Final
Abbreviated Preliminary Assessment Report
for the
Specific Congressionally Authorized Areas Within the Northwest Peninsula of Culebra Culebra, Puerto Rico

FUDS Property No. I02PR0068

U.S. Army Corps of Engineers, Jacksonville District
701 San Marco Boulevard
Jacksonville, FL 32207

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ACRONYMS AND ABBREVIATIONS

§	Section
AAF	Army Air Field
ACDEC	Conservation and Development Authority of Culebra
amsl	above mean sea level
AP	armor piercing
ASR	Archives Search Report
ATG	air to ground
BDU	Bomb Dummy Unit
bgs	below ground surface
bls	below land surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CESAJ	U.S. Army Corps of Engineers, Jacksonville District
CFR	Code of Federal Regulations
CoRIS	Coral Reef Information System
CRREL	Cold Regions Research and Engineering Laboratory
CSEM	conceptual site exposure model
CSM	conceptual site model
CTC	Cost-to-Complete
CZMP	Coastal Zone Management Program
DEP	Defense Environmental Programs
DERP	Defense Environmental Restoration Program
DNER	(Puerto Rico) Department of Natural and Environmental Resources
DoD	Department of Defense
DQO	data quality objective
EE/CA	Engineering Evaluation and Cost Analysis
Ellis	Ellis Environmental Group, LC
EOD	explosive ordnance disposal
EPA	Unites States Environmental Protection Agency
EPC	exposure point concentration
ER	Engineer Regulation
ERA	ecological risk assessment
ESA	Endangered Species Act
ESE	Environmental Science and Engineering, Inc.

ESV	ecological screening value
FDE	Findings and Determination of Eligibility
FLEX	Fleet Landing Exercise
FUDS	Formerly Used Defense Site
GIS	geographic information system
GPS	Global Positioning System
GSA	General Service Administration
HE	high explosive
HEI	high-explosive incendiary
HQ	hazard quotient
HRS	Hazard Ranking System
HTW	hazardous and toxic waste
INPR	Inventory Project Report
Marines	U.S. Marine Corps
MC	munitions constituent
MD	munitions debris
MEC	munitions and explosives of concern
mg/kg	milligram per kilogram
mm	millimeter
MRA	munitions response area
MMRP	Military Munitions Response Program
MRS	munitions response site
MRSPP	Munitions Response Site Prioritization Protocol
MS	matrix spike
MSD	matrix spike duplicate
Navy	U.S. Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDAI	no Department of Defense action indicated
NHA	National Heritage Area
NHL	National Historic Landmark
No.	number
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRIS	National Register Information System
NWI	National Wetlands Inventory
NWP	Northwest Peninsula

NWRS	National Wildlife Refuge System
OSE	Office of the State Engineer
Parsons	Parsons Corporation
PRASA	Puerto Rico Aqueduct and Sewer Authority
PREQB	Puerto Rico Environmental Quality Board
PRG	preliminary remediation goal
QA	quality assurance
QC	quality control
QR	qualitative reconnaissance
RAC	risk assessment code
RDA	recommended daily allowance
RfD	reference dose
RI/FS	Remedial Investigation and Feasibility Study
RMIS	Risk Management Information System
ROE	right of entry
SHPO	State Historic Preservation Office
SI	Site Inspection
SLERA	screening level ecological risk assessment
SLRA	screening level risk assessment
SSL	soil screening level
SS-WP	site-specific work plan
STL	Severn Trent Laboratories
TCRA	Time-Critical Removal Action
TESS	Threatened and Endangered Species System
TPP	technical project planning
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAE	USA Environmental, Inc.
USAESCH	U.S. Army Engineering and Support Center, Huntsville
USC	U.S. Code
USCB	U.S. Census Bureau
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UXO	unexploded ordnance

GLOSSARY OF TERMS

anomaly	Any item that deviates from the expected subsurface ferrous and non-ferrous material at a site (i.e., pipes, power lines, etc.).
discarded military munitions (DMM)	Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations.
magnetometer	An instrument for measuring the strength of a magnetic field; used to detect buried iron and other metal objects.
military munitions	*Military munitions* means all ammunition products and components produced for or used by the armed forces for national defense and security, including ammunition products or components under the control of the Department of Defense, the Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants; explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives and chemical warfare agents; chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, and demolition charges; and devices and components of any item thereof. The term does not include wholly inert items, improvised explosive devices, and nuclear weapons, nuclear devices, and nuclear components, other than nonnuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 U.S.C. 2011 *et seq.*) have been completed. (10 U.S.C. 101(e) (4)).
munitions and explosives of concern (MEC)	*Munitions and explosives of concern* distinguishes specific categories of military munitions that may pose unique explosives safety risks, such as UXO, as defined in 10 U.S.C. 101(e) (5); discarded military munitions, as defined in 10 U.S.C. 2710(e)(2); or munitions constituents (*e.g.,* TNT, RDX), as defined in

	10 U.S.C. 2710(e)(3), present in high enough concentrations to pose an explosive hazard.
munitions constituents (MC)	Any materials originating from unexploded ordnance, discarded military munitions, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.
munitions debris	Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.
munitions response	Response actions, including investigation, removal actions, and remedial actions, to address the explosive safety, human health, or environmental risks presented by unexploded ordnance, discarded military munitions, or munitions constituents, or to support a determination that no removal or remedial action is required.
munitions response area (MRA)	Any area on a defense site that is known or suspected to contain UXO, DMM, or MC.
munitions response site (MRS)	A discrete location within an MRA that is known to require a munitions response.
projectile	Object projected by an applied force and continuing in motion by its own inertia. This includes bullets, bombs, shells, grenades, guided missiles, and rockets.
unexploded ordnance (UXO)	*Unexploded ordnance (UXO)* means military munitions that: (1) Have been primed, fuzed, armed, or otherwise prepared for action; (2) Have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and (3) Remain unexploded, whether by malfunction, design, or any other cause.

CHAPTER 1. INTRODUCTION

1.1 SITE LOCATION

Culebra and its surrounding smaller islands (cayos) are located about 17 miles east of the main island of Puerto Rico. The main focus of this report is the Southern Portion of the Northwest Peninsula (NWP), also called Flamenco Peninsula, of Culebra situated at approximately latitude 18°19′ N, longitude 65°17.5′ W. The site location is shown on ***Figure 1***

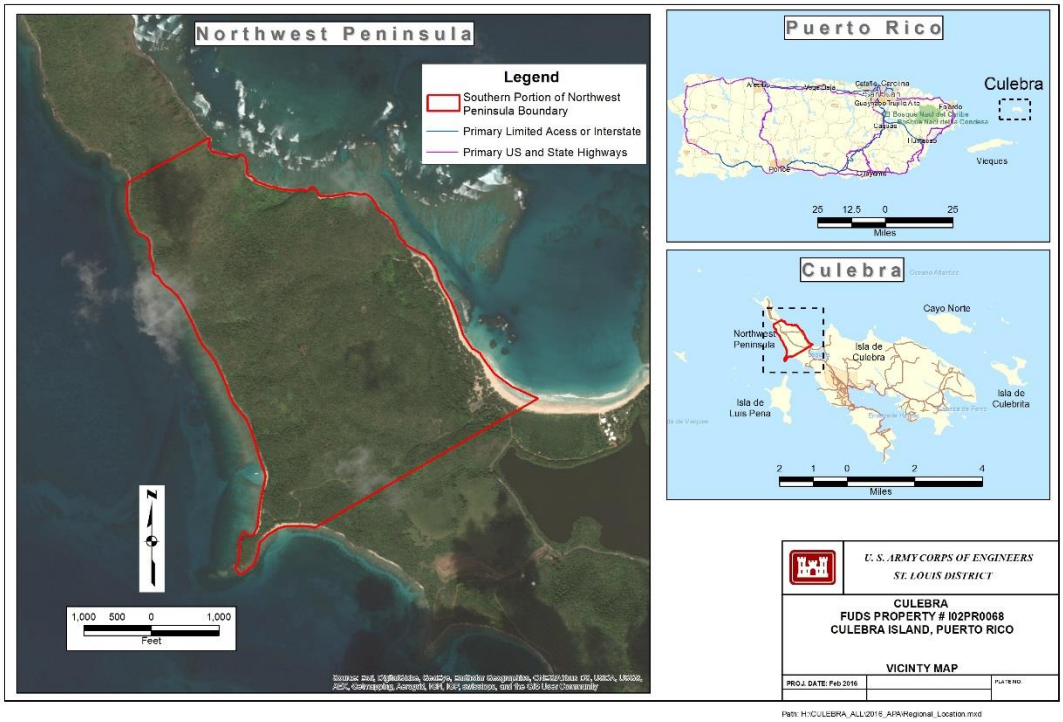

Figure 1 – Location Map

1.2 REPORT OBJECTIVES

The objective of this Abbreviated Preliminary Assessment (APA) is to document known information for the presence of Munitions and Explosives of Concern (MEC) and Munitions Constituents (MC) for the NWP on Culebra Island, Puerto Rico. This information is being documented in anticipation of the activities that will be required to render certain limited portions of the NWP safe for recreational use per the requirements of Public Law (PL) 113-291, Section (§) 317, (December 14, 2014). Paragraph (c) of this section states that "Notwithstanding paragraph 9 of the quitclaim deed, the Secretary of the Army may expend funds available in the Environmental Restoration Account, Formerly Used Defense Sites (FUDS), established pursuant to section 2703(a)(5) of title 10, United States Code, to decontaminate the beaches, the campgrounds, and the Carlos Rosario Trail of unexploded ordnance." The Secretary of the Army has delegated authority to the US Army Corps of Engineers (USACE) to execute actions required under the FUDS program. Headquarters (HQ) USACE has directed the South Atlantic Division

and Jacksonville District to undertake these decontamination efforts. Therefore, this APA will be used as a basis for creating a new MMRP project that will address the area to be decontaminated.

The NWP is a 572-acre tract that was a former naval bombardment area. Particular emphasis is placed on the 408-acre Southern Portion belonging to the Commonwealth of Puerto Rico. This emphasis results from three public laws that have been enacted regarding the NWP. The provisions of these public laws are discussed in the following sections. This Southern Portion includes the Flamenco campground, the Carlos Rosario Trail and Beach, and portions of the Flamenco and Tamarindo Beaches. The 164-acre Northern Part of the NWP is under the control of the Culebra National Wildlife Refuge (CNWR). It is a part of the Caribbean Islands National Wildlife Refuge Complex (CINWRC), which is a unit of the United States (US) Fish and Wildlife Service (FWS).

1.2.1 Public Law (PL) 93-166, Section 204, November 29, 1973

PL 93-166, Section (§) 204, prohibits expending federal funds for decontamination efforts within the NWP, except at the explicit direction of Congress. PL 93-166, § 204 was enacted as part of the process that eliminated Navy ordnance operations from Culebra. The PL is included in its entirety below.

> "PUBLIC LAW 93-166-NOV. 29, 1973
>
> SEC. 204. (a) In order to facilitate the relocation of the ship-to-shore and other gun fire and bombing operations of the United States Navy from the island of Culebra, there is hereby authorized to be appropriated the sum of $12,000,000 for the construction and equipage of substitute facilities in support of such relocation.
>
> (b) The relocation of such operations from the northwest peninsula of the island of Culebra is expressly conditioned upon the conclusion of a satisfactory agreement to be negotiated by the Secretary of the Navy, or his designee, with the Commonwealth of Puerto Rico and reported to the Committees on Armed Services of the Senate and the House of Representatives prior to execution of such agreement. The agreement shall provide, among other things, that the Commonwealth of Puerto Rico shall insure that (1) Commonwealth lands suitable for carrying out operations of the type referred to in subsection (a) will be made available for the long term continued use of the Atlantic Fleet Weapons Range and Fleet Marine Forces training areas by the Navy, including, but not limited to, present areas and facilities on the island of Vieques, and (2) any proposed facility or activity which would interfere with the Navy training mission will not be undertaken, including the proposed deep water super-port on the island of Mona, in the event that such agreement includes the use by the Navy of such island or the area adjacent to such island.
>
> (c) Notwithstanding any other provision of law, the present bombardment area on the island of Culebra shall not be utilized for any purpose that would

require decontamination at the expense of the United States. Any lands sold, transferred, or otherwise disposed of by the United States as a result of the relocation of the operations referred to in subsection (a) may be sold, transferred, or otherwise disposed of only for public park or public recreational purposes.

(d) The funds authorized for appropriation by this section shall remain available until expended."

Prior to the enactment of this public law, a considerable amount of Congressional action had taken place regarding Section 204. The House Congressional Record of 13 November 1973 contained the following statement regarding Culebra.

> "The Senate include in their bill authorization for $12 million to relocate the ship-to-shore and other gunfire and bombing operations of the US Navy from the Island of Culebra. The provision was added during the Committee mark-up without any hearings or testimony being taken in support thereof. The House bill contain(s) no such provision.
>
> This provision in the Senate bill caused much discussion and debate among the conferees regarding the feasibility of relocating this activity from Culebra to the Islands of Desecheo and Monito. This issue has been the subject of considerable concern in both the House and Senate for the last several years. The House conferees were privileged to have a conference with the Governor of Puerto Rico, the Resident Commissioner, and the Mayor of Culebra prior to the final conference with Senate conferees.
>
> The restrictive language included in Section 204 is a result of the discussion with the Governor and others and the conferees believe provides sufficient protection to the Navy upon relocation of the ship-to-shore gunfire operations from Culebra to the other islands mentioned."

1.2.2 Public Law 111-383, Section 2815, January 7, 2011

The information and data used in this APA were obtained pursuant to PL 111-383, § 2815 and presented in a 2012 Congressional Study report entitled, "Study Relating to the Presence of Unexploded Ordnance in a Portion of the Former Naval Bombardment Area of Culebra Island, Commonwealth of Puerto Rico". This Congressional Study Report is the prime source for the information relating to the physical conditions of the Southern Portion of the NWP. Further details are discussed in section **2.1.6.**

PL 111-383, § 2815 required that the Secretary of Defense, at the request of the Governor of the Commonwealth of Puerto Rico, assess the former bombardment area with regard to the following five elements, with a specific assessment of the Flamenco Beach:

(1) An estimate of the type and amount of unexploded ordnance [UXO].
(2) An estimate of the cost of removing unexploded ordnance.

(3) An examination of the impact of such removal on any endangered or threatened species and their habitat.
(4) An examination of current public access to the former bombardment area.
(5) An examination of any threats to public health or safety and the environment from UXO.

The information required by PL 111-383, § 2815 for the Congressional Study report was obtained through review of previous investigation results and historical military records, collection of soil, surface water, and sediment samples, and geophysical and intrusive investigation of transects and grids.

1.2.3 Public Law 113-291, Section 317, December 19, 2014

Subsequent to completion of the Congressional Study, PL 113-291 § 317 was enacted, which stated that it is the sense of Congress that certain limited portions of the former bombardment area on the Island of Culebra should be available for safe public recreational use while the remainder of the area is most advantageously reserved as habitat for endangered and threatened species. Those limited portions include those parts of Flamenco and Tamarindo Beaches located inside the former bombardment area and the entire areas of the Flamenco Campground, Carlos Rosario Trail, and Carlos Rosario Beach. The PL is included in its entirety below.

"PUBLIC LAW 193-291-DEC. 19, 2014

(a) SENSE OF CONGRESS.—It is the sense of Congress that certain limited portions of the former bombardment area on the Island of Culebra should be available for safe public recreational use while the remainder of the area is most advantageously reserved as habitat for endangered and threatened species.
(b) MODIFICATION OF RESTRICTION ON DECONTAMINATION LIMITATION. — The first sentence of section 204(c) of the Military Construction Authorization Act, 1974 (Public Law 93–166; 87 Stat. 668) shall not apply to the beaches, the campgrounds, and the Carlos Rosario Trail.
(c) MODIFICATION OF DEED RESTRICTIONS.—Notwithstanding paragraph 9 of the quitclaim deed, the Secretary of the Army may expend funds available in the Environmental Restoration Account, Formerly Used Defense Sites, established pursuant to section 2703(a)(5) of title 10, United States Code, to decontaminate the beaches, the campgrounds, and the Carlos Rosario Trail of unexploded ordnance.
(d) PRECISE BOUNDARIES.—The Secretary of the Army shall determine the exact boundaries of the beaches, the campgrounds, and the Carlos Rosario Trail for purposes of this section.
(e) DEFINITIONS.—In this section:

1) The term ''beaches'' means the portions of Carlos Rosario Beach, Flamenco Beach, and Tamarindo Beach identified in green in Figure 4 as Beach and located inside of the former bombardment area.

2) The term ‘‘campgrounds’’ means the areas identified in blue in Figure 4 as Campgrounds in the former bombardment area.
3) The term ‘‘Carlos Rosario Trail’’ means the trail identified in yellow in Figure 4 as the Carlos Rosario Trail and traversing the southern portion of the former bombardment area from the campground to the Carlos Rosario Beach.
4) The term ‘‘Figure 4’’ means Figure 4, located on page 8 of the study. (*Which is included under the APA as **Figure 6**)*
5) The term ‘‘former bombardment area’’ means that area on the Island of Culebra, Commonwealth of Puerto Rico, consisting of approximately 408 acres, conveyed to the Commonwealth by the quitclaim deed, and subject to the first sentence of section 204(c) of the Military Construction Authorization Act, 1974 (Public Law 93–166; 87 Stat. 668).
6) The term ‘‘quitclaim deed’’ means the quitclaim deed from the United States of America to the Commonwealth of Puerto Rico conveying the former bombardment area, signed by the Governor of Puerto Rico on December 20, 1982.
7) The term ‘‘study’’ means the ‘‘Study Relating to the Presence of Unexploded Ordnance in a Portion of the Former Naval Bombardment Area of Culebra Island, Commonwealth of Puerto Rico’’, dated April 20, 2012, prepared by the United States Army for the Department of Defense pursuant to section 2815 of the Ike Skelton National Defense Authorization Act for Fiscal Year 2011 (Public Law 111–383; 124 Stat. 4464).
8) The term ‘‘unexploded ordnance’’ has the meaning given the term in section 101(e) (5) of title 10, United States Code.”

USACE executed land surveys on the above to determine the exact boundaries of the features specified under this PL as follows.

- Flamenco Beach (4.30 acres): From the mean low water line to the vegetation line.
- Flamenco Campground (17.06 acres): From the vegetation line to the campground fence line.
- Carlos Rosario Trail (3.67 acres): 20 feet (ft) from either side of the trail centerline, excluding areas that cannot be reached due to physical constraints such as steep slopes or existing fences.
- Carlos Rosario Beach (5.00 acres): From the mean low water line to the vegetation line and extended 50 ft into the vegetation line (tree line).
- Tamarindo Beach (1.8 acres): From the mean low water line to the vegetation line and extended 50 ft into the vegetation line (tree line).

Those features and associated acres are shown in ***Figure 2***.

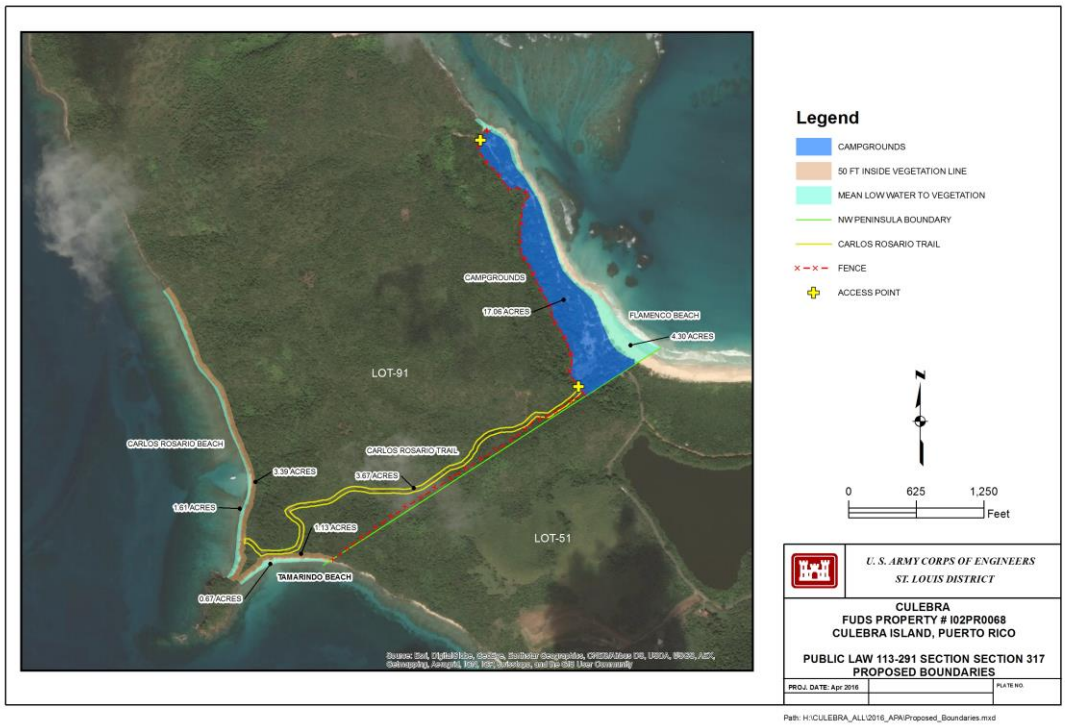

Figure 2 – Proposed Boundaries per PL 113-291 Section 317

1.3 AUTHORITY

The U.S. Army Corps of Engineers (USACE) is investigating this area under the authority of the Defense Environmental Restoration Program (DERP) [10 USC §§ 2701 et seq.], and its policies and procedures relating to Formerly Used Defense Sites (DERP-FUDS), including Department of Defense (DoD) Management Guidance for the DERP dated 9 March 2012, and Engineering Regulation 200-3-1, Environmental Quality, Formerly Used Defense Sites (FUDS) Program Policy. Completion of this investigation area supports several Federal laws and rules, DoD Directives and Standards, and Army Regulations as outlined in the subsequent sub-paragraphs.

1.3.1 Laws

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), commonly known as Superfund, to respond to threats posed by historic releases of hazardous substances into the environment. CERCLA was amended in 1986 by the Superfund Amendments and Reauthorization Act (SARA), which established the process for undertaking remedial actions at inactive waste sites containing hazardous substances, as well as reporting requirements for releases of hazardous substances. SARA expanded the provisions of CERCLA and added major

new authorities. These amendments included the addition of Section 120, Federal Facilities and Section 121, Cleanup Standards. Section 120 requires departments and agencies of the federal government to comply with the provisions of CERCLA as amended by SARA. Section 121 establishes the procedures for the selection of remedial actions and the determination of the degree of remediation.

In 1986, Congress established the DERP at 10 USC §§ 2701 et seq. This program directed the Secretary of Defense to carry out a program of environmental restoration at "Each facility or site which was under the jurisdiction of the Secretary and owned by, leased to, or otherwise possessed by the United States at the time of actions leading to contamination by hazardous substances." Executive Order 12580 (EO 12580, 23 January 1987), Superfund Implementation, delegated the DoD to be the lead agency and response authority for releases or threatened releases of hazardous substances, pollutants and contaminants from any facility or vessel under the jurisdiction, custody, or control of DoD, subject to Sections 120 and 121 of SARA. In March 1990, the U.S. Environmental Protection Agency (USEPA) issued a revised National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Under 40 Code of Federal Regulations (CFR) §300.120, DoD is identified as the lead agency and response authority for incidents involving DoD military weapons and munitions under the jurisdiction, custody, and control of DoD.

1.3.2 Regulations and Guidance

Since the beginning of DERP, the USACE has acted as the agency responsible for environmental restoration at FUDS. The USACE, St. Louis District, began conducting historical research and analysis for environmental site characterization in 1992. This research and analysis was originally captured in Archive Search Reports (ASRs) at FUDS, active DoD installations, and installation transitions under Base Realignment and Closure (BRAC) recommendations. Engineering Regulation 200-3-1, Environmental Quality, Formerly Used Defense Sites (FUDS) Program Policy dated 10 May 2004, dictates requirements of the CERCLA process as outlined in the NCP. As such, previous historical records research and analysis reports are incorporated into Preliminary Assessments (PA), which now include pathway and environmental hazard assessment. The USACE, St. Louis District, prepared this APA pursuant to ER 200-3-1 using USACE Formerly Used Defense Sites (FUDS) Program Guidance for Performing Preliminary Assessments under FUDS, September 2005 as a guide.

CHAPTER 2. PREVIOUS INVESTIGATIONS

2.1 USACE INVESTIGATIONS

2.1.1 1991 Inventory Project Report

An Inventory Project Report (INPR) was signed on 24 December 1991, establishing the Culebra Island site as a FUDS, defining a site boundary, and assigning FUDS Project No. I02PR006800 (USACE, 1991). The Findings and Determination of Eligibility (FDE) concluded that "the site, except for 87.5 acres still under control of the Navy, has been determined to be formerly used by the Department of Defense. It is therefore eligible for the Defense Environmental Restoration Program (DERP)."

2.1.2 1995 Archives Search Report

An Archives Search Report (ASR) was completed by the USACE Rock Island District in February 1995 (USACE, 1995) after reviewing available records, photographs, and reports that documented the history of the site. As part of the ASR, a site visit was conducted in October 1994, during which the team identified munitions debris (MD) on Flamenco Beach, which is located in Flamenco Peninsula.

Note: The APA did not performed interviews with Study Area related personnel. However, the interviews recorded from the 1995 ASR were reviewed.

2.1.3 2004 Archives Search Report Supplement

An ASR Supplement, which is based on the information in 1995 ASR, was completed by the USACE Rock Island District in 2004 (USACE, 2004a). This document summarizes the aerial training conducted by the Navy between 1935 and 1975 and identifies twenty range/sub-range areas.

The boundaries of the following sub-ranges encompass areas within the Southern Portion of NWP:

Naval Gunfire Target Area: This range was a naval gunfire and air-to-ground range with its target located on Northwest Peninsula. Munitions included general small arms, .50-caliber small arms, Mk80s series general purpose bombs, M1 105mm HE, Mk21 8-inch armor piercing (AP), Mk5 16-inch AP, 2.75-inch rockets, and 11.75-inch Tiny Tim rockets.

Air-to-Ground North: This target was located at the northern tip of Northwest Peninsula. Munitions used include general small arms, .50-caliber small arms, Mk82 500-pound general purpose bombs, 2.75-inch rockets, and 11.75-inch Tiny Tim rockets.

Air-to-Ground South: This target was located at the southern portion of Northwest Peninsula. Munitions used include general small arms, .50-caliber small arms, Mk82 500-pound general purpose bombs, 2.75-inch rockets, and 11.75-inch Tiny Tim rockets.

2.1.4 2005 Revised Inventory Project Report

A Revised INPR was completed in June 2005 (USACE, 2005a). The Revised INPR further clarified the military use of the Island of Culebra and divided the original site,

Property No I02PR0068, into 14 separate project areas. One Installation Restoration Program (IRP) site was identified and assigned the number 00, and 13 Military Munitions Response Program (MMRP) project areas, now known as Munitions Response Site (MRS), were identified and assigned Risk Assessment Code (RAC) scores. Project 01 is not defined. The following MMRP projects and RAC scores were listed:

MMRP Project 02 – Culebra and Cays, RAC 1

MMRP Project 03 – Flamenco Bay Water Area, RAC 1

MMRP Project 04 – Flamenco Lagoon Maneuver Area, RAC 1

MMRP Project 05 – Mortar and Combat Range Area, RAC 1

MMRP Project 06 – Artillery Firing Area, RAC 3

MMRP Project 07 – Culebrita Artillery Impact Area, RAC 1

MMRP Project 08 – Cayo Norte Impact Area, RAC 3

MMRP Project 09 – Soldado Point Mortar and Bombing Area, RAC 2

MMRP Project 10 – Defensive Firing Area No. 1, RAC 2

MMRP Project 11 – Defensive Firing Area No. 2, RAC 1

MMRP Project 12 – Luis Pena Channel Water Areas, RAC 1

MMRP Project 13 – Cayo Luis Pena Impact Area, RAC 1

MMRP Project 14 – Airfield and Camp Area, RAC 3

The risk assessment (RAC) procedure was developed to address explosives safety hazards related to munitions. This procedure does not address environmental hazards associated with munitions constituents. The U.S. Army Engineering and Support Center, Huntsville (USAESCH), Ordnance and Explosives Directorate (CEHNC-OE) developed this procedure in accordance with MIL-STD 882C and AR 385-10. The RAC score was used by the USACE to prioritize the response action(s) at FUDS. The risk assessment was based on the best available information resulting from record searches, reports of Explosive Ordnance Disposal (EOD) actions, field observations (site visits), and interviews. This information was used to assess the risk involved based on the potential MMRP hazards identified for the project. The risk assessment evaluated two factors, hazard severity and hazard probability.

The Southern Portion of NWP and the portion of Flamenco Beach included in this APA were identified and contained within the boundaries of MMRP Project 02 in this 2005 Revised INPR. MMRP Project 02 was revised during MMRP Project Realignment in 2008. In addition to updating those areas investigated during the 2007 SI, the NWP was removed from Project 02 in accordance with the provisions outlined in Section 204 of Public Law 93-166. Additionally, as part of a quitclaim deed transferring a portion of the NWP to the Commonwealth of Puerto Rico, the Governor agreed to the provisions of Section 204 of Public Law 93-166 stating that NWP was

accepted in its present condition. The quitclaim deed also stated that the grantor will hold no responsibility for decontamination nor any claims of damage or loss of property or persons associated with use of the property. Therefore, the entire property area of the NWP was removed from MMRP Project 02. At this time, the name of Project 02 was changed from "Culebra and Cays" to "Cerro Balcón and Accessible Cayos" in the FUDS Management Information System (FUDSMIS).

2.1.5 2005 Supplemental Archives Search Report

The Supplemental ASR was completed by the USACE St. Louis District in 2005 as an addition to the 1995 ASR. The Supplemental ASR is the source of most of the historical information pertaining to site operations and identifies the key areas of focus for the 2007 SI. The 2005 Supplemental ASR provides a detailed summary of military activities conducted on Culebra Island and the surrounding cayos. The document summarized planned and/or executed maneuvers and training conducted on the FUDS, including specific time periods, locations, and munitions used.

2.1.6 2012 Congressional Study Report

In April 2012, USACE completed a Congressionally-mandated study specified by Public Law 111-383, § 2815 relating to that portion of the former bombardment area on the Culebra NWP that was transferred to the Commonwealth of Puerto Rico by quitclaim deed.

PL 111-383, § 2815 required that the Secretary of Defense, at the request of the Governor of the Commonwealth of Puerto Rico, assess the former bombardment area with regard to the following five elements, with a specific assessment of the Flamenco Beach:

(1) An estimate of the type and amount of UXO.

(2) An estimate of the cost of removing unexploded ordnance.

(3) An examination of the impact of such removal on any endangered or threatened species and their habitat.

(4) An examination of current public access to the former bombardment area.

(5) An examination of any threats to public health or safety and the environment from UXO.

The information required by PL 111-383, § 2815 for the Congressional Study report was obtained through review of previous investigation results and historical military records, collection of soil, surface water, and sediment samples, and geophysical and intrusive investigation of transects and grids. These data provide the primary sources for this APA. Details of the study are provided in the following sections.

a. Overview

The Study Area (outlined in blue on ***Figure 3***), which consists of approximately 408 acres, is the southern portion of the NWP. The Study Area includes portions of Flamenco Beach, the Flamenco Beach Campground, the Carlos Rosario Trail, the Carlos Rosario Beach and northern portion of Tamarindo Beach.

Input to this report consisted of data collected through:

- A review of historical military records and previous investigation reports.
- A geophysical survey during which advanced metal detectors were used to detect subsurface metallic objects (referred to as anomalies) and record their location.
- The excavation of selected anomalies for which the geophysical survey data indicated the anomaly may be a UXO.
- An evaluation of the recovered item for UXO determination.
- Sampling of soil, surface water, and sediment for munitions constituents (MC).

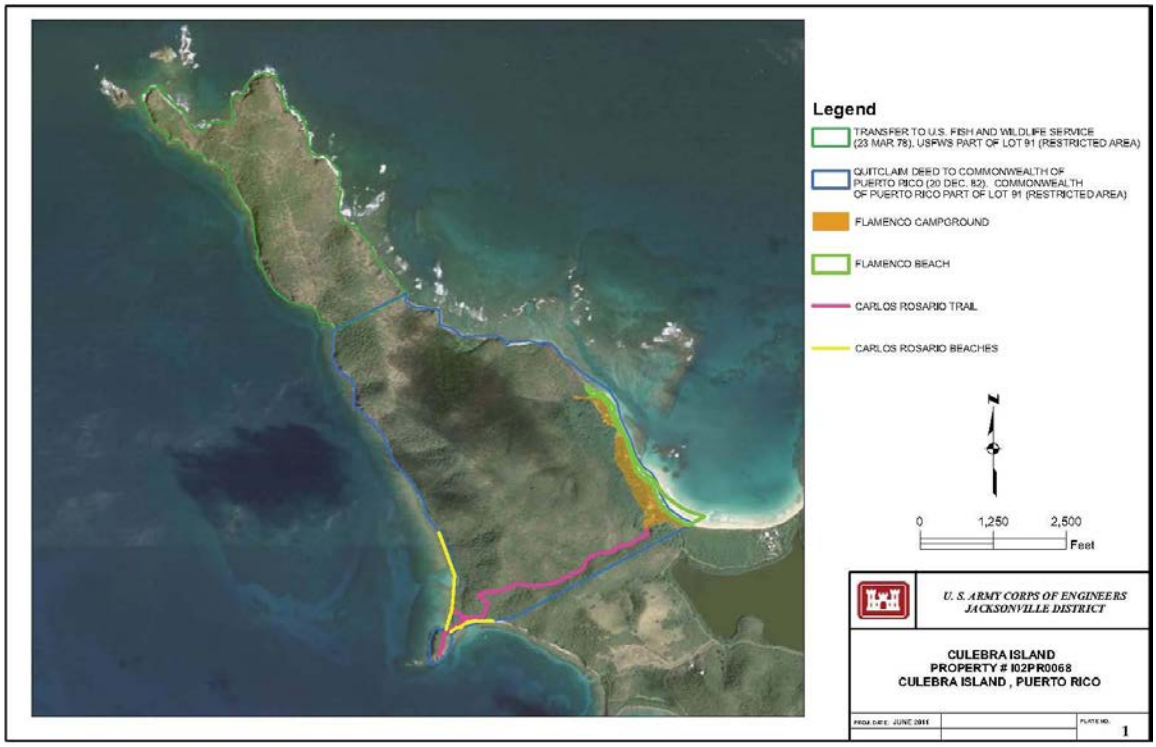

Figure 3 – Map of Study Area (Quitclaim Deed Boundary) – 2012

b. Study Approach

The Army developed this study to obtain the data needed to comply with the requirements of section 2815. Throughout the study, USACE coordinated with the Puerto Rico Environmental Quality Board (EQB) to ensure consideration of the EQB's concerns and input.

USACE's field work began with selection of geophysical survey paths that were located in areas representative of the different types of terrain found within the Study Area. The areas that USACE selected were along the beach, in the campgrounds, and included both flat and steeply sloping terrain. To accommodate the survey, workers manually cleared tropical vegetation from the selected survey paths. During clearing, plant biologists helped ensure endangered plant species were avoided, and UXO-qualified personnel ensured UXO were avoided.

Once the survey paths were cleared of vegetation, UXO-qualified personnel used metal detectors along the survey paths to detect subsurface anomalies that were subsequently

excavated to determine whether they were UXO. In some areas, USACE widened the survey path to allow more extensive data to be obtained.

During the geophysical survey, USACE:

- Used a portable global positioning system (GPS) instrument to record the location of the survey paths and any detected anomalies;
- Investigated all detected anomalies within grids to determine whether it was UXO, munitions debris, or other debris (e.g., cultural debris, like fence wire);
- Determined the explosives' safety status of any munitions debris encountered; and
- Destroyed all recovered UXO and any munitions debris determined to pose an explosive hazard either in place or at a selected location.

After the survey, USACE used specialized software to map the distribution and type of military munitions (e.g., UXO) found along the survey paths. Because the survey paths only covered a portion of the Study Area, experts used the survey data to develop a model to predict the potential distribution of UXO across the entire Study Area. The resulting map (see ***Figure 4***) divides the Study Area into distinct areas based on density of anomalies (High, Medium, and Low) and steepness of the terrain.

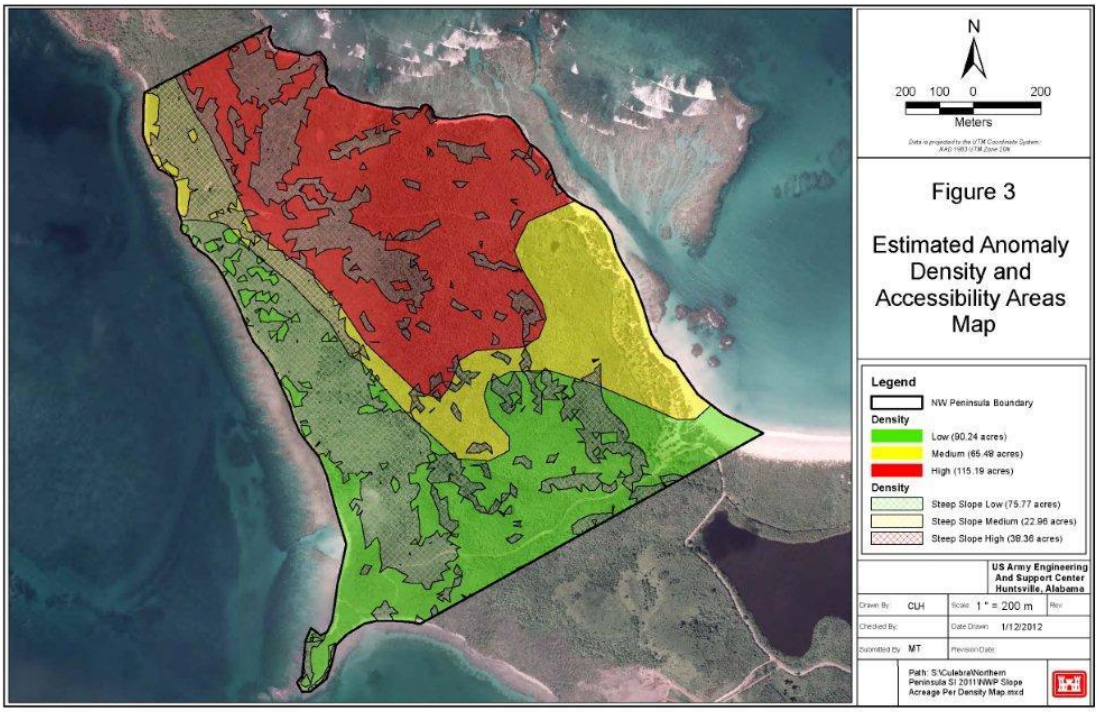

Figure 4 – Estimated Density and Accessibility Areas – 2012

As part of the investigation, USACE collected soil, surface water, and sediment samples. USACE analyzed these samples to determine whether they contained MC (metals and explosives) that could be harmful to human health or the environment.

c. Type and Amount of UXO

The NWP was used for live gunnery practice between 1935 and January 1, 1972. During this period, approximately 750,000 naval rounds were fired into the NWP. Of these, an estimated 80 percent (600,000) were 5 inch (")/38 caliber (cal) and 5"/54 cal projectiles and an estimated 10 percent (75,000) were 3"/50 cal, 6"/47 cal, and 8"/55 cal gun ammunition. The balance included other types of military munitions including 16"/50 cal, and munitions for both mortars and howitzers. Additionally, from 1942 to 1968, approximately 320,000 naval aviation munitions (e.g., bombs and rockets) were used (dropped or fired) within the NWP. (U.S. Navy Memorandum dated June 1973 from Commander in Chief U.S. Atlantic Fleet to Chief of Naval Operations, Subject: Time-Phased Plan for Relocation of Training Activities from the Culebra Complex to the Islands of Desecheo and Monito.)

Since 1995, 70 UXO have been encountered within approximately 19 acres of the Study Area. This total, which includes 36 UXO discovered during this study, equates to approximately 3.7 UXO per acre. The locations of the 36 UXO discovered during USACE's 2012 assessment are shown on ***Figure 5***.

The predominant military munition encountered within the Study Area as UXO was the 5-inch High Explosive (HE) naval projectile. Other UXO encountered included the following types of military munitions: 2.75-inch rockets, 3-inch naval projectiles, 40mm projectiles, 75mm projectiles, 81mm mortars, 100-pound General Purpose (GP) bombs, a 500-pound GP bomb, and Bomb Dummy Unit (BDU)-33 practice bombs.

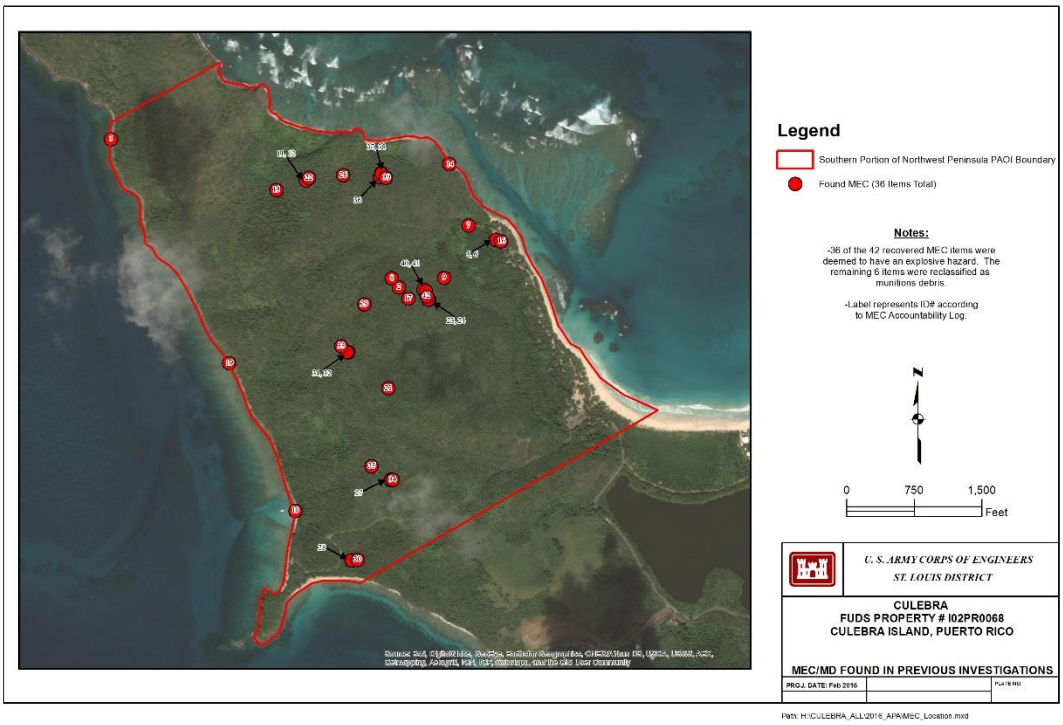

Figure 5 – Locations of Individual or Multiple UXO – 2012

As part of the Congressional Study, USACE divided the Study Area into three areas based upon the number of metallic anomalies that USACE detected during the geophysical survey, USACE's estimate of the density of those metallic anomalies within each area, and the steepness of the terrain (see ***Figure 4***). USACE based its estimate on the costs associated with digging each anomaly and destroying any UXO encountered. The three areas reflect an estimated anomaly density of:

- Low (Green): 0 to 785 anomalies per acre
- Medium (Yellow): 786 to 1,040 anomalies per acre
- High (Red): 1,041 to 1,400 anomalies or more per acre

Additionally, the steepness of terrain can increase the cost for UXO removal. The conduct of munitions response actions (e.g., investigation or removal) on terrain slopes of greater than 30 percent also poses safety concerns that must be considered. When necessary, the conduct of munitions responses on such terrain requires significantly more effort than areas with a lesser slope. To more accurately represent the UXO removal effort, USACE further subdivided the three density areas above into areas with and without steep terrain (see following listing and related ***Figure 4***).

Of the 408 acres within the Study Area, USACE determined that approximately 34 percent has a slope of over 30 percent.

- High density acres (115.19 acres)
- High density acres with a steep slope (38.36 acres)
- Medium density acres (65.48 acres)
- Medium density acres with a steep slope (22.96 acres)
- Low density acres (90.24 acres)
- Low density acres with a steep slope (75.77 acres)

d. UXO Removal Effect on Any Endangered or Threatened Species and Their Habitat

The Study Area consists of diverse sensitive habitats including wetlands, a mangrove area, seabird rookeries, and sea turtle nesting sites. Various valuable ecological resources are present or potentially present within the Study Area. Such resources include five federally listed threatened or endangered species. Because protected species and habitats are present or potentially present within the Study Area, the Study Area is considered ecologically important. Based on ecological resources present or potentially present, the primary ecological risk assessment management goal is to sustain the populations of any listed species that occur at the Study Area.

USACE's study included an analysis of the various types of habitat prevalent within the Study Area. Such habitat types include: beaches and shores, lagoons, rocky cliffs, open grasslands, closed forest canopy, legume canopy and grassland understory. The following threatened or endangered species are present or potentially present within these habitat types: hawksbill turtle, Virgin Islands tree boa, Culebra giant anole, Grant's leptocereus, and Wheeler's peperomia.

Removal of UXO may have an impact on endangered or threatened species and their habitats because vegetation clearance would be required for areas to be investigated to help ensure the safety of munitions response workers. The Endangered Species Act (ESA) requires that any possible impact or harm to endangered species or their critical habitat be minimized. Therefore, any munitions response actions that may be conducted that have the potential to impact or harm endangered species or their critical habitat should be coordinated with the USFWS and others, as appropriate.

Coordination among agencies will be the basis for developing avoidance measures to limit such impacts or harm before proceeding with the response action. The avoidance measures developed would be employed during response action activities to help ensure threatened or endangered species and their habitats are identified and when possible, avoided.

e. Current Public Access to the Former Bombardment Area

There are no full-time residents within the Study Area, and its use for residential purposes is restricted by deed provisions and section 204 of Public Law 93-166. Many people visit the area throughout the year. Local workers are regularly present within the Study Area to manage recreational areas. The Flamenco Beach Campground, which consists of 11 commercial vendor structures and an expansive tent-camping area, is located within the Study Area. Additionally, areas such as Flamenco Beach, Carlos Rosario Trail and Beach, and Tamarindo Beach are regularly visited. Access to the Study

Area is unrestricted to the public, however, chain-link fences and natural barriers such as dense vegetation and rocky cliffs keep many portions of the Study Area secluded.

As shown in ***Figure 6***, a fence was installed along the western border of the Flamenco Beach Camping Area. Another fence, which was installed during the 1970s, runs partially along the Study Area's southern boundary. This fence, which begins at the Flamenco Beach parking area, extends west and terminates short of the top of the ridgeline. Vegetation growth or visitors have compromised multiple areas along the fence line.

There are two gates in the fence that provide access to the Study Area. One is at the parking area on the south end of the campground, with the other at the campground's northern most point (*see* ***Figure 6***). The southern access point is controlled by a chained and locked gate. However, visitors have been able to bypass this gate, gaining access to the trail that leads to the Carlos Rosario and Tamarindo Beach Area. The Study Area's vegetation is very restrictive, generally deterring travel off established trails and roads. Additionally, the Study Area is accessible by sea on both the eastern and western sides along the beach areas.

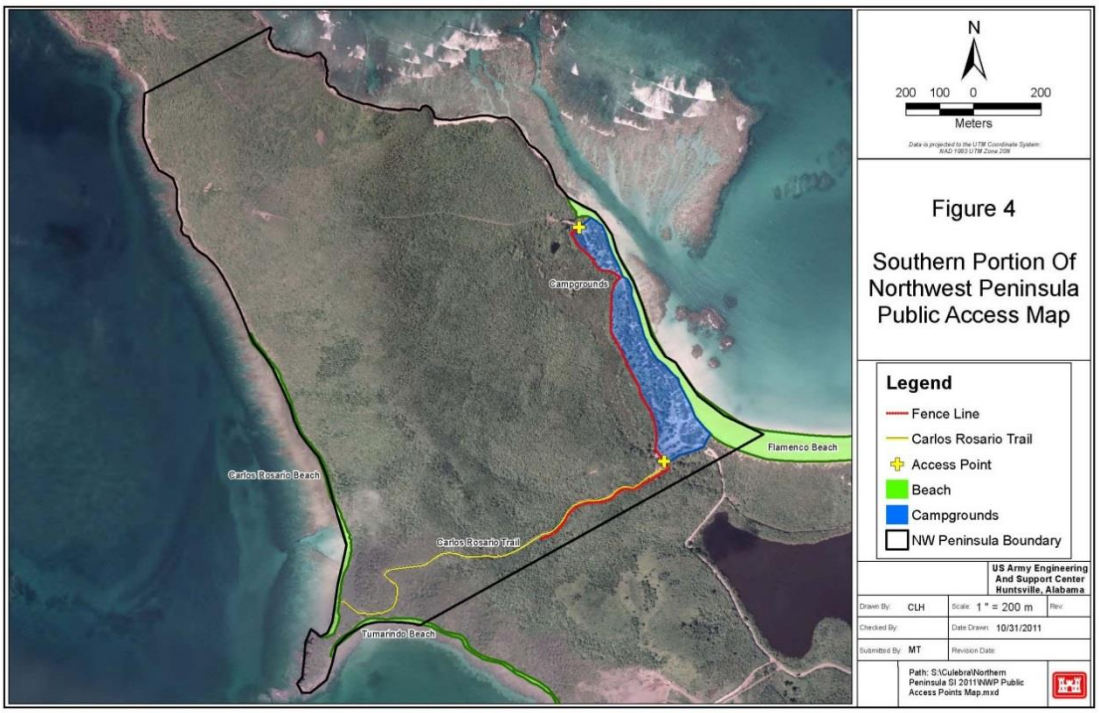

Figure 6 – Public Access Map – 2012

f. Examination of Any Threats to Public Health or Safety and the Environment from UXO

(a) Threats to Public Health or Safety from UXO

USACE applied the Munitions Response Site Prioritization Protocol (MRSPP) (32 Code of Federal Regulation, Part 179) to identify the relative risks posed by UXO, discarded

military munitions (DMM), and MC to people (e.g., visitors, current and future workers) who might obtain access to the Study Area. The MRSPP's modules are the:

- Explosive Hazard Evaluation (EHE) Module: provides the approach for assigning a relative priority to a MRS where UXO, DMM, and MD are known or suspected to be present.
- Chemical Warfare Materiel Hazard Evaluation (CHE) Module: provides the approach for assigning a relative priority to an MRS where chemical warfare materiel (CWM) (i.e., chemical munitions and chemical agents in other than a munitions configuration) hazards are known or suspected to be present.
- Health Hazard Evaluation (HHE) Module: provides the approach for evaluating the relative risk to human health and the environment where MC and any incidental non-munitions-related contaminants are known or suspected to be present.

Application of the MRSPP to the Study Areas resulted in a score of 2, on a scale of 1 to 8, with one being the highest relative priority. This ranking was based solely on the EHE module as there is no historical or physical evidence to indicate that CWM-related activities occurred within the Study Area and/or Culebra Island and adjacent cays. In addition, data (beyond the scope of this study) would be required to fully complete the MRSPP's HHE.

A relative MRS priority of 2 is the highest relative risk ranking possible for an MRS that is known or suspected to only contain conventional military munitions.

(b) Threats to Human Health and the Environment from MC

USACE collected over 100 soil, surface water, and sediment samples from within the Study Area. These samples were analyzed for MC (both metals and explosives). Samples that contained MC concentrations that exceeded both background (normal levels) and preliminary screening values (PSVs) were considered a chemical of potential concern (COPC) and was used in the risk assessment. Samples that did not exceeded background were not considered to be site related COPCs.

USACE used the results of the sampling and analysis and EPA's Risk Assessment Guidelines to determine that no unacceptable human health risks from MC would be expected through exposure to surface water or sediment. However, there may be an unacceptable human health risk from exposure to MC in soil. For ecological receptors, the sample analysis indicated that exposure to certain compounds in soil, surface water, and sediment may pose an unacceptable risk; however, further analysis is required to determine whether response actions may be needed to address potential human health and ecological risks.

Screening-level risk assessments were completed for both human health and ecological receptors. These risk assessments evaluated specific MC detected in the samples collected as part of this study. For soil, the MC considered in the risk assessment included metals (antimony, chromium, copper, lead and zinc) and explosives (2-amino-4,6-dinitrotolune, 4-amino-2,6-dinitrotoluene, 2,4,6-trinitrotoluene, and methyl-2,4,6-

trinitrophenyl-nitramine [tetryl]). The risk assessment also considered copper in sediment and copper, lead, and zinc in surface water.

The human health screening-level risk assessment results indicate that copper and one explosive (2,4,6-trinitrotoluene) were detected in soil above their human health PSVs (USEPA Regional Screening Levels, residential soil, June 2011). As such, copper and 2,4,6-trinitrotoluene may pose an unacceptable human health risk in soil at the Study Area. USACE used the results of the sampling and analysis and EPA's Risk Assessment Guidelines to determine that an unacceptable human health risk from MC would not be expected through exposure to surface water or sediment within the Study Area.

The screening-level ecological risk assessment results indicate that five metals (antimony, chromium, copper, lead, zinc) and four explosives (2-amino-4,6-dinitrotolune, 4-amino-2,6-dinitrotoluene, 2,4,6-trinitrotoluene, and methyl-2,4,6-trinitrophenylnitramine [tetryl]) were present above PSVs in soil (Metals - USEPA Ecological Soil Screening Levels; Explosives – Los Alamos National Laboratory, Eco Risk Database (Release 3.0), October 2011). Additionally, one metal (copper) was detected in sediment and three metals (copper, lead, and zinc) were detected in surface water above their preliminary ecological screening values (USEPA Region 4 Ecological Screening Values, November 30, 2001). Based on these results, exposure to these compounds in soil, sediment, and surface water may pose an unacceptable risk to ecological receptors within the Study Area. However, further analysis is required before determining if response actions may be needed to address these potential risks.

g. Munitions and Explosives of Concern (MEC) on Southern Part of NWP

The following tables summarize the MEC that have been discovered in the Southern Part of the NWP during the various investigations. The locations of the items discovered during the EE/CA activities, described in Section 2.2.2, are shown on ***Figure 7***. Items encountered during the 2012 Congressional Study report effort are shown on ***Figure 5*****.**

Table 1: UXO Items Identified - Southern Portion of Northwest Peninsula, Culebra, Puerto Rico

Item	Quantity	Notes	Reference	Location	Date
Candle, illumination, from 5"/ 38 naval projectile	1	Filled with 50% of illumination composition	MTA TCRA	NWP Grid No. 1	1995
Bomb, practice, 25 pound, MK 76/Bomb Dummy Unit (BDU)-33	1	Appeared spotting had functioned but too corroded to certify	MTA TCRA	NWP Grid No. 2	1995
Projectile, 40mm, M81A1 TP-T	1	Tracer present	MTA TCRA	NWP Grid No. 2	1995
Projectile, 40mm, M81A1 TP-T	1	Tracer partly burnt	MTA TCRA	NWP Grid No. 2	1995
BLP, 3 inch, with tracer	1	Condition not determined due to corrosion	MTA TCRA	NWP Grid No. 2	1995
Projectile, 3"/ 50 HE	1	Armed, PD, fuze	MTA TCRA	NWP Grid No. 2	1995
Projectile, 40mm, M81A1 TP-T	1	Tracer Present	MTA TCRA	NWP Grid No. 2	1995
Fuze, BD, from 5"/ 38 projectile	1	Tracer Residue Present	MTA TCRA	NWP Grid No. 3	1995
Fuze, BD, from 5"/ 38 projectile	1	Condition not determined due to corrosion	MTA TCRA	NWP Grid No. 4	1995
Projectile, 40mm, Bofors	1		MTA TCRA	NWP Grid No. 4	1995
Candle, illumination, from 5"/ 38 naval projectile	1	Filled with 75% of illumination composition	MTA TCRA	NWP Grid No. 4	1995
Naval gun fire, 3 inch	2	6-inch depth, fired fuzes	EE/CA	NWP NP-3	1997
Candle, illumination, 3 inch	1	5-inch depth	EE/CA	NWP NP-4	1997
Naval gun fire, 5 inch	1	Fired mod 2 fuze, 8-inch depth	EE/CA	Flamenco Beach FB-6	1997
Projectile, 37mm HE	1	No fuze, 5 inch depth	EE/CA	Flamenco Beach FB-6	1997
Warhead, rocket, 5-inch	1	Sand filled with fired fuze, 4-inch depth	EE/CA	Flamenco Beach FB-6	1997
Candle, illumination, 5-inch	2	Flares, no fuze, 4-inch depth	EE/CA	Flamenco Beach FB-6	1997
Various UXO	15	Various UXO identified on Northwest Peninsula	UXO Construction Support, Ellis	NWP	2001-2002
Candle, illumination, 5-inch	1	10-inch depth, unfuzed, magnesium filled	Ellis Grid Log	2029724.479N 2529724.682E	2002

Item	Quantity	Notes	Reference	Location	Date
Bomb, 100 pound	1	Surface, fuzed, HE	Ellis Grid Log	2029921.471N 25279.397E	2002
Bomb, 1,000 pound	1	12-inch depth, fuzed, HE	Ellis Grid Log	2029922.685N 252796.915E	2002
Candle, illumination, 5-inch	1	10-inch depth, fuzed, magnesium filled	Ellis Grid Log	2029922.685N 252796.915E	2002
Mortar, 81mm	1	18-inch depth, fuzed, w/p filled	Ellis Grid Log	2029924.127N 252920.989E	2002
5’ HE Projectile	1	ID #2	Congressional Study Report	See *Figure 5*	2011
BDU-33	1	ID #3	Congressional Study Report	See *Figure 5*	2011
2.75’ Rocket WH	1	ID #5	Congressional Study Report	See *Figure 5*	2011
20mm Projectile	1	ID #6	Congressional Study Report	See *Figure 5*	2011
BDU-33	1	ID #7	Congressional Study Report	See *Figure 5*	2011
5” HE Projectile	1	ID #8	Congressional Study Report	See *Figure 5*	2011
2.75’ Rocket WH	1	ID #9	Congressional Study Report	See *Figure 5*	2011
5” MK 41 Projectile	1	ID #10	Congressional Study Report	See *Figure 5*	2011
5” APHE Projectile	1	ID #11	Congressional Study Report	See *Figure 5*	2011
75mm Projectile	1	ID #12	Congressional Study Report	See *Figure 5*	2011
75mm Projectile	1	ID #13	Congressional Study Report	See *Figure 5*	2011
5” HE Projectile	1	ID #14	Congressional Study Report	See *Figure 5*	2011
Signal Flare	1	ID #16	Congressional Study Report	See *Figure 5*	2011

Item	Quantity	Notes	Reference	Location	Date
100lb GP Bomb	1	ID #17	Congressional Study Report	See *Figure 5*	2011
5” Mk 39 Projectile	1	ID #19	Congressional Study Report	See *Figure 5*	2011
Illumination Candle	1	ID #21	Congressional Study Report	See *Figure 5*	2011
Illumination Candle	1	ID #22	Congressional Study Report	See *Figure 5*	2011
3” APHE Projectile	1	ID #23	Congressional Study Report	See *Figure 5*	2011
Illumination Candle	1	ID #24	Congressional Study Report	See *Figure 5*	2011
5” APHE Projectile	1	ID #26	Congressional Study Report	See *Figure 5*	2011
5” HE Projectile	1	ID #27	Congressional Study Report	See *Figure 5*	2011
5” HE Projectile	1	ID #28	Congressional Study Report	See *Figure 5*	2011
5” HE Projectile	1	ID #29	Congressional Study Report	See *Figure 5*	2011
5” HE Projectile	1	ID #30	Congressional Study Report	See *Figure 5*	2011
100lb GP Bomb	1	ID #31	Congressional Study Report	See *Figure 5*	2011
Illumination Candle	1	ID #32	Congressional Study Report	See *Figure 5*	2011
5” HE Projectile	1	ID #33	Congressional Study Report	See *Figure 5*	2011
5” HE Projectile	1	ID #34	Congressional Study Report	See *Figure 5*	2011
Flare	1	ID #35	Congressional Study Report	See *Figure 5*	2011
3” HE Projectile	1	ID #36	Congressional Study Report	See *Figure 5*	2011

Item	Quantity	Notes	Reference	Location	Date
81mm WP Mortar	1	ID #37	Congressional Study Report	See *Figure 5*	2011
Partial 81mm Mortar	1	ID #38	Congressional Study Report	See *Figure 5*	2011
Partial 3” HE Projectile	1	ID #39	Congressional Study Report	See *Figure 5*	2011
500lb HE Bomb	1	ID #40	Congressional Study Report	See *Figure 5*	2011
Signal Flare	1	ID #41	Congressional Study Report	See *Figure 5*	2011
Signal Flare	1	ID #42	Congressional Study Report	See *Figure 5*	2011

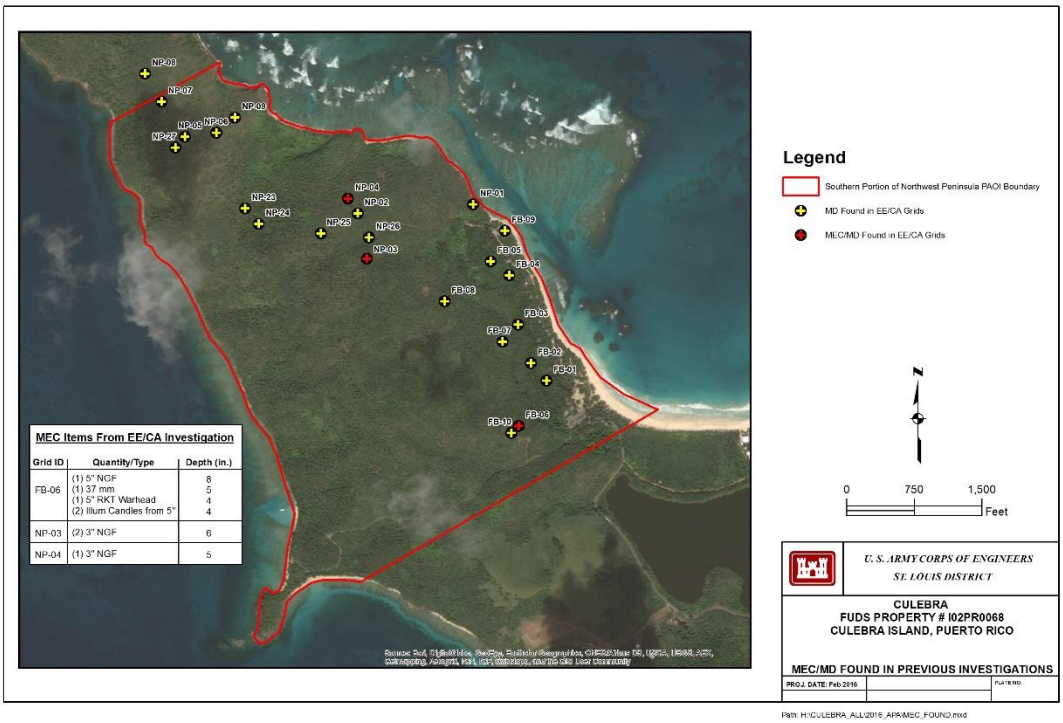

Figure 7 – MEC/MD Found During EE/CA Investigation Prior to the Congressional Study Report

2.2 OTHER INVESTIGATIONS

2.2.1 1995 Interim Remedial Action

In 1995, MTA, Inc. (MTA) completed an interim remedial action on 3.66 acres of the Flamenco Beach Campground near Flamenco Beach to dispose of UXO within 2 feet of the ground surface at the campground (MTA, 1995). Work was conducted on the site between 12 May and 26 May 1995. MTA found 11 UXO items including 5" HE naval projectiles, 40mm tracer rounds, BDU-33s, and various flares.

2.2.2 1997 Final Engineering Evaluation/Cost Analysis

In March 1997, Environmental Science and Engineering, Inc. (ESE) submitted the Final Engineering Evaluation and Cost Analysis (EE/CA) for the Former Culebra Island Naval Facility, Culebra Island, Puerto Rico (ESE, 1997). The EE/CA investigation included surface and subsurface sample grids on NWP, Isla Culebrita, Cayo Botella, Cayo del Agua, Cayo Lobo, and Cerro Balcon. UXO items were found in all areas except Cayo Lobo and Cerro Balcon, where only ordnance-related scrap was identified. Items found included 20mm high-explosive incendiary (HEI) devices, Mk76 practice bombs, Mk50 5-inch projectiles, 37mm projectiles, 5-inch rockets, 76mm projectiles, 3 and 6-inch naval projectiles, 81mm mortars, and a grenade. The UXO items found in grids located specifically in the Southern Portion of NWP are listed in ***Table 1*** and identified on ***Figure 7.***

2.2.3 2004 UXO Construction Support

In June 2004, Ellis Environmental Group, LC (Ellis) submitted the Site-Specific Final Report, UXO Construction Support, CWR, Culebra Island, Puerto Rico (Ellis, 2004a). The report documented clearance efforts conducted by Ellis on NWP. Ellis performed four phases of clearance from January 2001 to February 2004. Phase I consisted of construction support by clearing roadways, a wind generator foundation, a desalination plant foundation, and re-grading the site. Phase II of the construction support was not exercised due to a stop in funding for the construction project. Phase III included surface clearance of 70 acres of bird nesting area and 4-foot-depth subsurface clearance of roadways, firebreaks, and an observation post. Phase IV consisted of demilitarization of scrap, construction of a fence and information kiosk, and development of public awareness information. The public awareness information included a video, UXO safety poster, and UXO safety brochure.

During the UXO Construction Support project, Ellis excavated 6,121 holes and recovered 15,479 pounds of scrap metal and 249 UXO items. Fifteen (15) of the 249 UXO items were found within the boundary of the Southern Portion of NWP.

2.2.4 2007 Site Inspection (SI)

An SI of Culebra Island and the surrounding cayos was completed by Parsons in 2007 (Parsons, 2007) for CESAJ and the USAESCH. The objective of the 2007 SI was to determine whether the MMRP Projects created (currently MRSs) in the 2005 Revised INPR (identified above) warranted further investigation under the MMRP. The Southern Portion of NWP and a portion of Flamenco Beach were contained within the boundaries of MMRP Project 02. In accordance with Public Law 93-166, SI data were not collected from the NWP portion of Project 02. However, due to the presence of munitions debris and UXO previously found within the Southern Portion of NWP, the 2007 SI recommendation was to proceed to Remedial Investigation/Feasibility Study (RI/FS) in this area.

2.2.5 2009 Non-Time Critical Removal Action, Flamenco Beach

In 2008-2009, USAE completed a Non-Time Critical Removal Action (NTCRA) on the portion of Flamenco Beach within MRS 04, however in the course of the action anomalies were identified that led the investigation to the NWP at Flamenco Beach. USAE performed digital geophysical mapping of 12.3 acres and reacquired target anomalies. Findings included 6 munitions debris (MD) items and 1 UXO item (5” projectile) on Flamenco Beach.

CHAPTER 3. PROPERTY DESCRIPTION, ACREAGE AND LAND USE

3.1 SITE DESCRIPTION

The Southern Portion of NWP, including a portion of Flamenco Beach, consists of approximately 408 acres and was used for aerial bombing, maneuvers, artillery firing, and amphibious training by the Navy and U.S. Marine Corps (Marines) between 1902 and 1975 (USACE, 2005a). During military use of the land, the island was inhabited by many residents centralized around the town of Dewey on the west central portion of the island. Currently, the Southern Portion of NWP includes wildlife conservation and recreational areas. The Culebra Conservation and Development Authority (ACDEC), which manages the land comprising the Southern Portion of NWP was established under the Commonwealth Law No. 66 of 22 June 1975, known as the "Conservation and Development Law of Culebra". Limited receptor access is present on the northern portion of Flamenco Beach; fencing and natural barriers such as dense vegetation and rocky cliffs make access to many areas difficult beyond the Flamenco Beach and Campground areas. Receptor access is also present on the western beach area, Carlos Rosario Beach, by a dirt trail that runs along the southern side of the Southern Portion of NWP from the Flamenco Beach area.

3.2 PHYSICAL SETTING

3.2.1 Topography and Vegetation

The Southern Portion of NWP has irregular, rugged coastlines with sandy beaches, lagoons, coastal wetlands, and mountainous terrain. ***Figure 8*** shows the topography of Culebra Island. Vegetation is moderately to extremely dense on undeveloped areas of the Southern Portion of NWP. Hazardous vegetation includes the Mesquite acacia or thorny brush and the poisonous Manchineel tree (also called Manzanillo Tree on Culebra), which is known to be present on NWP and near Flamenco Lagoon.

3.2.2 Geology and Soils

Culebra Island is part of the Culebra Archipelago. The rocks are predominantly intrusive or extrusive volcanic rocks consisting of andesite lava and tuff. The rocks in the Southern Portion of NWP contain diorite porphyry inclusions and have little to no porosity due to compaction and quartz and calcite growth in the pore space. Soils are generally shallow and rocky and consist mostly of silts and clays. Loamy organic-rich soils are found in areas of dense vegetation and grasses, while sandy soils are found on tidal flats or areas near the beach. Many of the beaches on Culebra, including Flamenco Beach, Tamarindo Beach and Carlos Rosario Beach, have clean white to tan sand, while other beaches are rocky with a mix of cobbles and pieces of dead coral reef. ***Figure 9*** and ***Figure 10*** show the geology and soils of Culebra Island, respectively.

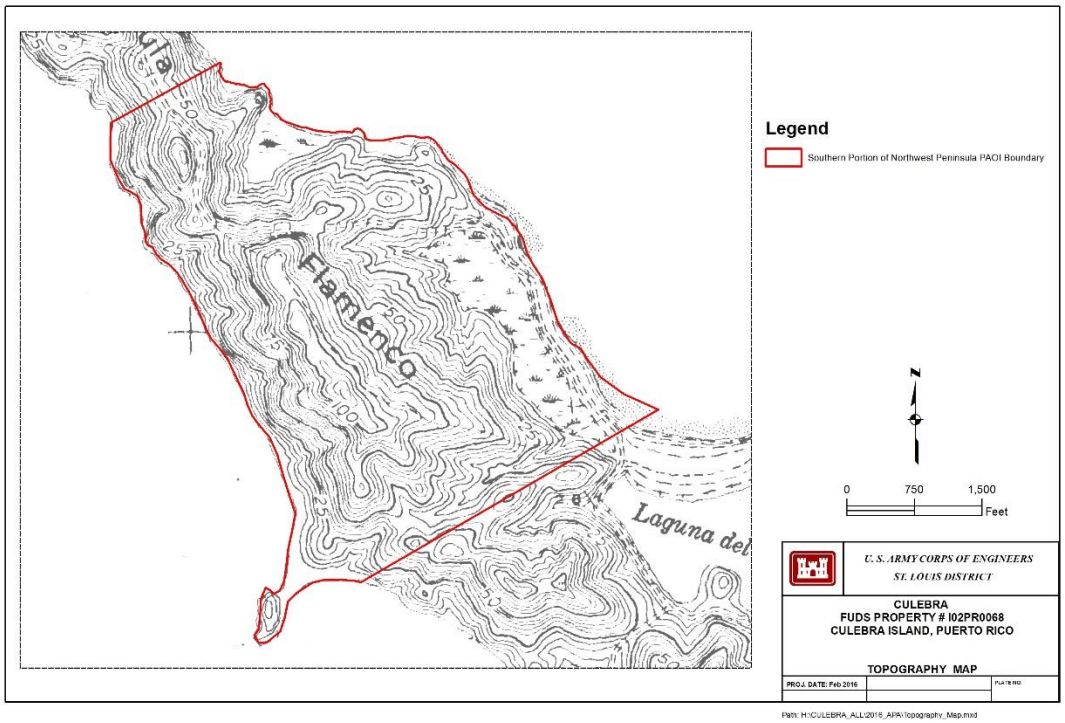

Figure 8 – Topography Map

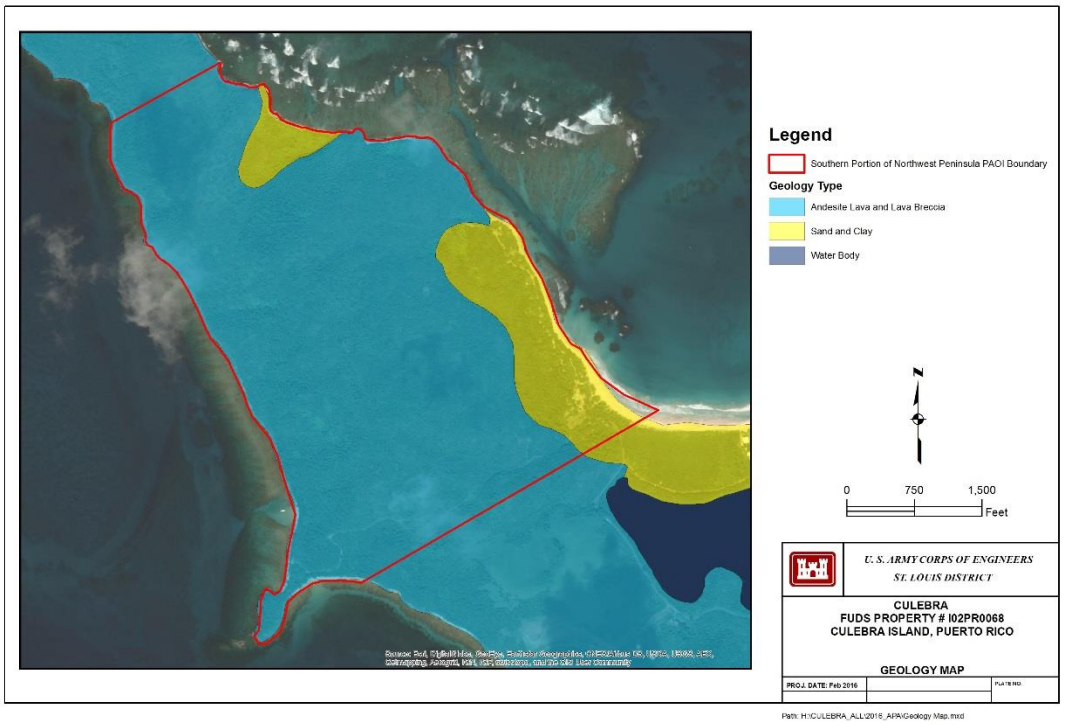

Figure 9 – Geology Map

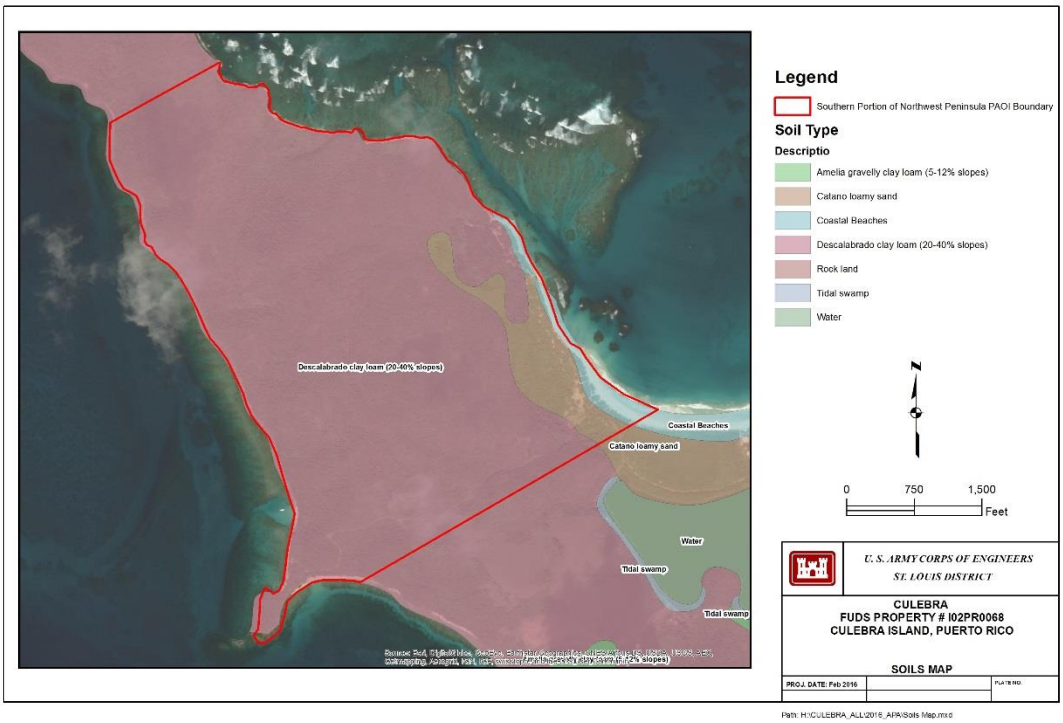

Figure 10 – Soils Map

3.2.3 **Hydrology and Groundwater**

There are no permanently flowing surface water streams on Culebra. Various ephemeral streams exist within the Southern Portion of NWP. These ephemeral streams generally only carry water after heavy precipitation. There are many small ephemeral gullies and ditches throughout the island, and several lagoons are present on the Southern Portion of NWP.

During the 2007 SI, the Technical Project Planning Team agreed that because there are no known cases where groundwater is used for consumption on Culebra Island, groundwater sampling was not conducted. No identifiable receptors that could result in a complete exposure pathway for MC via groundwater use were identified.

3.2.4 **Climate**

The weather at Culebra Island is generally warm year round due to its tropical marine climate. Average rainfall is approximately 36 inches, with the heaviest rain in May, October, September, and November. The months of August through November are considered the wet season, and the driest months are January through April. Daily temperatures average 80°F year round with an average maximum of 86°F and an average low of 74°F. Winds are generally from the east-northeast during November through January and from the east during February through October. Wind speeds average 8 knots. Hurricane season is from June through November, and severe hurricanes hit Culebra every 10 to 20 years.

3.2.5 Significant Structures

The Southern Portion of NWP is home to the Flamenco Beach Campground with 11 recreational type structures. There are no full time residents but are many visitors throughout the year.

3.2.6 Sensitive Environments

The main island of Puerto Rico and its associated islands support 75 federally listed threatened and endangered species consisting of 26 animals and 49 plants. Among this diverse group of fauna and flora are multiple species that are known to exist, potentially exist, or temporarily use areas within the Culebra Island, such as migratory birds. Of the 75 federally listed species, nine are known or are suspected to occupy Culebra Island. In addition to the federally listed species, 13 state-listed species are known to occupy Culebra Island. The federally and state-listed species include both terrestrial and marine life. The federally listed species of most concern for the Southern Portion of NWP are the Culebra Island giant anole, Virgin Islands tree boa, roseate tern, green sea turtle, hawksbill sea turtle, leatherback sea turtle, loggerhead sea turtle, Leptocereus grantianus (cactus), and Wheeler's peperomia.

According to the NWRS, portions of Culebra Island are considered NWR area. Vegetation ranges from moderate to extremely dense.

3.2.7 Cultural and Archeological Resources

According to the National Register Information System (NRIS), National Historic Landmarks (NHL) list, National Heritage Areas (NHA) list, and National Park Service (NPS), there are no registered cultural resources within the boundary of the Southern Portion of NWP. According to the Puerto Rico State Historic Preservation Office (SHPO), there are no known architectural resources within the boundary of the Southern Portion of NWP area.

3.2.8 Demographics

The U.S. Census Bureau's (USCB) Census 2010 provided the general demographics of the Municipality of Culebra summarized in ***Table 2*** (USCB, 2011).

Table 2: Demographic Summary -- Municipality of Culebra, Puerto Rico

General Characteristics	Number	Percent
Total Population	1,818	
Male	921	50.7
Female	897	49.3
Population Density (persons per square mile)	69.6	
Median Age (years)	39.4	
Under 5 Years	101	5.6
18 Years and Over	1,403	77.2
65 Years and Over	265	14.6
Total Housing Units	1,603	
Occupied Housing Units	749	46.7
Owner-Occupied Housing Units	484	64.6
Renter-Occupied Housing Units	265	35.4
Vacant Housing Units	854	53.3

Source: U.S. Census 2010 data.

3.2.9 Current and Future Land Use

Prior to use by the Navy the NWP was vacant land sometimes used for cattle grazing. The Southern Portion of NWP and Flamenco Beach are managed by the ACDEC for recreational use. Current land use is recreational within the Flamenco, Carlos Rosario and Tamarindo beach areas and Flamenco Campground area. ***Figure 6*** shows the location of these recreational areas. It is anticipated as per PL 93-166, the NWP area shall be used only for recreational purposes. The Commonwealth of Puerto Rico anticipates a future development of ecologically friendly camping facilities north of the Flamenco Campground area. They also anticipate establishing hiking trails within various portions of the Southern Portion of NWP.

3.2.10 Regulatory Activities

USACE is conducting this APA for the NWP as part of the FUDS response activities pursuant to and in accordance with the guidance, regulations, and legislation listed in Section 1.2.

CHAPTER 4. HISTORICAL PROPERTY SUMMARY

4.1 SITE OWNERSHIP

In 1898, the Spanish American War concluded and the Kingdom of Spain ceded all of Puerto Rico to include Culebra and its adjacent cayos to the U.S.

Between 1903 and 1964, the United States acquired 2747.12 acres of land on Culebra Island (2067.8 acres fee), Culebrita Island (266.0 acres fee), Luis Pena Cay (342.5 acres fee), Water Cay (7 acres fee) and the adjacent cayos (63.82 acres leased), for a bombing and gunnery range and auxiliary airfield for the Navy. The United States acquired fee title to 2135 acres of land from Spain (1785.5 acres on Culebra Island, the 342.5 acres on Luis Pena Cay, and the 7 acres on Water Cay). These lands were transferred to the Navy by Presidential Proclamation of 26 June 1903. The Navy acquired 13.83 acres by purchase in 1903 and 268.47 by donation in 1939, all on Culebra Island. In the early 1940s, 265.59 acres of fee land Culebrita Island and Ladrones Cay were transferred to the Navy from the Coast Guard (CG); 63.82 acres were acquired by leases for the Navy on adjacent cayos; and 0.41 of an acre on Culebrita Island was acquired by permit from the CG.

The lands were part of the U.S. Naval Station, Culebra Island, Puerto Rico and were utilized by the Navy as a coaling station, training area, auxiliary airport, weapons range, bombing and gunnery range. The Navy constructed various improvements including a range operation center, maintenance sheds, helicopter landing pad, security fencing, warehouses, storage tanks, septic tanks, water distribution building, pumping stations, housing, and an auxiliary landing field including runways, taxiways, etc. Parts of the property (approximately 990 acres on Culebra Island) were utilized by others by virtue of outgrants from the Navy, prior to the Navy declaring the property as excess. The remainder of the property was under Department of Defense (DoD) control during the period of DoD ownership.

The Navy terminated the leases on the 63.82 acres on the adjacent cayos in 1972 and returned the property to the then-current owners. The terms and conditions of the leases and termination notices or any restoration requirements are unknown as copies of those instruments could not be located. On 5 July 1972, the Navy reported 1089.80 acres of the site excess to the General Services Administration (GSA). On 19 May 1976, the Navy reported an additional 1501.5 acres excess to GSA. On 28 March 1976, the Navy transferred 4.09 acres on Culebrita Island to the CG and terminated the permit from the CG comprising 0.41 of an acre located on Culebrita, which is still utilized by the CG. The Navy retained and still utilized 87.5 acres on Culebra Island that was only recently declared excess and was transferred to the Department of the Interior (DoI).

The Lands reported excess to General Service Administration (GSA) were disposed of as follows:

a. The Navy (at the direction of GSA) transferred 611 acres (342.5 acres on Luis Pena Cay, 261.5 acres on Culebrita Island, and 7 acres on Water Cay) and 776.35 acres on Culebra Island, together with all improvements, to the Department of Interior (DoI), FWS

on 23 March 1978 and 15 September 1980, respectively. All 1387.5 acres transferred to the FWS comprise the CNWR.

b. By quitclaim deed dated 7 February 1980, GSA conveyed fee title to 79.73 acres to the Puerto Rico Ports Authority on Culebra Island for public airport purposes. The deed contained a recapture and reverter clause and was subject to existing easements for public highways, roads, utilities, etc. This property is utilized as a public airport.

c. By quitclaim deed dated 11 August 1982, the United States of America, through the Secretary of the Interior, conveyed 935.98 acres to the Commonwealth of Puerto Rico on Culebra Island. The deed contained a reverter clause and other restrictions that 644.99 acres would only be utilized for public park or public recreational purposes. The 408.04 acres Commonwealth portion of the NWP bombardment area is included in this 644.99 acres. The deed contained language that the Commonwealth agreed to accept the bombardment area in its present condition, that the United States would not be held responsible for decontamination, and that the United States would be held harmless from any and all claims, demands, actions, etc., arising from any person's use of or presence on the property. This property is utilized for park purposes.

d. By quitclaim deed dated 24 February 1984, GSA conveyed 32.34 acres to the Department of Housing, Commonwealth of Puerto Rico on Culebra Island which is now public housing. The deed contained no restrictions, reverter, recapture clauses.

e. By quitclaim deed dated 29 April 1988, GSA conveyed 155.9 acres on Culebra Island to the Municipality of Culebra, Puerto Rico. This deed contained no warranties, recapture or reverter clauses, but was subject to existing easements for public highways, roads, utilities, etc., and contained a hold harmless clause in favor of the United States. The site is being utilized for city facilities and is under development as a port.

Besides the areas mentioned above that were purchased or leased by the Navy, additional lands were used by the Marines starting as early as 1914. The Marines used the land for large-scale maneuvers and ordnance training exercises. Beginning in 1924 the Marines leased most of the private property on Culebra, other than the town of Dewey, for these exercises. In June 1937 the 1st Marine Brigade, Fleet Marine Force began preparations for the acquisition of property for the 1938 Fleet Landing Exercise #4. These preparations culminated in December 1937 when the Commanding Officer of the Naval Aviation and Facilities, St. Thomas, Virgin Islands reported that the government leases for all privately owned lands on the island of Culebra had been secured.

The Navy retained 87.5 acres near Flamenco Point that are not eligible for FUDS. The 2005 revised FDE report states that the site, except for 87.5 acres recently transferred from the control of the Navy, has been determined to be formerly used by the DoD and eligible for FUDS.

4.2 OPERATIONAL HISTORY

To better understand the operational history of the limited areas, this APA includes the historical usage of the entire NWP as a foundation. As part of the transfer from US Navy control certain stipulations were included that prevented decontamination at the expense

of the US government without the explicit direction of Congress. Congress decided in 2014 that certain limited areas could be made safe for public use.

4.2.1 General History

Although reconnaissance trips, development of a base, and placement of guns began as early as 1902, the first maneuvers at Culebra did not begin until January 1914, with the Marines first Advance Base Expedition establishing several encampments and 3-inch and 5-inch gun batteries at the mouth of Great Harbor. The Marines' use of the island continued over several more decades. In 1922, an exercise was conducted firing 7-inch, 8-inch, 3-inch, 155-millimeter (mm), 75mm, and 37mm guns. In 1924, maneuvers included firing of 75mm and 155mm guns, and mine placement in several water areas around Culebra.

In 1934, the Navy and Marines organized to carry out the first Fleet Landing Exercise (FLEX), Fleet Problem XV. Weapons used during this exercise included .30-caliber machine guns, 3-inch anti-aircraft guns, 6-inch gun batteries, 75mm batteries, and 6-inch naval guns. Six more FLEXs were conducted on Culebra Island between 1935 and 1941. Photographic accounts document Marine landing exercises in 1946 and 1947. Marine training at Culebra is believed to have continued until the late 1950s.

The NWP was used for live gunnery practice between 1935 and January 1, 1972. During this period of time, a total of 750,000 naval rounds had been estimated as being fired. During the period 1942 to 1968, an estimated 320,000 units of air ordnance were fired/dropped at the NWP. Eighty percent of the ammunition was 5"/38 and 5"/54 caliber. Ten percent was 3"/50, 6"/47, and 8"/55 gun ammunition. The balance included other varieties up to and including 16"/50, mortar, and howitzers. (U.S. Navy Memorandum dated June 1973 from Commander in Chief U.S. Atlantic Fleet to Chief of Naval Operations, Subject: Time-Phased Plan for Relocation of Training Activities from the Culebra Complex to the Islands of Desecheo and Monito) Naval exercises included aerial bombardment, submarine torpedo fire, and naval gunfire directed at NWP and many cays. All military use of the island was terminated in 1975. In summary, the Island of Culebra, nearby cays, and surrounding water were used between 1902 and 1975 for training and live fire of bombs, mortars, rockets, torpedoes, projectiles, and small arms.

In 1975, the Navy issued a report of excess for the land associated with the Navy's original 1900 holdings. Beginning in 1978, all of the land acquired by the military on Culebra and the surrounding cays were excessed to the DoI or transferred to the government of Puerto Rico by quitclaim deed.

In 1980, the GSA transferred approximately 776 acres of land, including 164 acres on the NWP, to the USFWS to establish the CNWR. The Governor of Puerto Rico accepted approximately 936 acres of land on the island of Culebra in a quitclaim deed from the Secretary of the Interior, which included 408 acres on the NWP. These 408 acres comprise the Southern Portion of the NWP, which is the primary focus of this report. Currently, the ACDEC manages this area for environmental management and recreational purposes. This Southern Portion area of the NWP is shown on ***Figure 3*****.**

This APA is being prepared as part of the process to implement those activities to render safe limited portions of the former Culebra bombardment area. The activities were specified by PL 113-291 § 317, which stated that it is the sense of Congress that certain limited portions of the former bombardment area on the Island of Culebra should be available for safe public recreational use while the remainder of the area is most advantageously reserved as habitat for endangered and threatened species. Those limited portions include those parts of Flamenco and Tamarindo Beaches located inside the former bombardment area and the entire areas of the Flamenco Campground, Carlos Rosario Trail, and Carlos Rosario Beach. These limited portions were identified as the result of the Congressional Study report that was developed for the bombardment area (see ***Figure 2***).

The Congressional Study of the Southern Portion of the NWP of Culebra was conducted pursuant to PL 111-383 § 2815, "Former Naval Bombardment Area, Culebra Island, Puerto Rico" that required the Secretary of Defense to conduct a study, at the request of the Commonwealth of Puerto Rico, relating to the presence of UXO in a portion of the former bombardment area at Culebra Island, Puerto Rico, that was transferred to the Commonwealth by Quitclaim Deed.

4.2.2 Specific Historical Activities

This site history describes those military operations that directly affected the NWP of Culebra. The former usage for the NWP was for naval gunfire, aerial bombing & rocket and strafing. The area for shore bombardment extended approximately three miles southeastward from the tip of the peninsula to a line marked by a wire fence and firebreak. The Marines used the peninsula for training from 1903 to 1941, and it is likely they fired weapons there. In 1935, the First Naval gunnery was at Flamenco Peninsula.

4.2.3 Fleet Landing Exercises 1, 2, and 4

Historically, during many instances Marines have landed units in hostile shores with the support of the Navy gunfire. From 21 January 1935 through 19 March 1939 the Marines and Navy practiced landing operations as part of the Fleet Landing Exercises (FLEX). FLEX No. 1, No. 2, and No. 4 were conducted against targets on Culebra Island by The Training Squadron consisting of the following ships.

Table 3: Ships of The Training Squadron for FLEX No. 1, No. 2 & No. 4

Ships	FLEX No. 1	FLEX No. 2	FLEX No. 4
U.S.S. ARKANSAS (FLAG)	X	X	X
WYOMING	X	X	X
TRENTON (FLAG)	X		
CLAXTON	X	X	
TAYLOR		X	
MEMPHIS (FLAG)			
MANLEY		X	

FAIRFAX	X	
NEW YORK (FLAG)		X
Destroyer Squadron Ten (6 Destroyers)		X

Operations from those exercises are detailed below and show the various target areas on the NWP.

A Navy record dated on 29 January 1938 outlines the objectives of a separate firing practice named "*Procedure for Practice Number Four*" as follows:

a) *To train personnel and develop techniques for rendering naval gunfire support for the initial landing of the assault sub-wave against opposition.*
b) *To test the current doctrine as regards the method for issuing the detailed plan of a schedule of fire required by (a) above.*
c) *To demonstrate the fire effect necessary to establish neutralization of a beach defense area (the equal of 16 75mm shells per minute in a 100 yard square for a period of 3 minutes).*
d) *To demonstrate the fire effect necessary to maintain neutralization of a beach defense area (the equal of 4 ½ 75mm shells per minute in a 100 yard square, delivered about every 15 minutes).*
e) *To demonstrate the comparative effectiveness of Bombardment, Armor Piercing, flat Nose, and Common projectiles on land targets.*
f) *To demonstrate the comparative effectiveness of naval gunfire delivered at various ranges by battleships and by destroyers.*

The firing would be carried in five phases as follows:

I. *OFF SHORE FIRE SUPPORT GROUP at long range (about 12000 yards) Turrets firing 14" bomb, and 12" AP (full charge); 5" firing Common Shell. Air spots.*
II. *INSHORE FIRE SUPPORT GROUP at medium range (about 5000 yards) 4" Common shell. Ships spot, assisted by air spot if desired.*
III. *INSHORE FIRE SUPPORT GROUP at medium range (about 4000 yards) 4" Common shell. Ships spot.*
IV. *OFFSHORE FIRE SUPPORT GROUP at close range (about 6000 yards) Turrets firing 14" Bomb and 12" AP (Full charge); 5" firing F.N shell. Ship spots.*
V. *INSHORE FIRE SUPPORT GROUP at close range (about 3000 yards) 4" F.N. Shell. Ships spot.*

The following figures illustrate the overlay of fire targets.

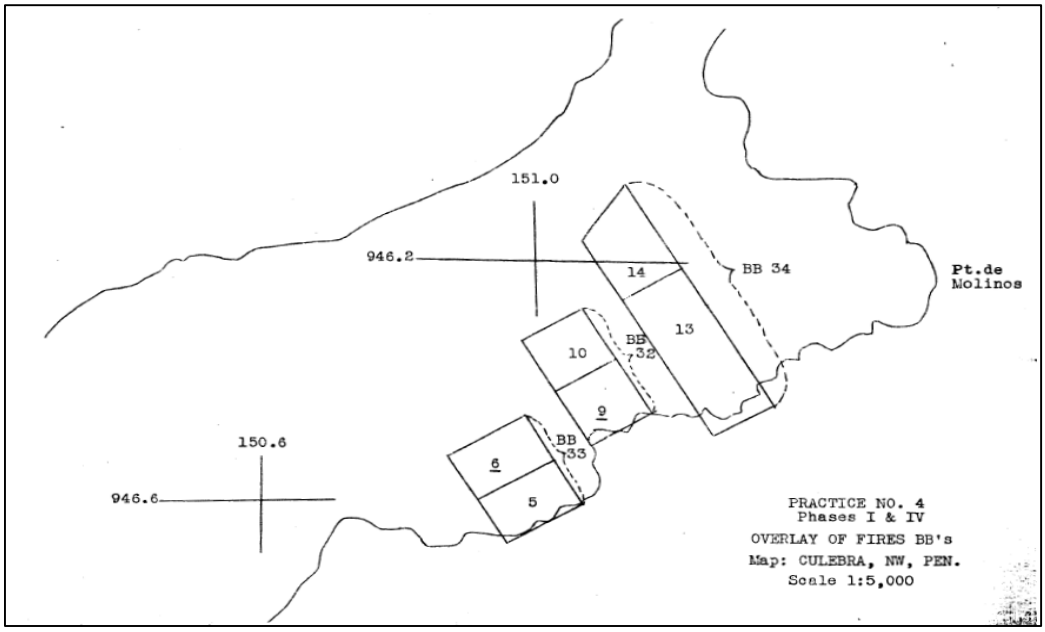

Figure 11 – Overlay of Battleship Target Areas (Phases I & IV) – 1938

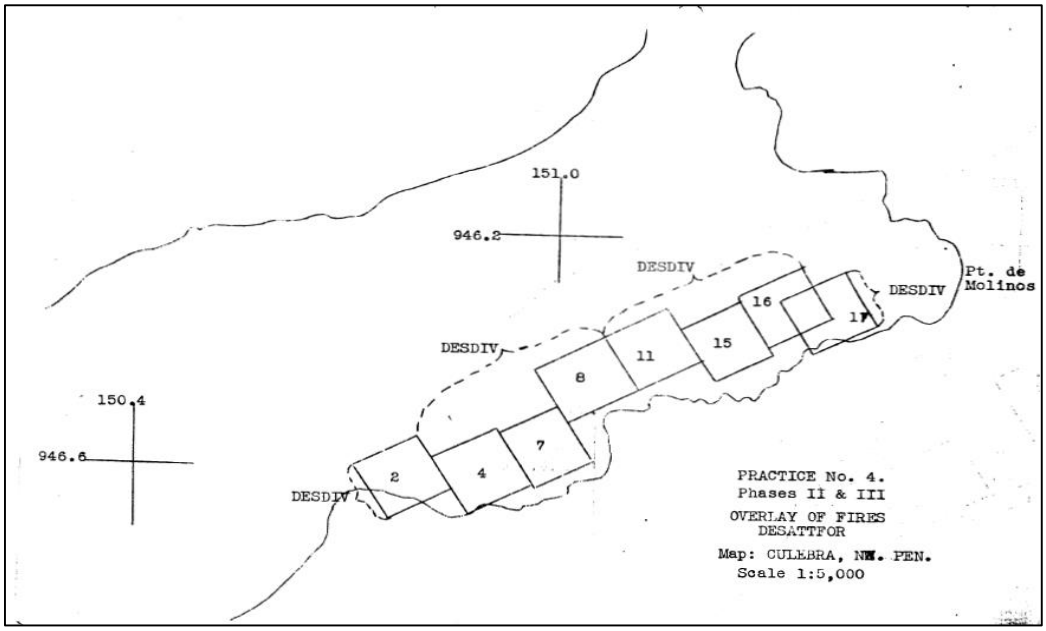

Figure 12 – Overlay of Destroyer Target Fire Areas (Phases II & III) – 1938

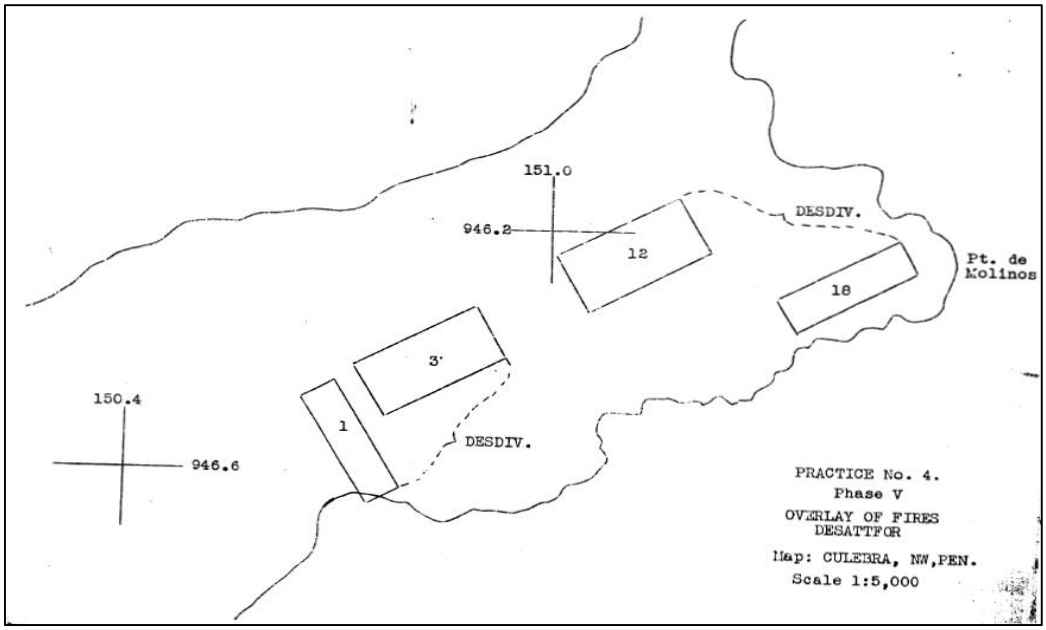

Figure 13 – Overlay of Destroyer Target Fire Areas (Phase V) – 1938

4.2.4 **Naval Targets 1946**

The following map (see ***Figure 14***) depicts the grid system used by the Navy Air Group FOUR in accordance with the Culebra Strike Approach Procedure & Operational Doctrines on 04 April 1946. It is shown that the naval gunfire impact areas (shaded in blue) are located within the Study Area. Targets such as pill box, anti-aircraft and tanks are identified.

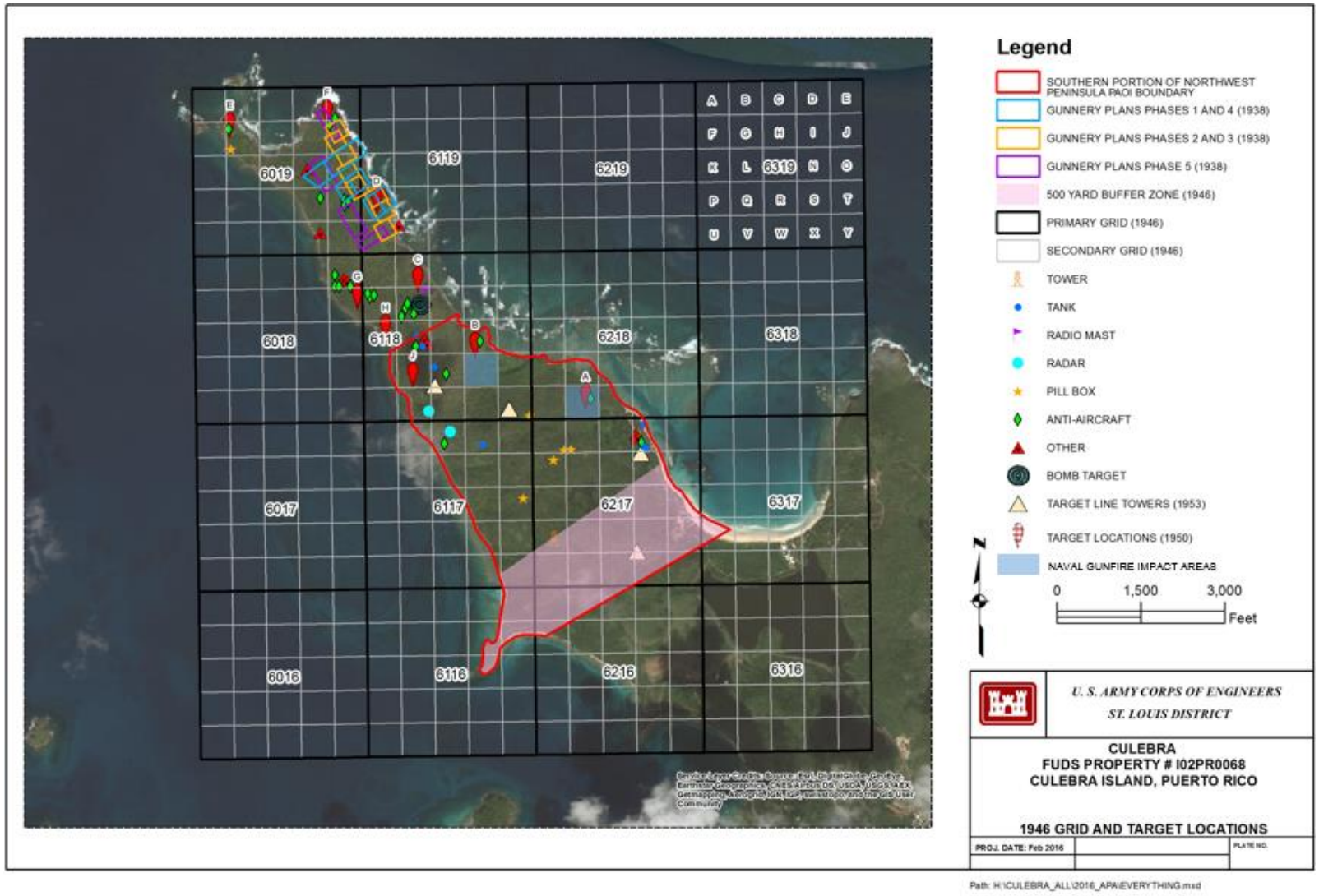

Figure 14 – 1946 Grid & Target Locations

4.2.5 US Naval Targets 1950

The Navy continued the use of the NWP in the 1950s. The map of the US Naval Reservation Culebra, PR, dated 30 June 1950, depicts a series of nine targets spaced around the perimeter of the NWP (see ***Figure 15***). Targets A through F appear to be direct fire targets visible along the eastern side of the peninsula. Targets G, H, and J are located along the western side of the peninsula and would have been suitable for indirect fire operations.

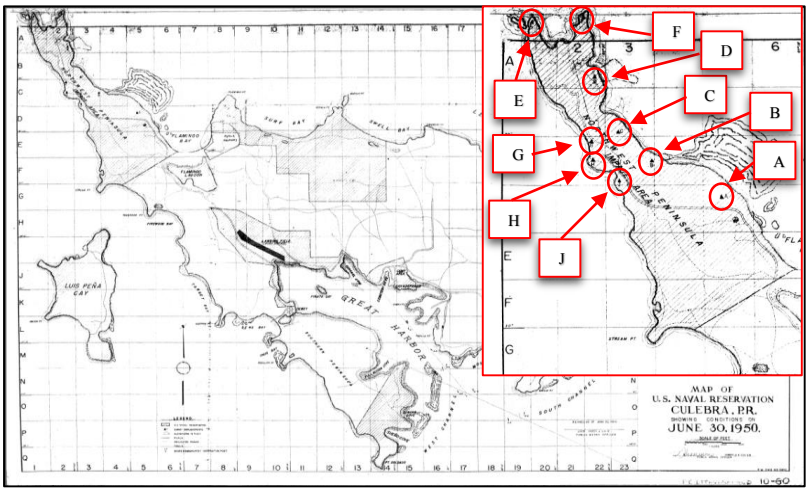

Figure 15 – Map of NWP showing nine targets – 1950

A map, dated on 30 June 1953, depicts three additional features, labeled as "Target Line Towers". The targets would have been in the generally vicinities of the towers (see ***Figure 16***).

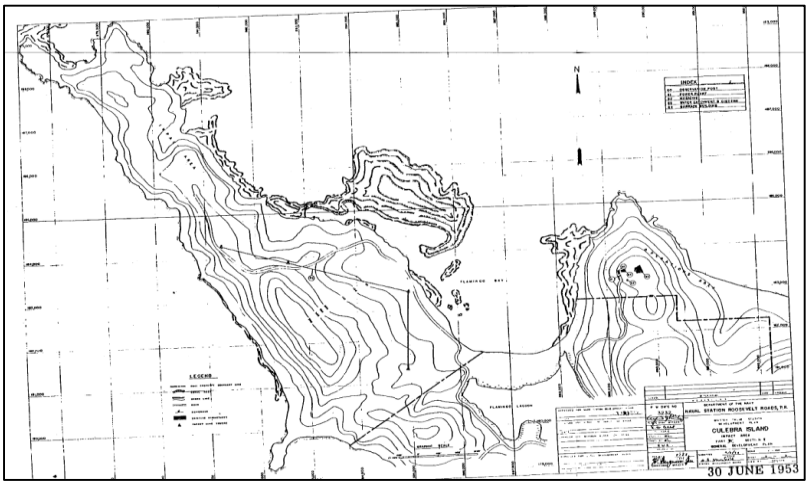

Figure 16 – Map of NWP showing Target Line Towers – 1953

4.2.6 Naval Target Areas 1960s

In the early 1960s, Flamenco Peninsula, Los Gemelos and Alcarraza had been the only aircraft targets in the Culebra Complex used for Vietnam (*Viet Nam*) training. The main observation post (OP)/ range control center at Flamenco point (*Flamingo Point*) was supplemented by additional OPs on Culebrita and Cayo de Luis Peña. U.S. Navy records show that the Flamenco Peninsula was the only target for naval gunfire support (NGFS) training. Targets included four old Sherman tanks as well as trucks and panels. U.S. ships normally fired at targets on the eastern slope of the NWP from a range of 2,000 to 12,000 yards, usually sailing parallel to the coastline heading northwest.

Firings were observed and scored visually from an observation post and control center on Flamingo Point (see ***Figure 17***).

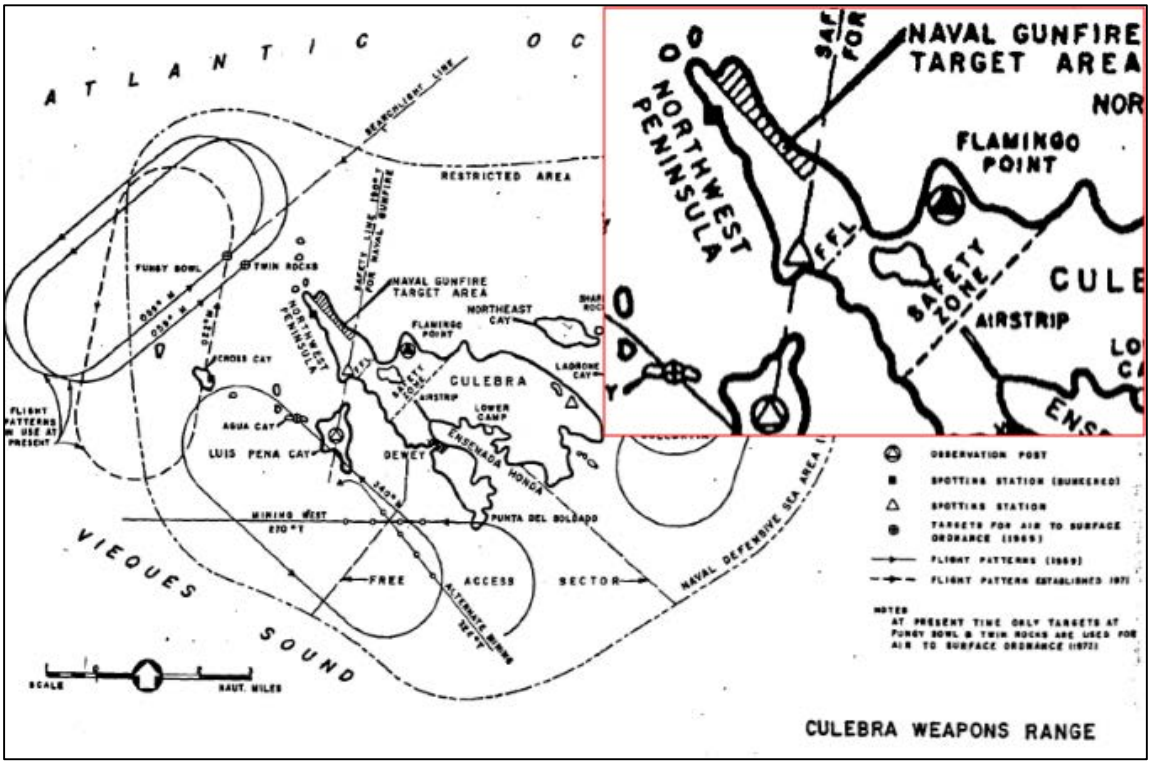

Figure 17 – Culebra Weapons Range – 1960s

The following 1964 aerial image depicts cluster of impact craters on the NWP and Southern Portion (Study Area). Impact craters relate to past military training such as the NGFS.

Figure 18 – NWP Cluster of Impact Craters – 1964

Table 4 shows the type of U.S. ships and caliber used during the firing exercises at the NWP in 1969.

Table 4: List of U.S. ships and caliber used during the 1969 firing exercises at NWP

Types of Ships	Caliber of Guns				
	3″-50	5″-38	5″-54	6″-47	8″-55
Cruisers					
CA	X	X			X
CG		X			
CLG		X		X	
Frigates, Destroyers and Escorts					
DLG, DD, DDG, DE, DEG	X	X	X		
Amphibious	X	X	(Plus 40mm guns)		

In some instances, 81mm white phosphorous (WP) spotting rounds were fired from near the Flamenco Point OP (see ***Figure 17***). It is likely that 81mm illuminating rounds were also used. The range was also used by ships from the Coast Guard as well as from the following foreign countries: Great Britain, Canada, Germany, The Netherlands, France, Brazil, Colombia, and Venezuela. These foreign ships fired live rounds varying from 3" to 5". Aircraft bombing and strafing of the Flamenco Peninsula ended around 1970 and the use of live rounds for NGFS ended in 1971. Naval ships fired only quieter smoke (puff) rounds from then on.

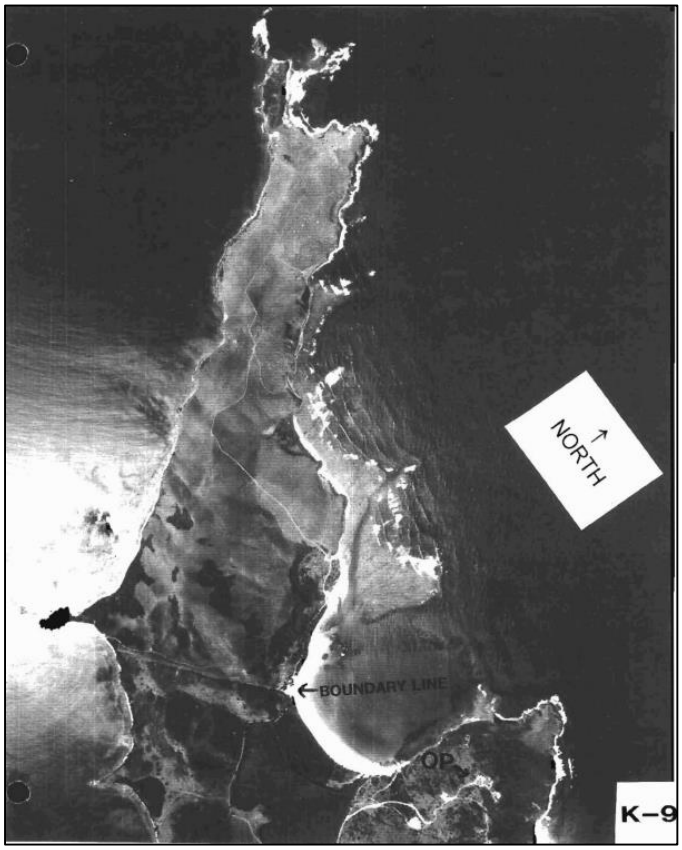

Figure 19 – Flamenco Beach – 1971

The target area is that portion of the NWP to the northwest of a line bearing 051-231 degrees true through Stream Point at 18°19'26"N, 65°19'53"W. The southeast limit of the impact area was marked by a wire fence and firebreak, both of which were clearly visible from the air and surface.

A large bull's target, also known as Target 14 (see ***Figure 20*** and ***Figure 21***) was constructed in the impact area at 18°20'31"N, 65°19'53"W for use by aircraft in delivery of practice ordnance and napalm. The large bull's-eye target was constructed on the side of a hill at a 15 degree angle and had a tank positioned at the target's center with two concentric white circles of 50 and 83 feet radii. The target center was 150 feet in altitude

with the hill behind the target rising to a height of approximately 225 feet. A white line was laid through the target along the 060/240 magnetic axis which is the normal aircraft delivery heading (240°M) to facilitate spotting estimates.

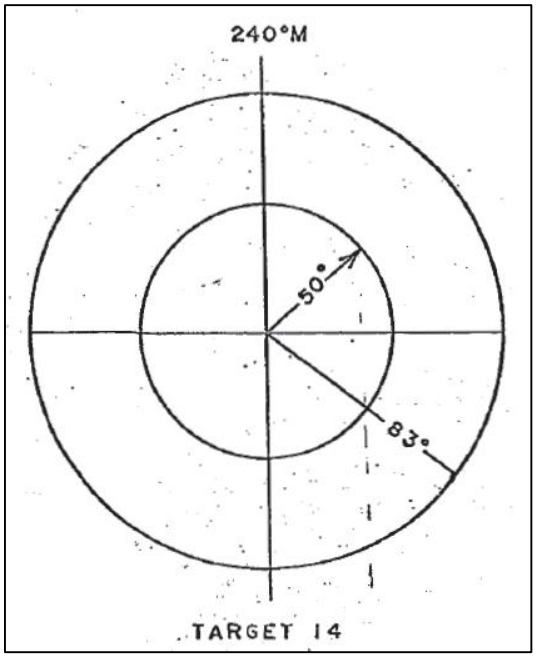

Figure 20 – Outline of bull's eye target – 1971

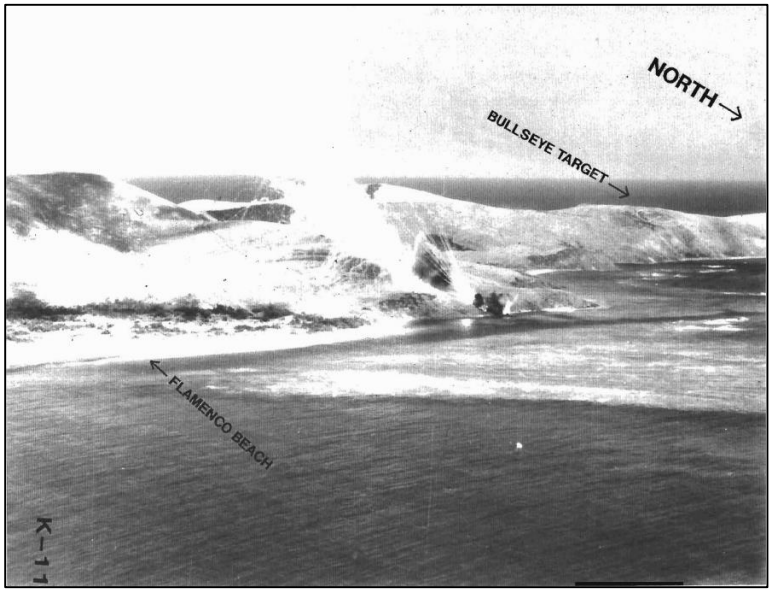

Figure 21 – White phosphorous rounds impacting just north of Flamenco Beach – No Date

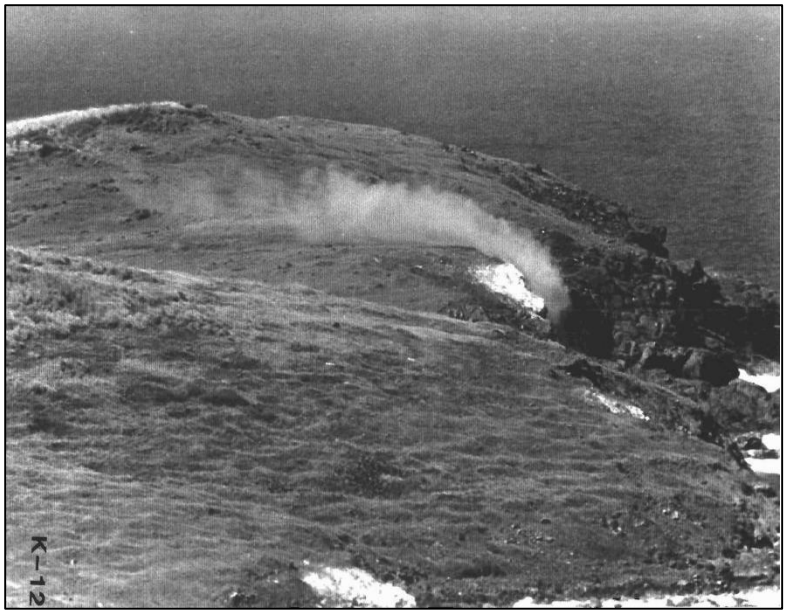

Figure 22 – Puff round on Flamenco Peninsula – 1972

4.2.7 Navy Ordnance Summary 1972

A 1972 Navy report estimated that ships had fired 750,000 rounds at the NWP, with 80% being 5" rounds. Ten per cent were 3", 6", and 8" rounds. The balance included other calibers including mortars, howitzers, and 16" rounds. This report also estimated that from 1942 to 1968, 320,000 units of aerial ordnance, up to 1000 pounds, were delivered. From then on, the U.S. Navy used Culebra and the cayos for gunnery training until ordnance use was terminated on 30 September 1975.

CHAPTER 5. MEC CHARACTERISTICS

5.1 CONGRESSIONAL STUDY MEC INVESTIGATION RESULTS

5.1.1 Digital Geophysics

Digital Geophysical Mapping (DGM) transects operations were conducted as part of the Congressional Study within the Southern Portion of NWP. Vegetation removal activities were conducted prior to starting DGM activities. The vegetation removal crews followed the path of least resistance to help minimize vegetation removal. A certified botanist/biologist accompanied the de-vegetation crew to ensure critical habitat or endangered species were avoided. During the course of conducting vegetation removal activities, MEC items were discovered on the surface of transects.

Based on the results of DGM transects, high, medium, and low density grid areas were developed. Each grid area was surveyed by the project botanist/biologist to avoid all critical habitat and endangered species. Once a grid was established and accepted by the biologist/botanist, it was cleared. During the course of conducting vegetation removal activities, MEC items were discovered on the surface within the grids. As MEC items were discovered, the locations of the items were recorded.

5.1.2 Intrusive Investigation

MEC intrusive operations were conducted subsequent to the completion of analog/flag and DGM grid mapping operations. The locations of recovered MEC items are shown on ***Figure 5***. ***Table 5*** contains a list of all MEC items found during the 2012 Congressional Study.

Table 5: UXO Items Found during the Congressional Study

ID #	Date	MEC Item	ID #	Date	MEC Item
2	26-Aug-11	5" HE Projectile	24	31-Aug-11	Illum Candle
3	26-Aug-11	BDU-33	26	5-Sep-11	5" APHE Projectile
5	29-Aug-11	2.75" Rocket WH	27	5-Sep-11	5" HE Projectile
6	29-Aug-11	20mm HE Projectile	28	6-Sep-11	5" HE Projectile
7	29-Aug-11	BDU-33	29	7-Sep-11	5" HE Projectile
8	29-Aug-11	5" HE Projectile	30	7-Sep-11	5" HE Projectile
9	29-Aug-11	2.75" Rocket WH	31	20-Sep-11	100lbs GP Bomb
10	29-Aug-11	5" MK41Projectile	32	20-Sep-11	Illum Candle
11	29-Aug-11	5" APHE Projectile	33	20-Sep-11	5" HE Projectile
12	29-Aug-11	75mm Projectile	34	4-Oct-11	5" HE Projectile
13	29-Aug-11	75mm Projectile	35	4-Oct-11	Flare
14	30-Aug-11	5" HE Projectile	36	5-Oct-11	3" HE Projectile
16	30-Aug-11	Signal Flare	37	6-Oct-11	81mm WP Mortar
17	30-Aug-11	100lbs GP Bomb	38	6-Oct-11	Partial 81mm Mortar
19	31-Aug-11	5" MK39 Projectile	39	6-Oct-11	Partial 3" HE Projectile
21	31-Aug-11	Illum Candle	40	7-Oct-11	500 lb Bomb MPPEH
22	31-Aug-11	Illum Candle	41	10-Oct-11	Signal Flare
23	31-Aug-11	3" APHE Projectile	42	10-Oct-11	Signal Flare

CHAPTER 6. RISK ANALYSIS

6.1 HAZARD ASSESSMENT FOR MEC

6.1.1 Qualitative Risk Evaluation

A qualitative risk evaluation was conducted to assess the potential explosive safety risk to the public within the Southern Portion of the NWP. The purpose of this risk evaluation is to qualitatively communicate whether a potential explosive risk is present at the site and the primary causes of that potential risk. The risk evaluation presented here is based on historical information presented in prior studies conducted on the Southern Portion of the NWP and data collected during the Congressional Study field work in 2011.

An explosive safety risk exists if a receptor can come near or into contact with an MEC item and interact with it in a manner that results in a detonation. The potential for an explosive safety risk depends upon the presence of three critical elements:

1. A source (such as, presence of MEC); and
2. A human receptor (such as, a person); and
3. The potential for interaction between the source and receptor (such as, the possibility that the item might be picked up or disturbed by the receptor).

All three of these elements must be present for there to be an explosive safety risk. There is no risk if any one element is missing. Each of these three elements provides a basis for implementing necessary risk-management response actions.

The potential risk posed by MEC was characterized qualitatively by evaluating three primary risk factors for the Southern Portion of the NWP site. Factors are related to the three critical elements listed above and are:

1. Presence of MEC: whether there is the potential for MEC to be present at the site; AND
2. Type of MEC: the type(s) of MEC that might be present at the site and the related potential explosive hazards; AND
3. Site Accessibility: the potential receptors at the site and how they might interact with the MEC.

The known or suspected presence of an explosive hazard and any potential human receptors at a site will typically be considered sufficient justification for further action. The following paragraphs describe each of the primary risk factors.

6.2 PRESENCE OF MEC

This factor describes whether or not MEC has been suspected or confirmed to be either on the surface or subsurface of a site. This factor is based on historical information presented in prior studies and observations made during the field work. Note that if there is historical evidence of potential MEC presence at a site, lack of confirmation of MEC presence during the site visit will not be considered as evidence of MEC absence for this

qualitative risk evaluation. ***Table 6*** lists the three possible categories used to describe MEC presence for this evaluation.

Table 6: Categories of MEC Presence

Munitions and Explosives of Concern Presence	Description
Confirmed or suspected	There is physical or confirmed historical evidence of MEC presence at the site, or there is physical or historical evidence indicating that MEC may be present at the MRS.
Small arms only(1)	The presence of small arms ammunition is confirmed or suspected, and there is evidence that no other types of munitions were used or are present at the site.
Evidence of no munitions	Following investigation of the site, there is physical or historical evidence that there are no UXO or DMM present.

(1) Small arms ammunition is defined as "ammunition, without projectiles that contain explosives (other than tracers), that is .50 caliber or smaller or for shotguns" (Department of the Army, 2005).

6.2.1 Type of MEC

This factor describes whether the MEC potentially present at the site might be detonated, resulting in injury to one or more human receptors. If multiple MEC items are potentially present at a site, the item which poses the greatest risk to public health is selected for the purposes of this qualitative risk evaluation. This determination is based on historical information presented in prior studies and observations made during field work. ***Table 7*** lists the three possible categories used to describe MEC type for this evaluation.

Table 7: Categories of MEC Type

Munitions and Explosives of Concern Type	Description
Potentially Hazardous	Fuzed or unfuzed MEC that may result in physical injury to an individual if detonated by an individual's activities.
Small arms only(1)	Small arms ammunition is confirmed or suspected, and there is evidence that no other types of munitions were used or are present at the MRS.
Inert	MD or other items that will cause no injury (such as, training ordnance containing no explosives, fuzes, spotting charges, etc.).

(1) Small arms ammunition is defined as "ammunition, without projectiles that contain explosives (other than tracers), that is .50 caliber or smaller or for shotguns" (Department of the Army, 2005).

6.2.2 Site Accessibility

This factor describes whether human receptors have any access to the site, and therefore, may interact with any MEC that is present at the surface or in the subsurface. For purposes of this qualitative risk evaluation, if MEC is confirmed or suspected to be present at the site, it is assumed that human receptors might come into contact with that MEC unless there is "Complete Restriction to Access." ***Table 8*** lists the two possible categories used to describe site accessibility for this evaluation.

Table 8: Categories of Site Accessibility

Site Accessibility	Description
Accessible	Access control is not complete: residents, site workers, visitors, or trespassers can gain access to all or part of the MRS.
Complete restriction to access	Human receptors are completely prevented from gaining access to the MRS.

6.2.3 MEC Risk Assessment: Southern Portion of the Northwest Peninsula

The risk to public safety associated with the presence of MEC was evaluated for the Southern Portion of NWP. The MEC safety risk results from a combination of the risk factors presented in this section.

Hazardous UXO items were recovered during past field work and have previously been observed during previous efforts (UXO Construction Support, EE/CA, and Flamenco Beach NTCRA). Only a limited percentage of the Southern Portion of NWP was investigated during the Congressional Study; therefore, it is possible that UXO is present in other areas of the Congressional Study boundary. Given confirmation of hazardous UXO presence (surface and subsurface) during field work and public accessibility to the site; the MEC exposure pathway is complete (that is, there is potential MEC risk) at the Southern Portion of NWP.

6.2.4 MEC Hazard Summary

The qualitative MEC hazard evaluation for the Southern Portion of the NWP is summarized in ***Table 9***.

Table 9: MEC Hazard Evaluation

MEC Presence	MEC Type(1)	Site Accessibility	Further Evaluation?
Confirmed	Practice Hand Grenades; Illumination/Flares: from 5-inch 38 naval projectiles; HE Bombs 100 lb, 500lb, 1000lb; Practice bombs; 25 pound, MK 76/BDU-33s, ; Projectile (HE and WP): 20mm, 37mm, 40mm, 75mm; 81mm Mortars; HE Naval Projectiles: 3-in, 5-in, 6-in; Projectile PD Fuzes; Rocket Warheads: 2.75-in, 5-in.	Accessible	Yes

CHAPTER 7. IMPACTS OF UXO REMOVAL

7.1 IMPACT OF MEC REMOVAL ON ANY ENDANGERED AND THREATENED SPECIES AND THEIR HABITATS

The Southern Portion of NWP consists of diverse sensitive habitats including wetlands, a mangrove area, seabird rookeries, and sea turtle nesting sites. Various valuable ecological resources are present or are potentially present within the study area. Such resources include five federally listed threatened or endangered species. Because protected species and habitats are present or potentially present within the Congressional Study area, the Southern Portion of NWP is considered ecologically important. Based on the ecological resources present or potentially present, the primary ecological risk assessment management goal is to sustain the populations of any listed species that occur at the Southern Portion of NWP.

The Congressional Study included an analysis of the various types of habitats prevalent within the Southern Portion of NWP. Such habitat types include: beaches and shores; lagoons; rocky cliffs; open grasslands; closed forest canopy; and legume canopy and grassland understory. The following threatened or endangered species are present or are potentially present within these habitat types: Culebra Island giant anole, Virgin Islands tree boa, Puerto Rican Boa, roseate tern, green sea turtle, hawksbill sea turtle, leatherback sea turtle, Leptocereus grantianus (cactus), and Wheeler's peperomia and Antillean manatee.

Removal of UXO may have an impact on endangered or threatened species and their habitats since vegetation clearance would be required in investigation areas to ensure the safety of munitions response workers. In compliance with the ESA, which requires that any possible impact or harm to endangered species or their critical habitats be minimized, USACE will coordinate with the USFWS and others, as appropriate, to develop conservation measures to limit the impacts before proceeding with any action. The avoidance measures would be employed during response action activities to help ensure that threatened or endangered species and their habitats are identified and when possible, avoided. The estimated time for vegetation regrowth varies between species; however, it has been observed that most plants grow back within 6 to 12 months.

CHAPTER 8. SUMMARY AND CONCLUSIONS

8.1 MEC INVESTIGATION SUMMARY

The risk to public safety associated with the presence of MEC was evaluated for the Southern Portion of NWP. Since 1995, 70 UXO items have been recovered from approximately 19 acres within the Southern Portion of NWP. This equates to approximately 3.7 UXO per acre. During the 2012 Congressional Study the field team recovered and disposed of 36 UXO items and 2,327 pounds of MD.

Based on finding UXO and MD during the Congressional Study the MEC exposure pathway is complete (that is, there is a MEC risk) at the specified authorized areas under Section 1.2.3.

8.2 SUMMARY OF IMPACT OF MEC REMOVAL

Removal of UXO may have an impact on endangered or threatened species and their habitats since vegetation clearance would be required in investigation areas to ensure the safety of munitions response workers. In compliance with the ESA, which requires that any possible impact or harm to endangered species or their critical habitats be minimized, USACE will coordinate with the USFWS and others, as appropriate, to develop conservation measures to limit the damage before proceeding with the action. The conservation measures would be employed during response action activities to help ensure that threatened or endangered species and their habitats are identified and when possible, avoided.

8.3 OVERALL CONCLUSIONS

Based on finding UXO and MD during the 2012 Congressional Study, the MEC exposure pathway for human receptors is complete (that is, there is a MEC risk) at the Southern Portion of NWP.

In addition, the Congressional Study evaluated the potential for complete MC exposure pathways to human and ecological receptors through soil, surface water, and sediment. USACE used the results of the sampling and analysis, EPA's Risk Assessment Guidelines and USACE Risk Assessment Guidance to determine that an unacceptable human health risk from MC would not be expected through exposure to surface water or sediment within the Study Area. Based on the sampling results, exposure in soil, sediment, and surface water may pose an unacceptable risk to ecological receptors within the Study Area. However, PL 113-291 § 317 dictates that the only action allowed in the specified areas is the decontamination of UXO. This authorization does not allow cleanup of other environmental contaminants, including munitions constituents.

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