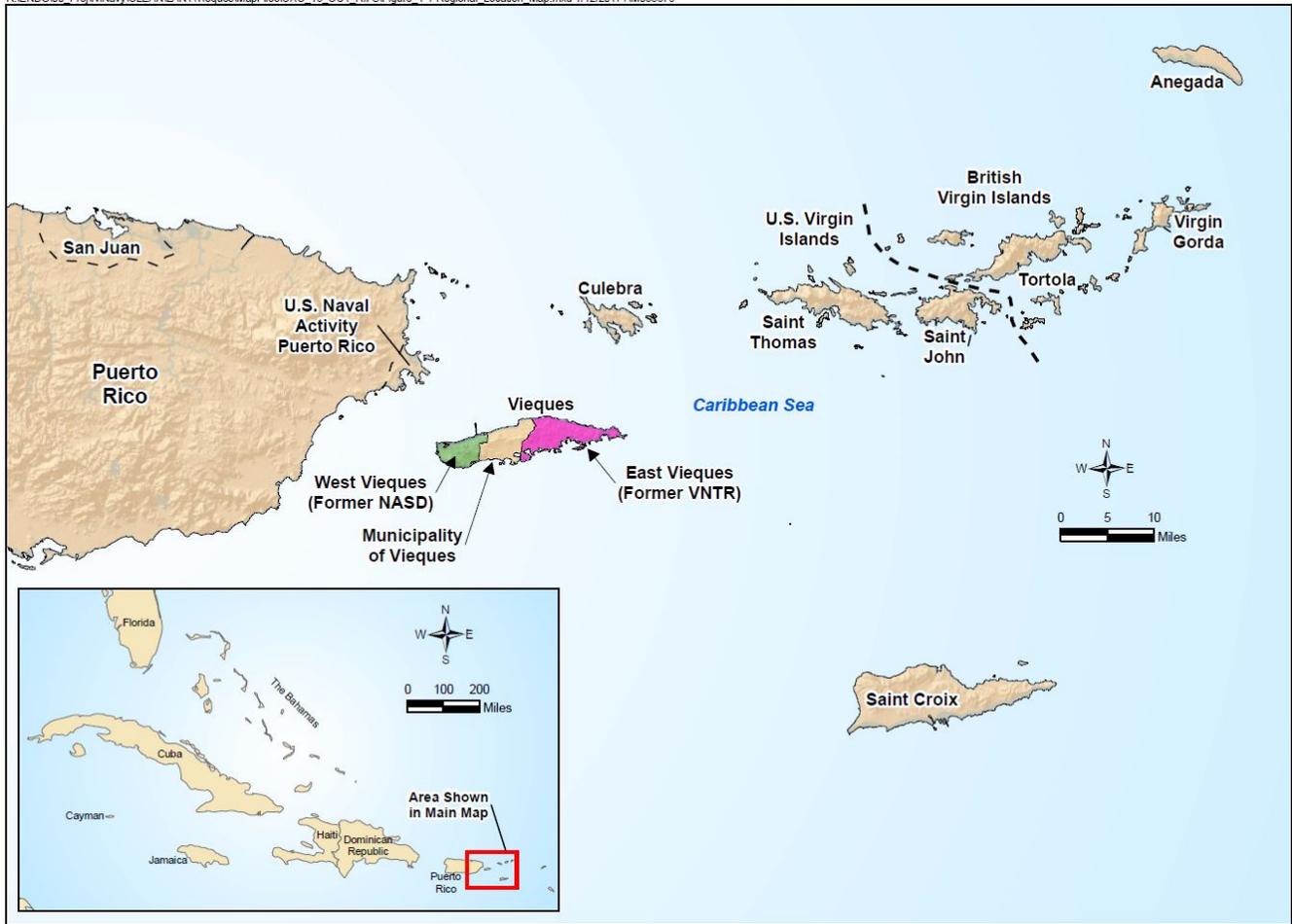
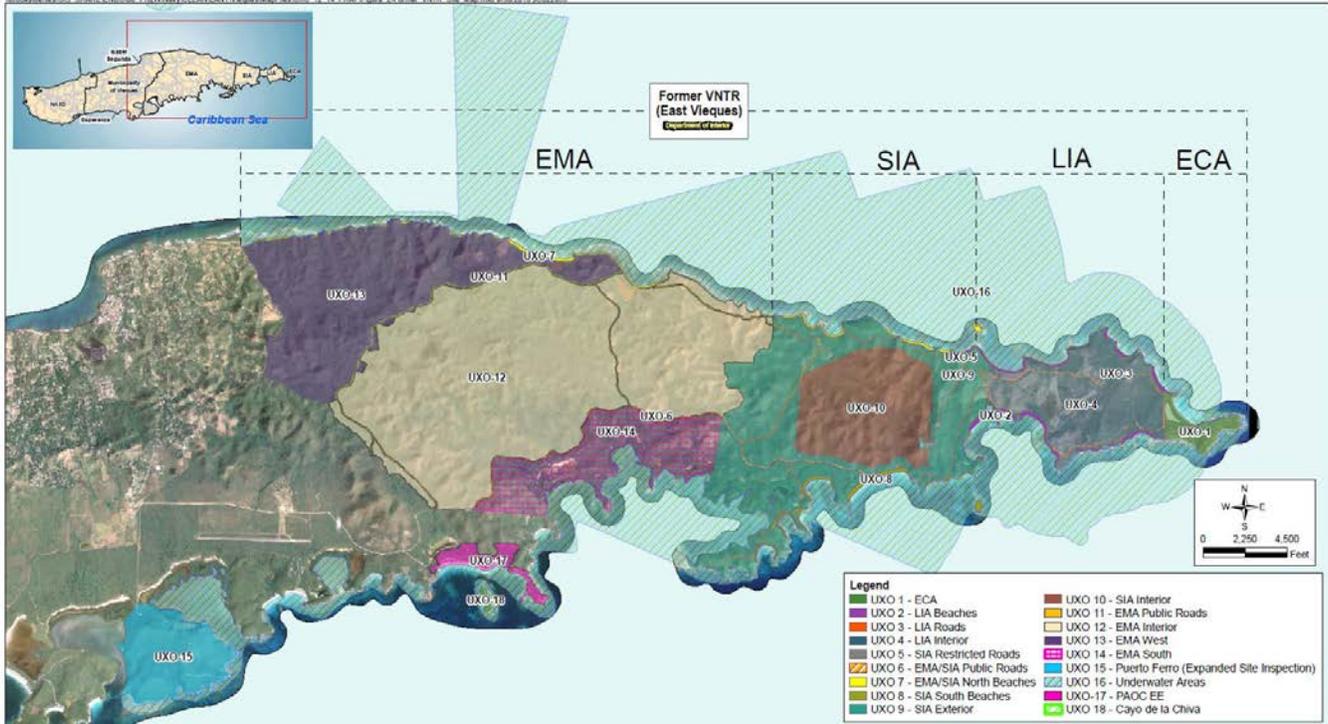


Figure 2 – UXO 12 and UXO 14 Location Map

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On February 11, 2005, the Atlantic Fleet Weapons Training Area – Vieques (also known as AFWTA-Vieques) was added to the **National Priorities List (NPL)**, which required all subsequent environmental restoration activities for Navy Installation Restoration (IR) sites on Vieques to be conducted under CERCLA. On September 7, 2007, the Navy, DOI, EPA, and the Commonwealth of Puerto Rico finalized a **Federal Facility Agreement (FFA)** that established the procedural framework and general schedule for implementing the CERCLA activities for Vieques. The Navy retains the primary responsibility under the FFA for conducting the environmental investigations and cleanup of the property, as warranted.

2.2 Site Description

While the majority of the EMA comprises UXOs 12 and 14, the EMA contains all or part of seven additional UXO sites (Figure 2): UXO 6 (EMA/SIA roads), UXO 7 (EMA/SIA north beaches), UXO 11 (SIA roads), UXO 13 (EMA west), UXO 15 (Puerto Ferro), and UXO 17 (PAOC EE). UXOs 12 and 14 lie immediately west of and are contiguous with the SIA, which includes portions of the aforementioned UXOs 6 and 7, as well as UXO 5 (SIA roads), UXO 8 (south beaches), UXO 9 (SIA exterior), and UXO 10 (SIA interior), as shown in Figure 2. The LIA, adjacent to the east side of the SIA, consists of three UXO sites (Figure 2): UXO 2 (LIA beaches), UXO 3 (LIA roads), and UXO 4 (LIA interior). Both the SIA and LIA were used primarily for various types of munitions targeting, including surface-to-surface targeting from the EMA. All of these other UXO sites are being addressed separately from UXOs 12 and 14.

UXO 12 (EMA interior) is approximately 4,026 acres and comprises interior portions of the former EMA (Figure 2). Artillery exercises were conducted in the EMA using live Marine artillery including 76-millimeter (mm), 81-mm, 90-mm, 105-mm, 106-mm, and 107-mm rounds, fired toward targets located within the SIA and LIA. Twenty-four gun positions were located in UXO 12 that were used for mortar or artillery gunfire.

Gun positions 1 through 6 were known artillery gun positions that were approved to fire 300 rounds of 155-mm projectiles per day; other, potential gun positions were identified from historical aerial photographs. Additionally, five photo-identified (PI) sites (PI 2, PI 3, PI 12, PI 18, and PI 19) were identified that include three potential small arms ranges and water production wells (Figure 3).

UXO 14 (EMA south) is approximately 784 acres and is located in the southern portion of the former EMA; the site is south of UXO 12 and adjacent to Ensenada Honda (Figure 2). One gun position was found within UXO 14 that would have fired toward targets located within the SIA and LIA.

2.3 Summary of Previous Investigations

Several environmental investigations and removal actions have been conducted at UXO 12 and/or UXO 14, beginning in 2002. The following subsections summarize the purpose, scope, and results of environmental investigations and removal actions completed to date. The dates provided in the subsection headings refer to the dates the investigation/removal action fieldwork was performed. Sample collection at UXOs 12 and 14 began in 2012.

Preliminary Range Assessment (2002-2003)

A Preliminary Range Assessment (PRA) was conducted in 2002 within the former VNTR including UXO 12. Personnel interviews, archive records search, and inspections, including magnetometer transect survey of six gun positions (G-1 through G-6) were conducted for UXO 12 (Figure 4) (NAVFAC, 2003). No MEC were found at UXO 12 during the PRA.

Expanded Range Assessment/Site Inspection (2005 - 2008)

As part of the Expanded Range Assessment /Site Inspection (ERA/SI), a surface inspection was performed in 2005 using a magnetometer at an additional six gun positions (G-14 through G-19) (Figure 4). No MEC were found at any of the gun positions. While other former gun positions are located within UXO 12, the findings for the gun positions

surveyed are representative of the remaining gun positions.

Additional ERA/SI transect inspections for surface munitions were performed throughout the historic area of UXO 12 (including each of the PI sites), covering an area of 274 acres (approximately 6 percent of UXO 12) (Figure 4). Only five MEC were identified during the transect inspections. In addition, PIs 2, 3, 18, and 19

were inspected. At PIs 2 and 3, fence posts, barbed wire, and metal banding were identified. At PI 18, only metal range related debris (RRD) was identified. At PI 19, two **munitions debris (MD)** and RRD were identified (CH2M, 2010). While PI 12 is also located within UXO 12, the findings for the other PI locations surveyed are representative of the remaining PI location.

Figure 3 – UXOs 12 and 14 Site Features

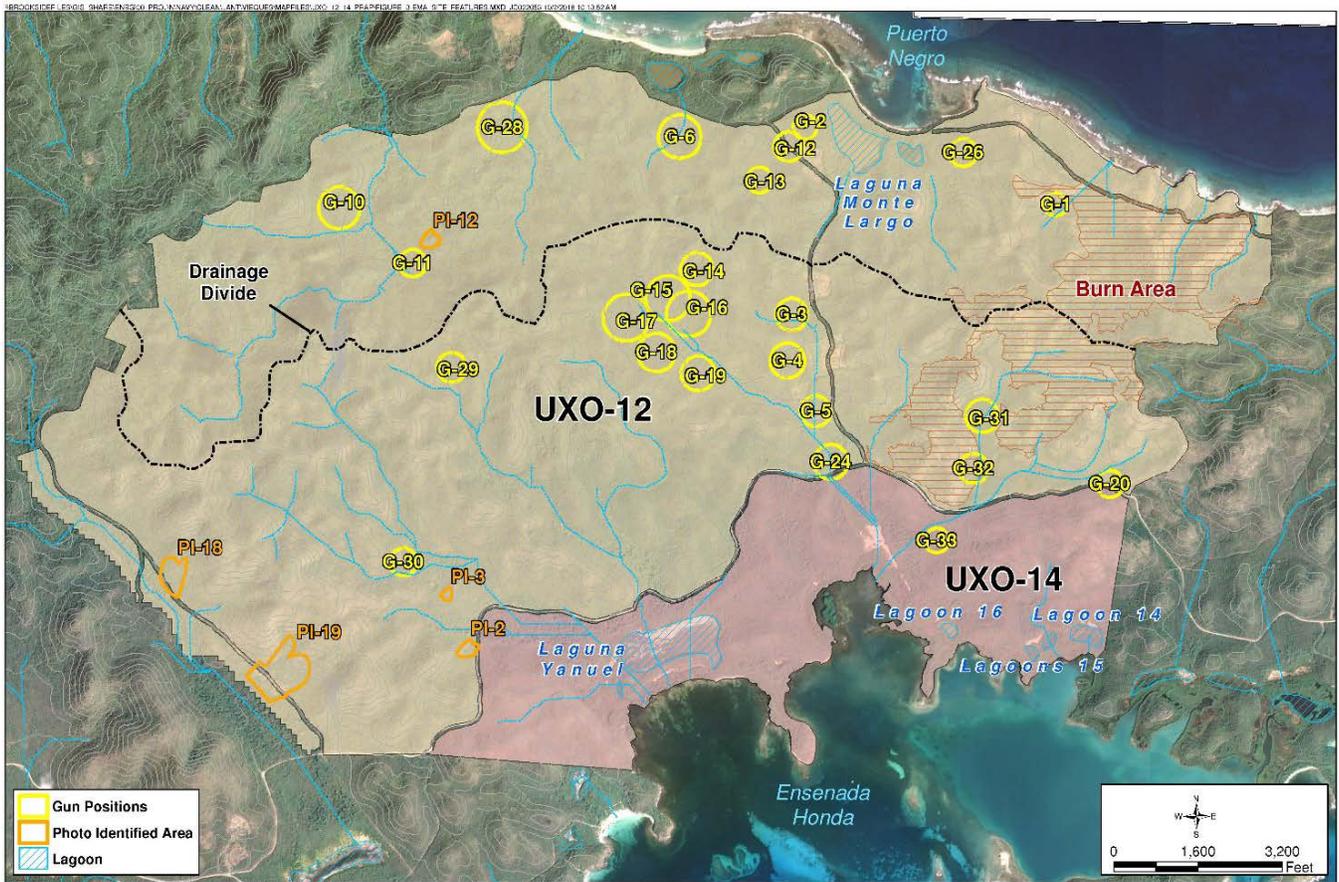
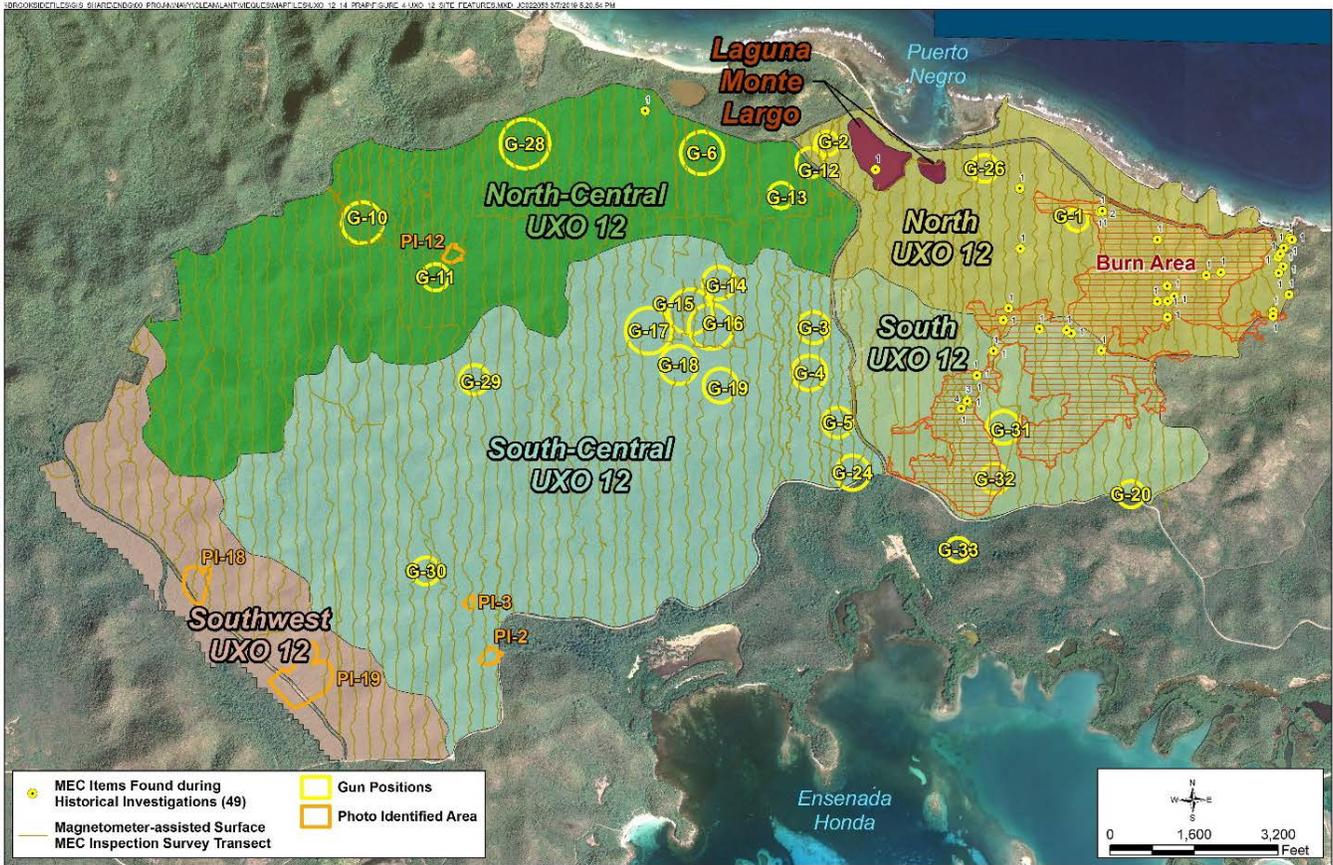


Figure 4 – UXO 12 Site Features



Transect inspections for surface munitions also were performed over most of the historic UXO 14, covering an area of 42 acres (approximately 4 percent of UXO 14) (Figure 5). Four MEC were identified within UXO 14 during the ERA/SI, primarily within the eastern portion of the site. No MEC were found at the gun position (CH2M, 2010).

Removal Actions (Surface MEC Clearance) of Laguna Monte Largo and 2013 Burn Area (2012 - 2013)

A removal action was performed at Laguna Monte Largo within UXO 12 in 2012, whereby surface clearance was conducted across a dry Laguna Monte Largo and an unnamed adjacent lagoon, together comprising approximately 25 acres. One MEC and 230 MD were recovered during the removal action.

In 2013, a removal action was performed in a 282-acre area where vegetation was burned by a fire suspected to have been set by trespassers. Seventeen MEC and 4,288 MD were recovered during the removal action.

Both removal actions were conducted in accordance with the SIA **Non-Time-Critical Removal Action (NTCRA)** Work Plan (CH2M, 2009).

Remedial Investigation/Feasibility Study (2012 - 2014)

An RI/FS (CH2M, 2018) was conducted at UXO 12 and UXO 14 to assess the nature and extent of contamination, to assess potential risks to human health and the environment, and to evaluate remedial alternatives for the sites. The RI was implemented in two separate, but related components – one focusing on MEC and one focusing on chemical contaminants in soil, groundwater, sediment, and surface water. As part of the RI, groundwater monitoring wells were installed to conservatively focus on areas with the highest potential for contamination, such as adjacent to gun positions, and also downgradient of potential release areas to evaluate potential contaminant migration. The locations were jointly selected by the Navy and regulatory agencies.

Based on the MEC characterization component of the RI, it was concluded that although MEC is potentially present within UXOs 12 and 14, the density estimate based on the historical investigations is very low for UXOs 12 and 14 (i.e., between approximately 0.012 and 0.015 MEC per acre or 1 MEC in every 70 to 80 acres). For perspective, the MEC density estimate in the adjacent SIA is over 100 MEC per acre). This information was used to evaluate potential remedial alternatives to address potential MEC explosive hazard considering the planned future land use.

The environmental characterization component of the RI characterized the horizontal and vertical extent of contamination in the surface water, sediment, soil, and groundwater and associated human health and ecological risks. A **human health risk assessment (HHRA)** and **ecological risk assessment (ERA)** were completed during the RI. The HHRA and ERA identified no unacceptable risks to human health or the environment due to past munitions-related activities at UXO 12 and UXO 14. Therefore, no remedial action is necessary to be protective of potential human and ecological **receptors** (current or future) with respect to chemical contaminants in environmental media.

Based on this information, an FS was conducted to evaluate potential remedial alternatives to address MEC potentially remaining at UXOs 12 and 14 in accordance with EPA guidance. Three MEC remedial alternatives were developed and screened against feasibility evaluation criteria, as defined in the NCP, and discussed in further detail later in this Proposed Plan.

3. Site Characteristics

3.1 Physical Characteristics

The ground elevation at UXO 12 ranges from about 360 feet above mean sea level (msl) in the central-western portion of the site to just above sea level near the coast. An east-to-west drainage divide runs along the central portion of the site, where surface runoff flows to the north toward the ocean and UXO 13 in the northern

portion of the site, toward UXO 14 in the southern portion of the site. UXO 14 is generally low-lying adjacent to the southern coastline (near sea level) but has some hills that reach an elevation of over 220 feet msl near its boundary with UXO 12. Surface runoff follows the sloping topography to the south toward the lagoons and ocean.

Both UXO 12 and UXO 14 are primarily forested areas underlain by marine sedimentary, volcanic rock, and granodiorite bedrock; alluvial deposits overlie bedrock near the coastal areas of UXOs 12 and 14.

Two lagoons (Laguna Monte Largo and an unnamed adjacent lagoon) occur within the northern portion of UXO 12 (Figure 4). These lagoons are not tidally influenced, and the temporal presence of surface water is believed to be wholly or primarily the result of precipitation. A number of ephemeral streams occur within UXO 12 that drain toward the ocean, lagoons, and UXOs 13 and 14. The ephemeral streams generally contain water only during sustained precipitation events.

Five lagoons occur within UXO 14 (Laguna Yanuel and four unnamed; Figure 5). These lagoons are tidally influenced, and surface water is present at all times. Surface water in Laguna Yanuel ranges from brackish to saline. A number of ephemeral streams, originating in UXO 12, flow through UXO 14 and drain to the lagoons and the ocean.

Generalized **groundwater** flow across UXOs 12 and 14 is consistent with what would be anticipated in that region. Groundwater flows within the bedrock from the topographic high along the approximate east-west center axis within UXO 12 (Figure 3) toward the northern and southern coasts. Groundwater adjacent to the coastline is expected to be brackish and saline from seawater intrusion.

3.2 Nature and Extent of Contamination

3.2.1 UXO 12

Only 49 MEC were identified within UXO 12, primarily within the eastern portion of the site near the SIA; only one MEC (a calcium hydride charge) was identified

west of the north-south road that cuts through the eastern third of the site. No MEC were found at any of the gun positions or PI sites. All MEC discovered were destroyed through controlled detonation.

Soil, groundwater, surface water, and sediment samples were collected and analyzed for explosives and metals. Sampling activities focused on areas with the highest potential for contamination to provide the most conservative evaluation of releases and nature and extent of contamination, such as in areas that best represent potential releases, potential contaminant types, highest contaminant concentrations, key transport pathways, and key exposure areas for potential receptors.

Explosives were not detected in the majority of environmental **media** samples. No explosives were detected in surface water or sediment samples and the few explosives detections in soil were all below risk-based screening criteria. Relatively low levels of perchlorate and pentaerythritol tetranite (PETN) were detected in groundwater. In fact, neither was detected at a concentration above the EPA **risk-based screening levels (RSLs)** for tap water. Metals detections were evaluated following a process agreed to by all agencies, which is based on a scientific assessment of the concentration of each metal to determine whether it is associated with a munitions constituent, such as its location relative to other detections, whether it is a natural constituent of the soils, and whether it is present at levels consistent with background. The risk-based conclusions reached based on evaluation of the UXO 12 data are provided in Section 4.

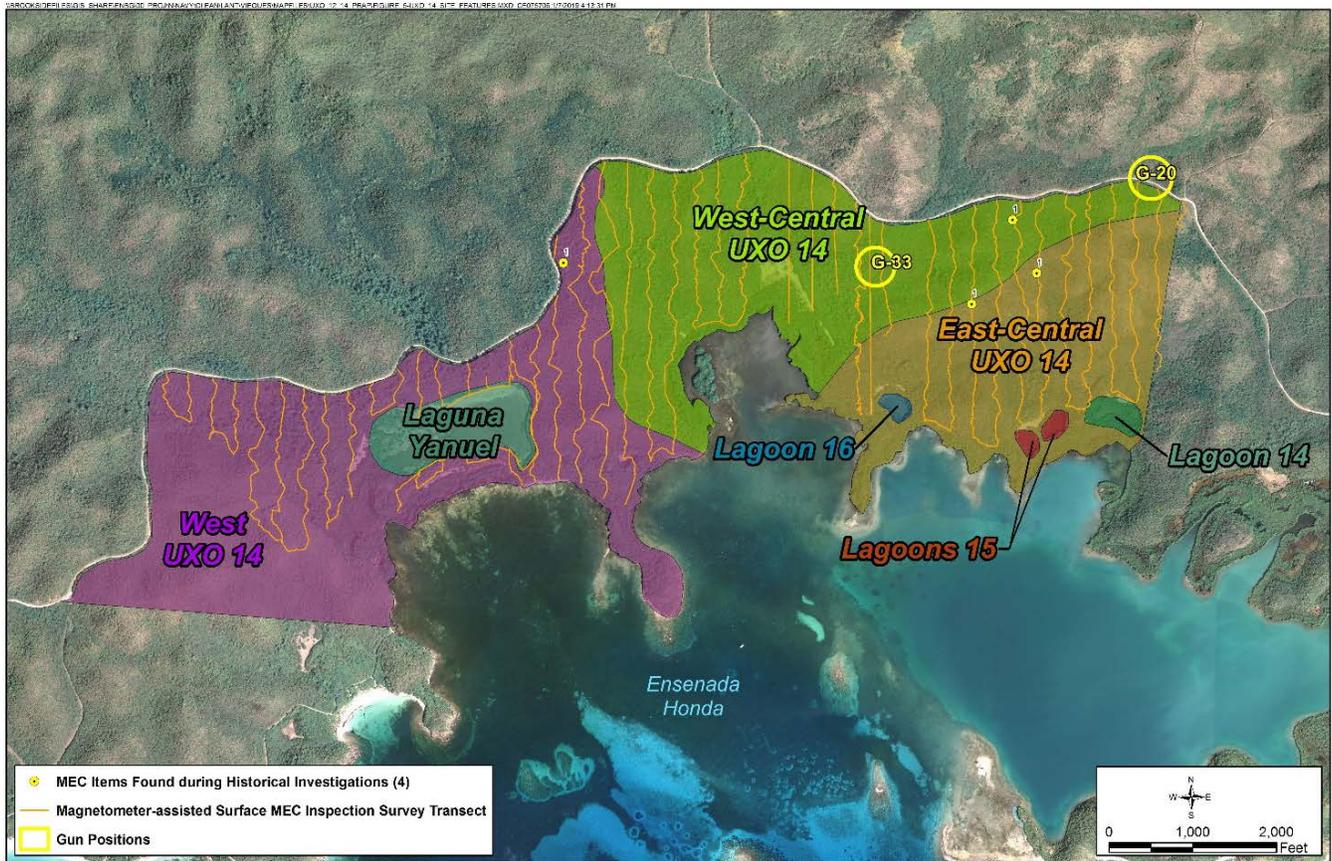
3.2.2 UXO 14

Only 4 MEC were identified within UXO 14 during the ERA/SI, primarily within the eastern portion of the site near the SIA. No MEC were found at the gun position (G-33) within UXO 14. All MEC discovered were destroyed through controlled detonation.

Like the approach at UXO 12, soil, surface water, and sediment samples were collected and analyzed for explosives and metals and sampling activities focused on areas with the highest potential for contamination to provide the most conservative evaluation of releases and nature and extent of contamination.

Other than a single detection of 2-nitrotoluene in soil below risk-based screening criteria, explosives were not detected in soil at UXO 14. No explosives were detected in surface water and the explosives 2,4,6-trinitrotoluene (TNT) and hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) were detected in sediment of Lagoon 14 (Figure 5), but at concentrations below risk-based screening criteria. Like UXO 12, metals detections at UXO 14 were evaluated following a process agreed to by all agencies, which is based on a scientific assessment of the concentration of each metal to determine whether it is associated with a munitions constituent, such as its location relative to other detections, whether it is a natural constituent of the soils, and whether it is present at levels consistent with background. UXO 14 does not have likely source areas and therefore the groundwater data associated with UXO 12 (discussed previously) can be assumed to conservatively represent UXO 14 because UXO 12 has significantly more potential source areas and the groundwater associated with UXO 12 shows little to no impact. See Section 4 for the risk-based conclusions reached based on evaluation of the UXO 14 data.

Figure 5 – UXO 14 Site Features



4. Summary of Site Risks

Summaries of the HHRA and ERA results for UXOs 12 and 14 are included in the following subsections and in Table 1 (UXO 12) and Table 2 (UXO 14). The complete HHRAs and ERAs are provided in the RI/FS Report (CH2M, 2018), which is available in the Administrative Record file (link provided on first page of this Proposed Plan).

While the removal actions described in Section 2 reduced explosive hazards and relatively few MEC have been found at UXOs 12 and 14, potential explosive hazards associated with munitions on the surface and in the subsurface possibly remaining at the sites will be considered in the remedy selection process that is the subject of this Proposed Plan.

4.1 Human Health Risk Assessment

The HHRAs were conducted to evaluate potential human health risks associated with exposure to

constituents detected in soil, groundwater, surface water, and sediment at UXOs 12 and UXO 14. Maximum detected concentrations of constituents were compared to EPA RSLs, and **chemicals of potential concern (COPCs)** were identified based on exceedances of these screening levels. Human health risks were then evaluated for these COPCs under current and potential future human exposure scenarios at UXOs 12 and 14. Exposure scenarios evaluated for soil considered recreational users, trespassers, maintenance workers, and land crab consumers. Exposure scenarios evaluated for surface water and sediment considered recreational users, trespassers, and fish and aquatic crab consumers. Exposure scenarios evaluated for groundwater considered residents (hypothetical) and industrial workers (hypothetical). Additionally, ingestion of fish and crab and game birds were evaluated as potential pathways.

Health risks are based on an estimate of the potential **cancer risk** and the potential **non-cancer hazard**, the latter of which is expressed as a **hazard index (HI)**. A detailed explanation of how human health risk is assessed is provided in the “What is Human Health Risk and How is it Calculated?” informational box. No

contaminants of concern (COCs) were identified based on human exposure to soil, sediment, surface water, or groundwater at UXO 12 or UXO 14. Therefore, no unacceptable human health risks are present at UXO 12 or UXO 14.

What is Human Health Risk and How is it Calculated?

A Human Health Risk Assessment (HHRA) estimates the likelihood of health problems occurring if no cleanup action were taken at a site. This is also referred to as “baseline risk.” HHRA’s are conducted using a stepped process (as outlined in Navy and EPA HHRA policy and guidance). To estimate baseline risk at a site, the Navy performs the following four-step process:

Step 1: Data Collection and Evaluation

Step 2: Exposure Assessment

Step 3: Toxicity Assessment

Step 4: Risk Characterization

During Data Collection and Evaluation (**Step 1**), the concentrations of chemicals detected at a site are evaluated, including:

- Identifying and evaluating area(s) where site-related chemicals may be found (source areas) and at what concentrations.
- Evaluating potential movement (transport) of chemicals in the environment.
- Comparing site concentrations to risk-based screening levels to determine which chemicals may pose the greatest threat to human health (called “constituents of potential concern” [COPCs]). Constituents are not excluded from the risk assessment process if they are within the range of background.

In **Step 2**, the Exposure Assessment, potential exposures to the COPCs identified in Step 1 are evaluated. This step includes:

- Identifying possible exposure media (for example, soil, air, groundwater, surface water, and/or sediment).
- Evaluating if/how people may be exposed (exposure pathways).
- Evaluating routes of exposure (for example, ingestion).
- Identifying the concentrations of COPCs to which people might be exposed.
- Identifying the potential frequency and length of exposure.
- Calculating a “reasonable maximum exposure” (RME) dose that portrays the highest level of human exposure that could reasonably be expected to occur.

In the Toxicity Assessment (**Step 3**), both cancer and non-cancer toxicity values are identified for oral, dermal, and inhalation exposures to the COPCs. The toxicity values are identified using the hierarchy of toxicity value sources approved by EPA.

Step 4 is Risk Characterization, where the information developed in Steps 1-3 is used to estimate potential risk to people. The following approach is used:

- Two types of risk are considered: cancer risk and non-cancer hazard.
- The likelihood of developing cancer as a result of site exposure is expressed as an upper-bound probability; for example, a “1 in 10,000 chance.” In other words, for every 10,000 people that might be exposed under the conditions identified in Step 2, one additional case of cancer may occur as a result of site exposure. **Unacceptable risk** exists when the **excess lifetime cancer risk (ELCR)** of 1×10^{-4} is exceeded.
- For non-cancer health effects, a “hazard index” (HI) is calculated. The HI represents the ratio between the “reference dose,” which is the dose at which no adverse health effects are expected to occur over a lifetime of exposure, and the RME dose for a person contacting COPCs at the site. The key concept here is that a “threshold level” (measured as an HI of 1) exists below which no non-cancer health effects are expected to occur. However, it should be noted that an HI > 1 does not mean that health effects will occur, only that the non-cancer hazard is unacceptable.
- The potential risks from the individual COPCs and exposure pathways are summed, and a total site risk is calculated for each receptor.
- The uncertainties associated with the risk estimates are presented and their effects on the conclusions of the HHRA are discussed. This often includes further evaluation to determine if the chemicals are associated with releases from site activities or if the concentrations are consistent with background levels, especially for metals, which are inherent to environmental media.

4.2 Ecological Risk Assessment

The ERAs evaluated potential ecological (plants and animals) risks associated with exposure to constituents detected in soil, surface water, and sediment using established ecological effects values to assess risks from direct exposure by organisms as well as via the food chain. No COCs were identified for soil, surface water, sediment, or food web exposure at UXO 12 or UXO 14. Therefore, no unacceptable ecological risks were identified, and no further evaluation or action is warranted for ecological receptors at UXOs 12 or 14.

4.3 Principal Threat Waste

MEC, specifically discarded military munitions (DMM) or unexploded ordnance (UXO), if any, that remains present at UXOs 12 and 14 may constitute a principal threat waste (PTW) due to the potential for it to pose an explosive hazard if the material is moved, handled, or disturbed. The preferred alternative includes LUCs and inspections to limit the potential for people to

encounter MEC. During historical investigations and removal actions, over 500 MEC were removed from UXOs 12 and 14. If potential MEC is later found at UXOs 12 and 14, Department of Defense (DoD) explosive ordnance disposal personnel or similarly qualified personnel will evaluate the material to determine if it poses an explosive hazard. Material that is determined to pose an explosive hazard will normally be treated on site or removed for destruction per applicable DoD explosives safety standards and environmental laws and regulations. In these cases, the Navy, EPA, DOI, and the Commonwealth will consult, in accordance with the terms of the Vieques FFA, to make a determination as to whether the material should, as defined by CERCLA, the NCP, and EPA guidance, be classified as PTW. If the material is deemed to be PTW, the Navy will conduct the actions necessary to ensure protectiveness of human health and the environment to address unacceptable risks posed by the material designated as PTW.

What is Ecological Risk and How is it Calculated?

An Ecological Risk Assessment (ERA) is conceptually similar to a Human Health Risk Assessment except that it evaluates the potential risks and impacts to ecological receptors (plants, animals other than humans and domesticated species, habitats [such as wetlands], and communities [groups of interacting plant and animal species]). ERAs are conducted using a tiered, step-wise process (as outlined in Navy and EPA ERA policy and/or guidance) and are punctuated with Scientific Management Decision Points (SMDPs). SMDPs represent points in the ERA process where agreement among stakeholders on conclusions, actions, or methodologies is needed so that the ERA process can continue (or terminate) in a technically defensible manner. The results of the ERA at a particular SMDP are used to determine how the ERA process should proceed, for example, to the next step in the process or directly to a later step. The process continues until a final decision has been reached (i.e., remedial action if unacceptable risks are identified, or no further action if **acceptable risks** are identified). The process can also be iterative if data needs are identified at any step; the needed data are collected, and the process starts again at the point appropriate to the type of data collected.

An ERA has three principal components:

1. Problem Formulation establishes the goals, scope, and focus of the ERA and includes:

- Compiling and reviewing existing information on the habitats, plants, and animals that are present on or near the site
- Identifying and evaluating area(s) where site-related chemicals may be found (source areas) and at what concentrations
- Evaluating potential movement (transport) of chemicals in the environment
- Identifying possible exposure media (for example soil, air, surface water, and/or sediment)
- Evaluating if/how the plants and animals may be exposed (exposure pathways)
- Evaluating routes of exposure (for example, ingestion)
- Identifying specific receptors (plants and animals) that could be exposed
- Specifying how the risk will be measured (assessment and measurement endpoints) for all complete exposure pathways

2. Risk Analysis which includes:

- Exposure Estimate - An estimate of potential exposures (concentrations of chemicals in applicable media) to plants and animals (receptors). This includes direct exposures of chemicals in site media (such as soil) to lower trophic level receptors (organisms low on the food chain such as plants and insects) and upper trophic level receptors (organisms higher on the food chain such as birds and mammals). This also includes the estimated chemicals' dose to upper trophic level receptors via consumption of chemicals accumulated in lower food chain organisms.
- Effects Assessment - The concentrations of chemicals at which an adverse effect may occur are determined.

3. Risk Calculation or Characterization:

- The information developed in the first two steps is used to estimate the potential risk to plants and/or animals by comparing the exposure estimates with the effects threshold.
- Also included is an evaluation of the uncertainties (that is, potential degree of error) associated with the predicted risk estimate and their effects on ERA conclusions.

The three principal components of an ERA are implemented as an 8-step, 3-tier process as follows:

1. **Screening-Level ERA (Steps 1-2; Tier 1)** – The Screening Level ERA (SLERA) conducts an assessment of ecological risk using the three principal components described above and very conservative assumptions (such as using maximum chemical concentrations).
2. **Baseline ERA (Steps 3-7; Tier 2)** – If potential risks are identified in the SLERA, a Baseline ERA (BERA) is typically conducted. The BERA is a reiteration of the three principal components described above but uses more site-specific and realistic exposure assumptions, as well as additional methods not included in the SLERA, such as consideration of **background concentrations**. The BERA may also include the collection of site-specific data (such as measuring the concentrations of chemicals in the tissues of organisms, for example, fish) to address key risk issues identified in the SLERA.
3. **Risk Management (Step 8; Tier 3)** – Step 8 develops recommendations on ways to address any unacceptable ecological risks that are identified in the BERA and may also include other activities, such as evaluating remedial alternatives.

Table 1 – UXO 12 Risk Assessment Results

Receptors	Human Health Risk
Current/Future Trespassers	Adult – ELCR = 3×10^{-7} and HI < 1.0 Youth – ELCR = 2×10^{-7} and HI < 1.0 Acceptable
Future Recreational Users	Adult – ELCR = 5×10^{-7} and HI < 1.0 Child – ELCR = 1×10^{-6} and HI < 1.0 Acceptable
Hypothetical Future Residents	Adult/Child – No carcinogenic COCs for groundwater and HI > 1.0 (cobalt, manganese, and selenium) Although calculations indicate unacceptable non-cancer hazard, metals concentrations responsible for the calculated value were concluded to be either attributable to natural conditions or may be associated with historic military activities at UXO 13 and, if so, will be addressed accordingly as part of UXO 13.
Potential Current/Future Fish and Blue Crab Consumers	Adult – ELCR = 2×10^{-5} and HI > 1.0 (arsenic) Child – ELCR = 1×10^{-5} and HI > 1.0 (arsenic and selenium) Although calculations indicate unacceptable non-cancer hazard, metals concentrations responsible for calculated values were concluded to be attributable to natural conditions; therefore, there is no unacceptable non-cancer hazard associated with past munitions-related activities.
Potential Current/Future Land Crab Consumers	<u>Laguna Monte Largo Fringe</u> Adult – ELCR = 1×10^{-6} and HI < 1.0 Child – ELCR = 1×10^{-6} and HI < 1.0 Acceptable
Potential Current/Future Game Bird Consumers	Adult and Child – ELCR = 2×10^{-7} and HI < 1.0 Acceptable
ELCR – excess lifetime cancer risk HI – hazard index µg/L – microgram per liter Unacceptable ELCR = $>1 \times 10^{-4}$ Unacceptable HI = >1	
UXO 12 Media	Ecological Risk
	All Receptors
Soil, Surface Water, Sediment, Food Web Exposures	Acceptable

Table 2 – UXO 14 Risk Assessment Results

Receptors	Human Health Risk
Current/Future Trespassers	Adult – ELCR = 7×10^{-7} and HI < 1.0 Youth – ELCR = 6×10^{-7} and HI < 1.0 Acceptable
Future Recreational Users	Adult – ELCR = 9×10^{-7} and HI < 1.0 Child – ELCR = 2×10^{-6} and HI < 1.0 Acceptable
Hypothetical Future Residents	Adult/Child – No COCs for groundwater Acceptable
Potential Current/Future Fish and Blue Crab Consumers	<u>Laguna Yanuel</u> Adult – ELCR = 2×10^{-5} and HI > 1.0 Child – ELCR = 2×10^{-5} and HI > 1.0 <u>Lagoons 14 and 15</u> Adult – ELCR = 8×10^{-7} and HI > 1.0 Child – ELCR = 6×10^{-7} and HI > 1.0 Although calculations indicate unacceptable non-cancer hazard, metals concentrations responsible for calculated values were concluded to be attributable to natural conditions; therefore, there is no unacceptable non-cancer hazard associated with past munitions-related activities.
Potential Current/Future Land Crab Consumers	<u>East Lagoon Fringe</u> Adult – ELCR = 9×10^{-7} and HI < 1.0 Child – ELCR = 8×10^{-7} and HI < 1.0 <u>West Lagoon Fringe</u> Adult – ELCR = 4×10^{-5} and HI < 1.0 Child – ELCR = 3×10^{-5} and HI < 1.0 Acceptable
Potential Current/Future Game Bird Consumers	Adult and Child – ELCR = 5×10^{-8} and HI < 1.0 Acceptable
ELCR – excess lifetime cancer risk HI – hazard index µg/L – microgram per liter Unacceptable ELCR = $>1 \times 10^{-4}$ Unacceptable HI = >1	
UXO 14 Media	Ecological Risk
	All Receptors
Soil, Surface Water, Sediment, Food Web Exposures	Acceptable

5. Scope and Role of Response Action

In cooperation with EPA, PRDNER, and USFWS, and in accordance with the FFA and applicable guidance, the Navy performed investigations at UXOs 12 and 14 to evaluate the nature and extent of contamination and to assess the potential risks to human health and the environment. In addition, an NTCRA was conducted to remove surface MEC from UXO 12. Although a low density of munitions was identified at UXO 12 and an even lower density at UXO 14, there is still potential explosive hazards due to the possibility of munitions remaining at each site. The preferred alternative described in this Proposed Plan will address potential explosive hazards to ensure UXOs 12 and 14 can be used for the planned wildlife refuge and localized recreational activities, as described in the refuge's Comprehensive Conservation Plan (CCP) and subsequent Step-Down Plans for the area. The response action is intended to be the final remedy for UXOs 12 and 14, and does not include or substantively affect any other sites under the CERCLA process.

To date, a final remedy has been selected for two other munitions response sites (UXOs 1 and 18) located on the former VNTR on the eastern portion of the island. In addition, remedy selection for Solid Waste Management Unit (SWMU) 4, located on the former NASD in western Vieques, is anticipated in 2019. UXO 16.1, the offshore area adjacent to SWMU 4, is still under investigation, but remedy selection for this area is anticipated in 2020.

6. Remedial Action Objectives

Remedial action objectives (RAOs) are standards that define the extent to which sites require cleanup to protect human health and/or the environment. The following RAOs were developed to be protective of current and potential future receptors, in accordance

with the current and intended future land use (i.e., wildlife refuge with localized recreational use):

- Reduce or prevent the explosive hazard that may be present and associated with potential MEC to be compatible with current and anticipated future land use set forth in Public Law 106-398, as amended by Public Law 107-107, which requires the land containing UXO 12 and UXO 14 to be managed by USFWS as a National Wildlife Refuge.
- Reduce or prevent the potential for unauthorized access to portions of the site, including the unauthorized use of groundwater.

An RAO for groundwater restoration is not necessary because there is no groundwater contamination requiring remediation (i.e., no promulgated standard exceedance, no unacceptable risk). However, long-term groundwater monitoring can be conducted to evaluate long-term trends in contaminant concentrations. In that the objectives of an RI differ from those of a remedial action, including long-term groundwater monitoring as part of the remedial action is a conservative approach because it provides a mechanism for assuring the potential long-term impacts associated with potential source areas across the sites are evaluated and addressed, as appropriate.

7. Summary of Remedial Alternatives

The following three remedial alternatives were developed to address potential MEC explosive hazards:

- Alternative 1 – No Action
- Alternative 2 – Land Use Controls and MEC Inspections
- Alternative 3 – Focused MEC Removal, Land Use Controls, and MEC Inspections

These remedial alternatives were developed and evaluated in the RI/FS Report (CH2M, 2018).

Following the screening of various technologies, the remedial alternatives summarized in Table 3 were selected for detailed evaluation and comparative analysis. To support evaluation of the alternatives, USFWS has identified and mapped locations of proposed, future recreational features and public use areas, including vehicular, ATV, biking, and/or horse riding along the roads around and through UXOs 12 and 14; parking, picnic, hunting, and hiking areas along the road through UXO 12; parking, picnic, and hunting areas along the UXO 12 western perimeter road; parking and hiking areas along the road separating UXOs 12 and 14; and parking, hiking, biking, and an observation tower along Punta Yanuel

within UXO 14. These proposed public use areas are shown in Figure 6.

Inclusion of the No Action Alternative is required by the NCP as a basis of comparison for the other alternatives. Each remedial alternative for UXOs 12 and 14 was evaluated with respect to the first seven evaluation criteria provided in the NCP. The alternatives were then compared to one another with respect to each NCP criterion. Following the public comment period on this Proposed Plan, the preferred alternative will be evaluated further against the remaining two criteria (Commonwealth acceptance and community acceptance).

Table 3 – Remedial Alternatives

Alternative	Components	Details	Cost
<p>1. No Action No action and no restriction on activities.</p>	-	-	<p>Capital Cost: \$0</p>
<p>2. Land Use Controls and MEC Inspections Manages MEC explosive hazards by reducing the potential for unauthorized access to portions of the site, guiding site users to areas intended for access, and performing periodic inspections to identify and remove exposed MEC.</p>	<ul style="list-style-type: none"> - LUCs, including physical mechanisms (e.g., educational kiosks) and administrative processes (e.g., special use permits) - Long Term Monitoring (LTM) and removal of any MEC identified 	<ul style="list-style-type: none"> - Implementing LUCs (e.g., educational kiosks and administrative mechanisms) to guide access to approved areas and control unauthorized access. The specific LUC requirements, including the associated checklist, would be included in an LTM plan associated with the remedy that would be submitted for regulatory review. - A MEC LTM program would be established, including periodic inspections for trespassing, erosion, MEC/MD recurrence in public-access areas, and the integrity and effectiveness of physical LUCs. Any MEC/MD discovered during implementation of the LTM program would be removed. - A groundwater LTM program would be established to evaluate long-term trends in contaminant concentrations. 	<p>Capital Cost: \$246,000</p> <p>Present Value of Future, Annual LTM Costs: \$552,000</p> <p>Total Present-Worth Cost: \$1,057,000</p> <p>Assumed timeframe: 30 years</p>
<p>3. Focused MEC Removal, Land Use Controls, and MEC Inspections Manages MEC explosive hazards by performing surface and subsurface MEC removal in planned recreational use areas. Further manages MEC explosive hazards by reducing the potential for unauthorized access to portions of the site, guiding site users to areas intended for access, and performing periodic inspections to identify and remove exposed MEC.</p>	<ul style="list-style-type: none"> - MEC removal in planned recreational use areas - LUCs, including physical mechanisms (e.g., educational kiosks) and administrative processes (e.g., special use permits) - LTM and removal of any MEC identified 	<ul style="list-style-type: none"> - Vegetation cutting and focused MEC removal (i.e., surface and subsurface MEC clearance within areas identified land management and recreational activities). This includes biological and archaeological surveys and vegetation cutting necessary to facilitate focused MEC removal. - Implementing LUCs (e.g., educational kiosks and administrative mechanisms) to guide access to approved areas and control unauthorized access. The specific LUC requirements, including the associated checklist, would be included in an LTM plan associated with the remedy that would be submitted for regulatory review. - A MEC LTM program would be established, including periodic inspections for trespassing, erosion, MEC/MD recurrence in public-access areas, and the integrity and effectiveness of physical LUCs. Any MEC/MD discovered during implementation of the LTM program would be removed. - A groundwater LTM program would be established to evaluate long-term trends in contaminant concentrations. 	<p>Capital Cost: \$528,000</p> <p>Present Value of Future, Annual LTM Costs: \$552,000</p> <p>Total Present-Worth Cost: \$1,339,000</p> <p>Assumed timeframe: 30 years</p>

Figure 6 – Conceptual Layout of Alternative 2-Land Use Controls and MEC Inspections and Alternative 3-Focused MEC Removal, LUCs, and MEC Inspections



The NCP outlines the approach for comparing remedial alternatives. Evaluation of the alternatives uses the nine evaluation criteria set forth in the NCP, which consist of “threshold,” “primary balancing,” and “modifying” criteria (Table 4). To be considered for selection as the preferred alternative, a remedial alternative must meet the two threshold criteria. The five primary balancing criteria, which are technical criteria based on environmental protection, cost, and engineering feasibility, are then considered to determine which alternative provides the best combination of attributes. Finally, upon receipt of public comments on this Proposed Plan, the preferred alternative is evaluated further against the two modifying criteria.

The three remedial alternatives were evaluated against the first seven of the nine criteria identified in the NCP. The two remaining criteria will be considered after the close of the public comment period for this Proposed Plan.

7.1 Relative Evaluation of Alternatives

The comparative analysis of alternatives with respect to the first seven evaluation criteria is summarized in the remainder of this section. The UXO 12 and UXO 14 RI/FS Report (CH2M, 2018) provides a more-detailed discussion of the evaluation and includes a table that provides a relative ranking of the alternatives.

7.2 Threshold Criteria

Overall Protection of Human Health and the Environment

Alternative 1 (no action) is not protective because the RAOs would not be attained. The remaining

alternatives are protective of human health and the environment by reducing the exposure to MEC by guiding access to areas planned for public use, performing periodic MEC inspections, and/or conducting focused MEC removal.

Table 4 – Evaluation Criteria for Comparative Analysis of Alternatives

CERCLA Criteria	Definition
Threshold Criteria	
Protection of human health and the environment	Addresses whether a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through mitigation, engineering controls, or institutional controls.
Compliance with Applicable Relevant and Appropriate Requirements (ARARs) and “To-Be-Considered” criteria	Addresses whether a remedy will meet all of the ARARs or other Federal and Commonwealth/State environmental laws and/or justifies a waiver of the requirements.
Primary Balancing Criteria	
Long-term effectiveness and permanence	Addresses the expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once clean-up goals have been met.
Primary Balancing Criteria	
Reduction in toxicity, mobility, or volume through treatment	Discusses the anticipated performance of the treatment technologies a remedy may employ.
Short-term effectiveness	Considers the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until clean-up goals are achieved.
Implementability	Evaluates the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement an option.
Present-worth cost	Compares the estimated initial, operations and maintenance, and present-worth costs.
Modifying Criteria	
Commonwealth/State acceptance	Considers the Commonwealth/State support agency comments on the Proposed Plan.
Community acceptance	Provides the public's general response to the alternatives described in the Proposed Plan, and RI/FS report. The specific responses to the public comments are addressed in the “responsiveness summary” section of the Record of Decision (ROD) .

Compliance with Applicable Relevant and Appropriate Requirements

All alternatives comply with the ARARs, which consist of Federal Location-specific ARARs, which address coastal zones and migratory bird areas, and Federal

and Commonwealth Action-specific ARARs, which address land disturbance and munitions management.

7.3 Primary Balancing Criteria

Long-Term Effectiveness and Permanence

While Alternative 1 does not provide any additional long-term effectiveness, a low quantity of munitions likely remains present within UXOs 12 and 14, as indicated by past investigations and munitions removal activities. Alternatives 2 and 3 provide long-term effectiveness and permanence using LUCs and/or additional MEC removal. While Alternative 3 provides the highest amount of long-term effectiveness and permanence due to inclusion of focused MEC removal within the planned recreational areas, given that only a small amount of MEC was identified at UXOs 12 and 14 (especially relative to the total acreage), the additional level of protectiveness is likely minimal. While USFWS has no plans to expand the areas of land management and/or public access within UXOs 12 and 14 beyond what is provided in the current CCP step-down plan, even if expanded access is planned in the future, the additional level of protectiveness associated with Alternative 3 would likely be minimal due to the very low quantity of MEC estimated to be potentially remaining across the sites.

Reduction in Toxicity, Mobility, or Volume through Treatment

Alternative 1 does not result in any additional reduction of toxicity, mobility, or volume (TMV). Alternative 3 has slightly higher degree of reduction in TMV than Alternative 2 because it includes the focused screening for and, if present, removal of surface and subsurface MEC within planned recreational areas, versus removal of MEC only if discovered during LTM (or reported by the agencies or public). However, the potentially higher TMV reduction is marginal given the small amount of MEC likely present in UXOs 12 and 14. As noted previously, USFWS has no plans to expand the areas of land management and/or public access within UXOs 12 and 14 beyond what is provided in the current CCP step-down plan. However, even if expanded access is planned in the future, the additional level of TMV reduction associated with

Alternative 3 would likely be minimal due to the very low quantity of MEC estimated to be potentially remaining across the sites.

Short-Term Effectiveness

Alternative 1 has the least short-term impacts because no remedial construction activities are associated with the alternative; however, Alternative 1 would not meet short-term-effectiveness goals because no MEC would be removed. Alternative 2 can be implemented immediately after a ROD and remedial action work plan are finalized because it involves periodic monitoring with the potential for future MEC removal and implementation of LUCs, which has the least short-term construction impacts. Alternative 3 will require a longer time to complete because of focused MEC removal and increased construction activities compared to Alternative 2.

Implementability

Alternative 2 is technically feasible and could facilitate public access in the areas intended for this use by USFWS through use of LUCs. Alternative 3 is technically and administratively feasible but would have a higher degree of logistical challenges due to surface and subsurface MEC clearance activities within areas planned for public use.

Cost

Alternative 1 is the most cost effective but does not meet the RAOs. Alternatives 2 and 3 both meet the RAOs and have present-worth costs of \$1,037,000 and \$1,339,000, respectively.

7.4 Modifying Criteria

Commonwealth Acceptance

Commonwealth involvement has been continual throughout the CERCLA process for UXOs 12 and 14 and PRDNER supports the preferred alternative. However, PRDNER's formal concurrence is pending following the review of all comments received during the public comment period.

Community Acceptance

Community acceptance will be evaluated after the public comment period for the Proposed Plan, and substantive public comments will be documented and addressed in a responsiveness summary as part of any ROD for UXO 12 and UXO 14.

8. Preferred Alternative

The Navy and EPA, in consultation with DOI and PRDNER, have identified Alternative 3–Focused MEC Removal, Land Use Controls, and MEC Inspections as the preferred alternative for UXO 12 and UXO 14. Based on evaluation of the data, information currently available, and the comparative analysis of potential remedial alternatives, the preferred alternative meets the statutory requirements of CERCLA for protection of human health and the environment under current and projected future land use as a wildlife refuge area with localized recreational use.

Key elements that make Alternative 3 the preferred alternative are:

- Meets the RAOs and are compatible with the planned land use, based on the USFWS CCP.
- Performs additional surface and subsurface MEC removal in all areas planned for recreational use and implements a MEC LTM program to monitor for and remove MEC identified in the future.
- Implements, monitors, and maintains LUCs to guide access to approved areas and control unauthorized access.

9. Community Participation

A community relations program has been ongoing for the Vieques environmental restoration program since 2001. The community relations program fosters two-way communication of investigation and remediation activities between the stakeholder agencies (Navy, EPA, USFWS, and PRDNER) and the public. A Restoration Advisory Board was formed in 2004 to provide for expanded community participation.

Regular meetings are held to provide an information exchange among community members, stakeholder agencies, and the Municipality of Vieques. These meetings are open to the public and are held approximately every 3 months.

Public input is a key element in the decision-making process. Nearby residents and other interested parties are strongly encouraged to use the comment period to relay any questions and comments about the preferred alternative or any of the other alternatives identified in this Proposed Plan for UXO 12 and UXO 14. Following the public comment period, the Navy will summarize and respond to substantive comments in a responsiveness summary, which will become part of any ROD for UXO 12 and UXO 14.

This Proposed Plan fulfills the public participation requirements of CERCLA Section 117(a), which specifies that the lead agency (the Navy) must publish a plan outlining any remedial alternatives evaluated for a site and identify the preferred alternative. The Community Involvement Plan and technical reports supporting the preferred alternative for UXO 12 and UXO 14 are available for public review in the Administrative Record at:

<http://www.navfac.navy.mil/Vieques>.

Additionally, paper copies of the UXO 12 and UXO 14 Proposed Plan are available at the EPA office in Vieques.

The public comment period for the Proposed Plan provides an opportunity for input regarding the remedy selection process for UXO 12 and UXO 14. The public comment period will be from March 18 to April 16, 2019, and a public meeting will be held on April 2, 2019, at 6:00 p.m. at the Multiple Use Center (in front of the Public Square), #6 Antonio G. Mellado Street, Isabell II, Vieques, PR. All interested parties are encouraged to attend the public meeting to learn more about the preferred alternative for UXO 12 and UXO 14. The meeting will provide an additional opportunity to submit comments on the Proposed Plan.

Comments on the preferred alternative, or this Proposed Plan, must be postmarked no later than April 16, 2019. On the basis of comments or new information, the Navy, EPA, and DOI, in consultation with PRDNER, may modify the preferred alternative or choose another alternative. The comment page included as part of this Proposed Plan may be used to provide comments to the Navy. However, questions or comments can be submitted to any of the individuals listed in the box below during the public comment period.

Note: This Proposed Plan is presented in English and Spanish for the convenience of the reader. Every effort has been made for the translations to be as accurate as reasonably possible. However, readers should be aware that the English version of the Proposed Plan is the official version.

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10. Glossary

Acceptable Risk and Non-Cancer Hazard: EPA's human health acceptable risk range for Superfund hazardous waste sites is 1×10^{-4} to 1×10^{-6} , meaning there is 1 additional chance in 10,000 (1×10^{-4}) to 1 additional chance in 1 million (1×10^{-6}) that a person may develop cancer if exposed to contaminants at a site that is not remediated. EPA's acceptable non-cancer hazard (risk) threshold for Superfund sites is a hazard index less than or equal to 1, meaning that if the exposure at a particular site is less than or equal to the threshold, there is not a concern for potential non-cancer effects associated with exposure to potentially site-related contaminants. For ecological health, acceptable risk is the result of a weight-of-evidence assessment that finds ecological exposure pathways to site chemicals are incomplete, or that contaminant exposure concentrations are below ecological toxicity values, are not bioavailable, and/or are attributable to background.

Administrative Record: A compilation of documents and information for CERCLA sites that is made available to the public for review.

Applicable or Relevant and Appropriate Requirements (ARARs): CERCLA Section 121 (d)(2)(A) requires that remedial actions meet any state or federal standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate.

Background Concentration: Concentrations of naturally occurring and anthropogenic (because of human activities) constituents, such as inorganic constituents, found in groundwater, soil, sediment, and surface water at levels not influenced by site-specific releases. Background concentrations of some inorganics and other constituents are often at levels that may pose a risk to human health or the environment. However, background concentrations of site chemicals are factored into risk management determinations to ensure remedial actions are not implemented for constituents whose concentrations

are attributable to background conditions and not indicative of a site-related release.

Cancer Risk: Cancer risks are expressed as a number reflecting the increased chance that a person will develop cancer if exposed to chemicals or substances, as described in the Human Health Risk Assessment.

Contaminant of Concern (COC): A contaminant that contributes risk or hazard above acceptable levels to a receptor.

Chemical of Potential Concern (COPC): A chemical at the site that may be hazardous to human health or the environment due to its detected concentrations.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA): A Federal law passed in 1980 (United States Code Title 42, Chapter 103), commonly referred to as the "Superfund" Program, that provides for cleanup and emergency response in connection with numerous existing, inactive hazardous substance disposal sites that endanger public health and safety or the environment. CERCLA was amended by the Superfund Amendments and Reauthorization Act (SARA) in 1986.

Department of the Interior (DOI): Land owner of the National Wildlife Refuge.

Ecological Risk Assessment (ERA): A qualitative and quantitative evaluation of the risk posed to ecological receptors (i.e., plants and animals) by the presence of specific pollutants. Elements include identification of the hazardous substances present in the environmental media; assessment of exposure and exposure pathways; assessment of the toxicity of the site's hazardous substances; and characterization of ecological risks.

Environmental Protection Agency (EPA): The Federal agency responsible for administration and enforcement of CERCLA (and other Federal environmental statutes and regulations).

Excess Lifetime Cancer Risk (ELCR): Potential carcinogenic effects that are characterized by estimating the probability of cancer incidence in a population of individuals for a specific lifetime from projected intakes (and exposures) and chemical-specific dose-response data.

Feasibility Study (FS): A study undertaken by the lead agency to develop and evaluate options for remedial action. The FS emphasizes data analysis and is generally performed concurrently with the RI. The data from the RI is used to define the objectives of the response action, to develop remedial action alternatives, and to undertake an initial screening and detailed analysis of the alternatives.

Federal Facility Agreement (FFA): A legal agreement between the Navy, DOI, EPA, and the Commonwealth of Puerto Rico that establishes the procedural framework and general schedule for implementing the CERCLA activities for Vieques.

Groundwater: The supply of water beneath the Earth's surface that occurs in the pore spaces between soil grains or within fractures in geologic formations that are fully saturated.

Hazard Index (HI): The HI represents a measure of the potential for non-carcinogenic effects from exposure to COPCs. A "threshold level" (measured as an HI of 1) exists below which no non-cancer health effects are expected to occur.

Human Health Risk Assessment (HHRA): A qualitative and quantitative evaluation of the risk posed to human health by the presence of specific pollutants. Elements include: identification of the hazardous substances present in the environmental media; assessment of exposure and exposure pathways; assessment of the toxicity of the site's hazardous substances; and characterization of human health risks.

Land Use Control (LUC): Physical, legal, or administrative methods that restrict the use of or limits access to property to reduce risks to human health and the environment.

Media (singular, Medium): Soil, groundwater, surface water, or sediment at the site.

Munitions and Explosives of Concern (MEC): Distinguishes specific categories of military munitions that may pose unique explosive risks.

Munitions Debris (MD): Non-explosive remnants of munitions remaining after munitions use, demilitarization, or disposal.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): The Federal regulations (Code of Federal Regulations [CFR], Volume 40, Part 300 [40 CFR 300]) that guide determination of the sites to be addressed under both the Superfund (CERCLA) program and the program to prevent or control spills into surface waters or elsewhere.

National Priorities List (NPL): A list developed by EPA of uncontrolled hazardous substance release sites in the United States that are considered priorities for long-term remedial evaluation and response.

National Wildlife Refuge: A protected area within the United States managed by the United States Fish and Wildlife Service for the conservation of wildlife and plants.

Non-Cancer Hazard: Non-cancer hazards (or risk) are expressed as a quotient that compares the potential exposure to contaminants at a particular site to the acceptable level of exposure. There is a level of exposure (the reference dose) below which it is unlikely for even a sensitive population to experience adverse health effects.

Non-Time-Critical Removal Action (NTCRA): A removal action conducted to address priority risks when a planning period of at least six months is available.

Preferred Alternative: With respect to the nine criteria specified in the NCP for evaluating remedial alternatives, the Preferred Alternative is the proposed remedy that meets the threshold criteria and is deemed to provide the best balance of tradeoffs

among the other alternatives with respect to the balancing and modifying criteria.

Present-Worth Cost: Total present-day cost to complete the proposed remedy.

Proposed Plan: A document that presents the preferred remedial alternative and requests public input regarding its proposed selection.

Public Comment Period: The time allowed for the members of a potentially affected community to express views and concerns regarding an action proposed to be taken at a site, such as a rulemaking, permit, or remedy selection.

Puerto Rico Department of Natural and Environmental Resources (PRDNER): The agency responsible for protecting natural resources, Commonwealth-owned conservation areas, submerged lands, and the coastal zone in the Commonwealth of Puerto Rico.

Receptors: Humans, animals, or plants that may be exposed to contaminants related to a given site.

Record of Decision (ROD): A legal document that describes the cleanup action or remedy selected for a site, the basis for choosing that remedy, and reflects the public comments that were considered regarding the selected remedy.

Remedial Action Objectives (RAOs): Statements that define the extent to which sites require cleanup to protect human health and the environment.

Remedial Investigation (RI): A study in support of the selection of a remedy at a site where hazardous substances have been released. The RI identifies the nature and extent of contamination and assesses human health and ecological risk associated with the contamination.

Risk-based Screening Level (RSL): A screening criterion designed to evaluate constituent concentrations in environmental media for potential risk to human health.

To-be-considered Criteria: Non-promulgated regulatory criteria, advisories, guidance, and proposed standards that have been issued by the Federal or State government that are not legally binding and do not have the legal status of ARARs. However, TBC criteria may be useful for developing remedial alternatives and for determining the necessary level of cleanup for protection of human health and the environment.

Unacceptable Risk: Excess lifetime cancer risk that exceeds EPA's acceptable risk range for Superfund hazardous waste sites of 1×10^{-4} to 1×10^{-6} or a non-cancer hazard in excess of EPA's target level of 1.

United States Fish and Wildlife Service (USFWS): The Federal agency responsible for the management of the Department of the Interior-owned land and the protection of trust species (e.g., threatened and endangered species and migratory birds) on Vieques.

Place
stamp
here

NAVFAC Atlantic
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