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ACRONYMS AND ABBREVIATIONS

ACDE	Association of Commercial Diving Educators
AHA	Activity Hazard Plan
APP	Accident Prevention Plan
ARARS	Applicable or Relevant and Appropriate Requirements
ASI	Aqua Survey Inc.
ASR	Archives Search Report
ATS	Analog Test Strip
BDU	Bomb Dummy Unit
BSI	Blind Seed Item
CAP	Contractor Acquired Property
CDSQ	Corporate Director of Safety and Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESAJ	Corps of Engineers, South Atlantic Division, Jacksonville District
CFR	Code of Federal Regulation
CMS	Caribbean Marine Services
CMUA	Concentrated Munitions Use Area
COR	Contracting Officers Representative
CSM	Conceptual Site Model
DA	Department of the Army
DD	Decision Document
DDESB	Department of Defense Explosives Safety Board
DFW	Definable Feature of Work
DGPS	Differential GPS
DID	Data Item Description
DMM	Discarded Military Munitions
DN	Deficiency Notice
DoD	Department of Defense
DQO	Data Quality Objective
EBS	Environmental Baseline Survey
EE/CA	Engineering Evaluation/Cost Analysis
EEG	Ellis Environmental Group, LC
EM	Engineering Manual
EOD	Explosive Ordnance Disposal
EOTI	Explosive Ordnance Technologies, Inc.
EPA	Environmental Protection Agency
EPP	Environmental Protection Plan
EQB	Environmental Quality Board
ESA	Endangered Species Act
ESCA	Endangered Species Conservation Act

ESE	Environmental Science and Engineering, Inc.
ESP	Explosives Site Plan
EZ	Exclusion Zone
FDE	Findings and Determination of Eligibility
°F	Fahrenheit
FLEX	Fleet Exercise
FSW	Feet of Salt Water
FUDS	Formerly Used Defense Site
GFP	Government Furnished Property
GIS	Geographical Information System
GPS	Global Positioning System
GSA	General Services Administration
HE	High Explosive
HTRW	Hazardous, Toxic, and Radioactive Waste
HTW	Hazardous and Toxic Waste
IAW	In Accordance With
IDW	Investigation Derived Waste
IHO	International Hydrographic Organization
INPR	Inventory Project Report
ISO	Industry Standard Object
LDD	Loss/Damage/Destruction
LLP	Lessons Learned Program
MBS	Multibeam Bathymetry Survey
MC	Munitions Constituents
MD	Munitions Debris
MEC	Munitions and Explosives of Concern
MPPEH	Material Potentially Presenting an Explosive Hazard
MRR	Material Receiving Report
MRS	Munitions Response Site
NATO	North Atlantic Treaty Organization
NAUI	National Association of Underwater Instructors
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
O/S/D	Overage/Shortage/Damaged
OSHA	Occupational Safety and Health Administration
PADI	Professional Association of Diving Instructors
Parsons	Parsons Government Services Inc.
PDA	Personal Digital Assistant
PDT	Project Delivery Team
PLS	Professional Licensed Surveyor

PM	Project Manager
POC	Point of Contact
PPE	Personal Protective Equipment
PR	Puerto Rico
PR DNER	Puerto Rico Department of Natural and Environmental Resources
QC	Quality Control
QCP	Quality Control Plan
RAB	Restoration Advisory Board
RCWM	Recovered Chemical Warfare Materiel
RI/FS	Remedial Investigation/Feasibility Study
ROE	Right of Entry
ROV	Remotely Operated Vehicle
RRD	Range Related Debris
RTK-DGPS	real-time kinematic differential GPS
SARA	Superfund Amendments and Reauthorization Act of 1986
SCUBA	Self-Contained Underwater Breathing Apparatus
SI	Site Inspection
SLRA	screening level risk assessment
SS	Snorkeling Supervisor
SSHP	Site Health and Safety Plan
SP	Snorkeling Plan
SOP	Standard Operating Procedure
SSS	Side Scan Sonar
SUXOS	Senior UXO Supervisor
TIFF	Tagged Image File Format
TM	Technical Manager
TP	Technical Paper
TPP	Technical Project Planning
USACE	U.S. Army Corps of Engineers
USAESCH	U.S. Army Engineering and Support Center, Huntsville
USA	USA Environmental, Incorporated
USBL	Ultra Short Baseline
USCG	United States Coast Guard
USFWS	U.S. Fish and Wildlife Service
U/W	Underwater
UXO	Unexploded Ordnance
UXOQCS	Unexploded Ordnance Quality Control Specialist
UXOQCS/SO	Unexploded Ordnance Quality Control Specialist/Safety Officer
UXOSO	Unexploded Ordnance Safety Officer
UXOTII	Unexploded Ordnance Technician II
UXOTIII	Unexploded Ordnance Technician III
VSP	Visual Sampling Plan
WP	Work Plan

1.0 INTRODUCTION

This Work Plan (WP) describes Phase 3 field activities planned for the Remedial Investigation (RI) of the underwater (U/W) areas surrounding Munitions Response Site (MRS) 07 Culebrita Artillery Impact Area Water Acreage and all Cayos of MRS 02, on the island of Culebra, Puerto Rico (PR). The RI consists of U/W surface and subsurface investigation of transects, to determine the extent of hazards posed by Munitions and Explosives of Concern (MEC) and Munitions Constituents (MC).

1.1 PROJECT AUTHORIZATION

Parsons Government Services Inc. (Parsons) has prepared this Phase 3 WP for the intrusive investigation of underwater DGM anomalies for MRS 07 Culebrita Artillery Impact Area Water Acreage and all Cayos of MRS 02, Culebra, PR (Formerly Used Defense Site [FUDS] Project Number I02PR0068) under Contract No: W912DY-09-D-0062, Task Order No. 0010, from the U.S. Army Engineering and Support Center, Huntsville (USAESCH).

1.2 PURPOSE AND SCOPE

This RI is being performed under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and is part of the overall Remedial Action process. The primary purpose and scope is to perform a U/W RI. The U/W investigation is to determine the nature and extent of possible contamination of Material Potentially Presenting an Explosive Hazard (MPPEH)/MC located both on and below the surface of the seafloor resulting from Department of Defense (DoD) use. The end goal is to gain acceptance of a Decision Document (DD) for the areas investigated.

The U/W operations at each site will commence at the shoreline, and extend seaward to the MRS boundary within the MRS 02 and MRS 07 water areas. This WP outlines the U/W operations within the MRS 02 and 07 boundaries which will be completed during Phase 3 of the work. Phases 1 and 2 have already been completed under previously submitted and approved WPs.

Phase 1 consisted of an Environmental Baseline Survey (EBS) with EBS Report. The Phase 1 fieldwork was completed in October 2013. Phase 1 was separated into two different tasks and mobilizations which are referred to as Phase 1A and Phase 1B.

Phase 2 consisted of U/W investigation by geophysical survey. The Phase 2 fieldwork was completed in August 2015. Results of the geophysical surveys are incorporated into this Phase 3 WP and will be included in the RI Report.

Phase 3 will consist of U/W Intrusive Investigations of the geophysical anomalies identified during Phase 2 and marine sediment sampling to determine the nature and the extent of MEC/MC contamination within the MRS's.

All activities involving work in areas potentially containing MEC hazards will be conducted in full compliance with USAESCH, U.S. Army Corps of Engineers (USACE), Department of the Army (DA), and DoD requirements regarding personnel, equipment, and procedures, and with Occupational Safety and Health Administration (OSHA) Standard 29 Code of Federal Regulation (CFR) Part 1910. In addition, all activities will be conducted in accordance with "Final Supplemental Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat (Addendum 1), DERP-FUDS Property No. I02PR0068, Culebra, Puerto Rico (CESAJ, February 2015)", found in Appendix J.

1.3 WORK PLAN ORGANIZATION

1.3.1 GUIDANCE DOCUMENTS

This WP follows the directions of Engineer Manual (EM) 200-1-15 and the Data Item Descriptions (DIDs) listed in Table 1-1.

Table 1-1: Data Item Descriptions

DID	DID Title
WERS-001.01	Work Plans
WERS-002.01	Explosives Management Plan
WERS-003.01	Safety Submission
WERS-004.01	Geophysics
WERS-005.01	Accident Prevention Plan
WERS-007.01	Geospatial Information and Electronic Submittals
WERS-008.01	Property Management Plan/Property Management Control System
WERS-009.01	Munitions Constituents Chemical Data Quality Deliverables
WERS-011.01	Accident / Incident Reports
WERS-012.01	Personnel Qualifications Certification Letter
WERS-014.01	Reports / Minutes, Record of Meeting
WERS-015.01	Telephone Conversations / Correspondence Records
WERS-016.02	Periodic Status Report

1.3.2 WP ORGANIZATION

This WP has been divided into Chapters 1 through 10 with associated documents provided either as appendices herein or as standalone documents. Together, the WP and associated documents present the project history, work elements, and requirements in an organized manner. Table 1-2 describes the general structure and organization of this WP. References are frequently made between various sections in the WP and the associated documents.

Table 1-2: Work Plan Structure

Chapter Number	Descriptor	Information
1	Introduction	A statement of the project objectives, project authorization, purpose and scope; summary of work plan organization, project location, and site descriptions.
2	Technical Management Plan	Summary of project objectives, project organization, communication and reporting, project deliverables, project schedule, public relations support, subcontractor management, and management of field operations.
3	Field Investigation Plan	Describes the approach and procedures that will be followed in performing the intrusive investigation of the DGM survey completed during Phase 2, and reporting activities, and includes discussion of project goals, data quality objectives.
4	Quality Control Plan	Describes the standard processes that will be used to monitor, inspect, and control daily field activities to ensure quality performance, processes to correct quality issues, quality control of contract deliverables, and QC reporting requirements.
5	Explosives Management Plan	The Explosives Management Plan will be used to provide details for management of explosives in accordance with applicable regulations.
6	Environmental Protection Plan	Describes the approach, methods and operational procedures that will be employed during onsite activities to protect the natural environment.
7	Property Management Plan	Describes how Government Furnished Property (GFP) and Contractor Acquired Property (CAP) will be managed.

Chapter Number	Descriptor	Information
8	Interim Holding Facility Siting Plan for Recovered Chemical Warfare Materiel	This chapter is not used. The Interim Holding Facility Siting Plan for Recovered Chemical Warfare Materiel is not required for this Task Order.
9	Physical Security Plan for Recovered Chemical Warfare Sites	This chapter is not used. The Physical Security Plan for Recovered Chemical Warfare Sites is not required for this Task Order.
10	References	Citation of documents referenced within this Work Plan

1.4 PROJECT LOCATION

The project location is the U/W areas surrounding MRS 07 (Cayo Culebrita) and MRS 02 (Cayo Lobo, Cayo Lobito, El Mono, Cayo del Agua, Cayo Yerba, Cayo Raton, Cayo Alcarraza, Cayo Los Gemelos, Cayo Piedra Stevens, Cayo Tiburon, Cayos Geniqui, and Cayo Sombrerito), all located off the northern, western and eastern coasts of Culebra Island.

1.5 SITE DESCRIPTION

1.5.1 LOCATION

The site location is described in Section 1.4 and shown in Figure 1-1.

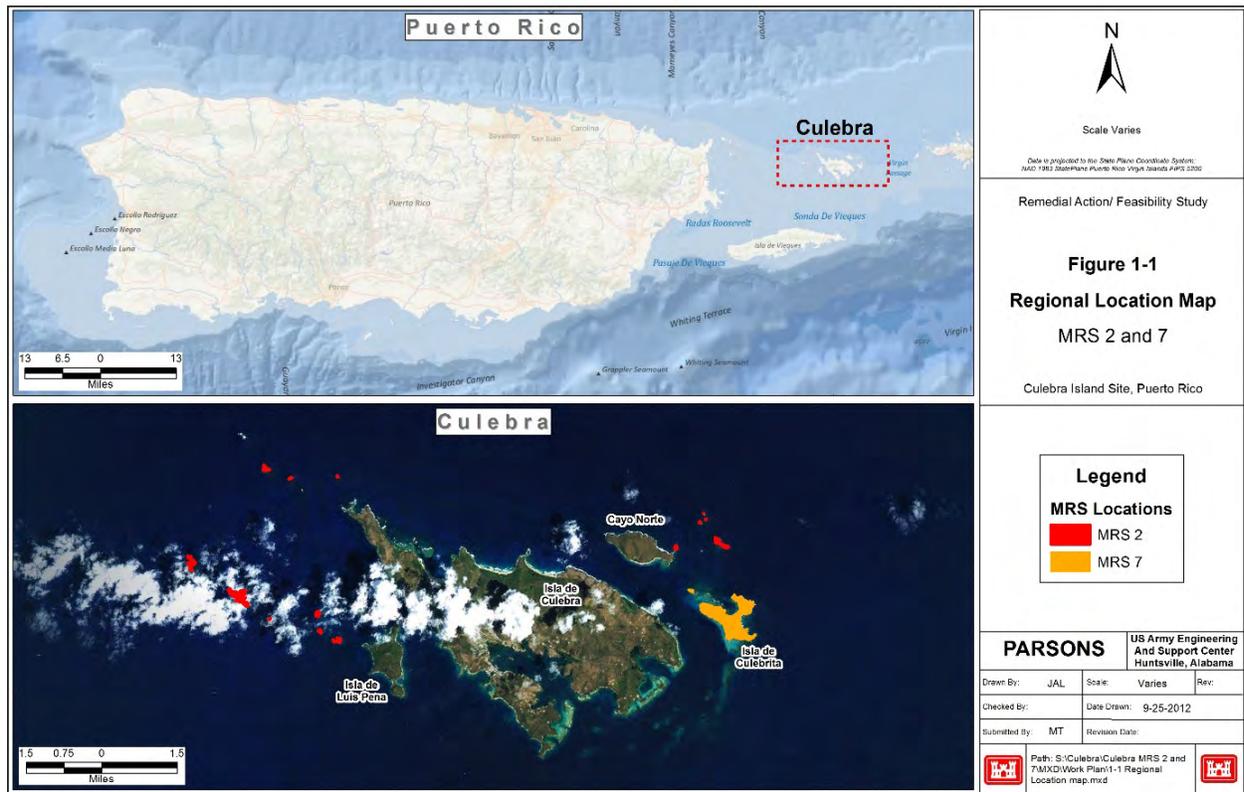


Figure 1-1: Location Map of MRSs 07 and 02 Boundaries

1.5.2 GEOLOGY

The Culebra Islands are underlain by both intrusive and extrusive volcanic rock of Upper Cretaceous age. The volcanic rock exhibits little or no porosity because of compaction and filling of the pores with quartz and calcite. Open fractures make up the vast majority of the porosity and permeability of the volcanic bedrock (USEPA, 1985).

Cayo Culebrita (MRS 07) is comprised of sandy beaches, irregular rugged coastlines and steep hills.

Most of the MRS 02 Cayos are smaller islands comprised of solid volcanic rock.

1.5.3 CLIMATE

The weather on Culebra Island is generally warm year round due to its tropical marine climate. Yearly average rainfall is approximately 37 inches. The months of August through November are considered the wet season, and the driest months are January through April. The average daily temperatures are 80 degrees Fahrenheit (°F); the average maximum is 86 °F with 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. Yearly average wind speed is 8 knots. Hurricane season is June through November, and severe hurricanes hit Culebra every 10 to 20 years. The yearly average rainfall for Culebra is provided in Table 1-3 (source: www.weather.com).

Sea state is often the limiting factor for marine operations. During the Phase 1A fieldwork, conducted during the month of June of 2013, the combination of wave swells and waves generated by winds did not impact the field work as the winds averaged 10 to 14 knots. However, for Phase 1B (August 2013), the winds averaged 15 to 20 knots, creating small craft warnings for the duration of the project. During Phase 2, weather conditions remained at 15 to 20 knots throughout the project (May – August 2015). A total of 25 weather days out of 59 scheduled field days occurred (42% weather days) during the length of Phase 2. To take full advantage of the weather conditions, the field teams worked on the lee of the islands when the sea state was high, and when the sea state was light or moderate, the field teams concentrated their efforts on the windward side of the cayos. This same approach will be used during the Phase 3 field work.

Table 1-3: Average Rainfall, Culebra Island

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
mm	48.6	34.6	37.7	51.7	91.2	80.9	78.5	98.2	119.1	122.6	104.2	62.8	931.1
inches	1.9	1.4	1.5	2.0	3.6	3.2	3.1	3.9	4.7	4.8	4.1	2.5	36.7

1.5.4 SENSITIVE ENVIRONMENTS

1.5.4.1 Threatened and Endangered Species

The main island of PR and its associated islands support 82 federally listed threatened and endangered species consisting of 33 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 archipelago. Of the 82 federally listed species, 16 are known, or are suspected, to occupy Culebra Island and/or the associated cayos. In addition to the federally listed species, two state-listed species are known to occupy Culebra Islands. The federally and state-listed species include both terrestrial and marine life. The federally listed species of most concern for the wildlife refuge are the green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricate*), leatherback sea turtle (*Dermochelys coriacea*), and loggerhead sea turtle (*Caretta caretta*). Due to declining populations, Pillar Coral (*Dendrogyra cylindrus*), Rough Cactus Coral (*Mycetophyllia ferox*), Lobed Star Coral (*Orbicella annularis*), Mountainous Star Coral (*Orbicella faveolata*), and Boulder Star Coral (*Orbicella franksi*) (genus *Orbicella* formerly known as *Montastrea*) Elkhorn Coral (*Acropora palmata*) and Staghorn Coral (*Acropora cervicornis*) are listed as threatened species.

1.5.4.2 Conservation Priority Areas

According to the PR Department of Natural and Environmental Resources (PR DNER) and the 2005 Puerto Rico Comprehensive Wildlife Conservation Strategy, the conservation priority areas for Culebra and associated cayos are as follows:

- Designated Critical Habitat
- All of the lagoons on Culebra
- All beaches around Culebra
- Flamenco Peninsula
- Punta Soldado
- Ensenada del Cementerio
- Puerto del Manglar
- Los Caños
- Culebra's surrounding islets (cayos)
- The Canal Luis Peña Marine Reserve.
- Resaca Mountain

1.6 SITE HISTORY

Spain ceded all of PR to the United States in 1898 following the Spanish American War. The public lands in the Culebra Island Archipelago were placed under the control of the U.S. Department of Navy in 1901. The Culebra Island Archipelago was used for training purposes by the U.S. Navy and U.S. Marines, and was later used by the North Atlantic Treaty Organization. The U.S. Marines used portions of Culebra Island as a training facility from 1902 through 1941. Culebra Island was used as a bombing and gunnery range from 1935 through 1975. To support the increased training needs during Vietnam operations, the Navy acquired additional training areas on cayos east and west of Culebra Island for use as air-to-ground ranges. Live ordnance operations reached their peak in 1969, as the fleet was training pilots for Vietnam. Aircraft bombing and strafing of the Flamenco Peninsula ended around 1970, while the use of live rounds for naval gunfire support training ended in 1971. Subsequent naval support training was conducted using quieter practice rounds until ordnance use was terminated on September 30, 1975. Between 1975 and 1982, the facilities were turned over to the General Services Administration.

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 site includes municipal, residential, and recreational areas. Most of the main island of Culebra, as well as Cayo Norte, are privately owned, while the surrounding cayos are managed by the U.S. Fish and Wildlife Service (USFWS). The PR DNER also manages land and adjacent water areas on Culebra. The following references provide a more complete description of the U.S. military's training events and the munitions used on Culebra and the surrounding cayos: Supplemental Archives Search Report for Culebra, Puerto Rico, Project No. I02PR0068 (USACE, 2005) and Site Inspection Report, Culebra Island Site, Puerto Rico (Parsons, 2007). Additional references can be found in Section 10. Historical findings for the project sites (MRS 02 and MRS 07) are summarized in Section 1.8.

1.7 LAND USE

A real estate map showing the parcels transferred to the Department of Interior (USFWS) and the Commonwealth of Puerto Rico (PR DNER) by the US DoD is provided in Appendix B: Figure B-27. The land use was identified by parcels with the cayos to be utilized only for conservation/preservation of resources, Public Park, or public recreational purposes. No change in property ownership or change in use for MRS 02 Cayos or for MRS 07 is anticipated. Any additional land/property within the MRSS associated with this WP is subject to the land use restrictions established by the Puerto Rico Planning Board and the Culebra Conservation and Development Authority.

1.7.1 MRS 07 CULEBRITA ARTILLERY IMPACT AREA WATER ACREAGE

The Cayo is managed by the USFWS and PR DNER as part of the Culebra NWR. Residential areas do not exist on Culebrita; however, many people visit by boat, the beach and water areas of the MRS. Boaters use the mooring field or anchor inside and outside of the bay. Recreational activities such as fishing, swimming, snorkeling, and Self-Contained Underwater Breathing Apparatus (SCUBA) diving are conducted within the MRS water boundaries. The Culebrita Lighthouse is the only structure on Culebrita; however, it functions as a historical attraction and is not occupied.

1.7.2 MRS 02 SURROUNDING CAYOS

MRS 02 Cayos are managed by the USFWS as part of the Culebra NWR. Residential areas do not exist on any of these islands. Most of the cayos are inaccessible due to steep terrain from the water's edge. SCUBA divers frequently access the water acreage surrounding these cayos.

1.8 PREVIOUS INVESTIGATIONS OF THE SITES

The summaries below provide previous investigation information relevant to MRS 07 and MRS 02. All of the projects listed in this section were land based investigations.

1.8.1 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, was formerly used by the DoD and that it was eligible for the Defense Environmental Restoration Program (DERP).

1.8.2 1995 ARCHIVES SEARCH REPORT

The 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 Cayo Botella, Cayos Geniqui, and Cayo Del Agua.

1.8.3 1997 FINAL ENGINEERING EVALUATION / COST ANALYSIS

In April 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 Flamenco Peninsula, Isla Culebrita, Cayo Botella, Cayo del Agua, Cayo Lobo, and Cerro Balcon. MEC were found in all areas except Cayo Lobo and Cerro Balcon, where only MD was identified.

1.8.4 2004 ARCHIVES SEARCH REPORT SUPPLEMENT

The ASR Supplement was completed by the USACE Rock Island District as an addition to the 1995 ASR (USACE, 2004a). This report provides details of aerial training conducted by the Navy between 1935 and 1975 and identifies the following range areas applicable to this contract:

- Cayo Tiburon (MRS 02) was used as a bombing and rocket target. Suspected ordnance includes MK82 general purpose 500-pound HE bombs and 5-inch Zuni rockets. 75mm Projectiles are also documented as being used on Cayo Tiburon during Fleet Exercise (FLEX) #2 and FLEX #5.
- Cayo Geniqui (MRS 02) was used as a bombing and rocket target. Suspected ordnance includes MK82 general purpose 500-pound HE bombs and 5-inch Zuni rockets. Cayo Geniqui was also a target within the Culebrita Torpedo Range. Firing at this range from the water north of Culebrita targeted the sheer cliffs of Cayo Geniqui. Suspected munitions include the Navy's general torpedo. During FLEX #2 and #5, 75mm projectiles were documented as used on Cayo Geniqui and at water borne targets within Impact Area #1 (which includes Cayo Geniqui).

- Cayo Geniqui (MRS 02) Torpedo Range: US Navy conducted torpedo firing exercises from the northeast of Cayo Geniqui targeting the steep underwater cliffs of Cayos Geniqui on the Northern side of the cayo. Suspected munitions include: MK 14-3A/MK 16-6/MK 16-7/MK 27-4/MK 28-3/MK 15 torpedoes.
- Cayo Botella (MRS 07) was used as bombing and rocket target. Suspected ordnance includes MK82 general purpose 500-pound HE bombs, 6-inch projectiles and 5-inch Zuni rockets.
- Culebrita Strafing Range (MRS 07): This strafing range target was located on the north side of Culebrita and is part of MRS 07. Suspected munitions include general small arms, .50-caliber small arms, and MKI 20mm HEI. Though Culebrita was used as a strafing range, it may have been impacted by the MK 82 general purpose 500-pound HE bombs and the other listed munitions for Cayo Botella due to Cayo Botella's close proximity to Culebrita underwater acres.
- Culebrita (MRS 07) Torpedo Range: The US Navy conducted torpedo firing exercises east of Culebrita firing towards Marc Point. Suspected munitions include: MK 14-3A/MK 16-6/MK 16-7/MK 27-4/MK 28-3/MK 15 torpedoes.
- Los Gemelos (MRS 02) was used as a target for aerial bombs and rockets. Munitions included MK80s series general purpose bombs, 5-inch Zuni rockets, and MK8 5-inch practice rockets. During exercises and training conducted in 1922; 3-inch, 7-inch, 8-inch, 37mm, 75mm and 155mm guns, were used targeting the cayo.
- Alcarraza (MRS 02) was used as a target for aerial bombs and rockets. Suspected munitions include MK80s series general purpose bombs, and 5-inch Zuni rockets. During exercises and training conducted in 1922, 3-inch, 7-inch, 8-inch, 37mm, 75mm and 155mm guns were used targeting the cayo.
- Cayo Lobo (MRS 02) was used as a strafing and bombing target. Munitions included general small arms, .50-caliber small arms, MK80s series general purpose bombs, 25 pound Bomb Dummy Unit (BDU) 33 practice bombs, 5 pound MK 106 practice bombs, and 20 mm MK I HEI projectiles.
- Cayo del Agua (MRS 02) was used as a target for bombing and rocket fire. Munitions include MK80s series general purpose bombs and 2.75-inch rockets. In addition, during the ASR Site visit (USACE, 2004), the EE/CA (ESE, 1997), and the Site Inspection (SI) (Parsons, 2007), an MK 76 practice bomb, a 76mm projectile, and evidence of aircraft flares were located. Local residents provided a report indicating a 12 to 16 inch diameter munition in the water off of Cayo del Agua during the ASR interviews (USACE, 2004).
- Cayo Raton (MRS 02) may have been used as an artillery target for 76mm projectiles. Local residents provided a report indicating a 12 to 16 inch diameter munition was seen in the water off of Cayo Raton during the ASR interviews (USACE, 2004).
- Cayo Yerba (MRS 02) was used as a target for bombing and artillery practice. Suspected munitions use included MK 80 series bombs and 76mm projectiles. Local residents provided a report indicating a 12 to 16 inch diameter munition was seen in the water off of Cayo Yerba during the ASR interviews (USACE, 2004).
- Cayo Lobito (MRS 02) the ASR had no historical MEC information for Cayo Lobito.
- Cayo Sombrerito (MRS 02) has no historical MEC information listed within the ASR.
- EL Mono (MRS 02) was used as a target for 75mm and 155mm howitzers (nomenclature was not specified in historical documents; however, an explosive weight of 15.4 pounds of TNT was identified in the EE/CA, dated March 1997.
- Piedra Stevens (MRS 02) may have been used for DoD munitions training; however, there is no historical evidence. It is near the Northwest Peninsula and Los Gemelos and may have had similar munitions dropped or fired at it. MK80 series general purpose bombs, 5-inch Zuni Rockets, and MK8 5 inch practice rockets may be among the munitions used.

1.8.5 2005 REVISED INVENTORY PROJECT REPORT

A Revised INPR was completed in June 2005 (USACE, 2005b). The Revised INPR further clarified the military use of the Island of Culebra and divided the original site, Property No I02PR0068, into 14 separate MRSs. One hazardous and toxic waste (HTW) project was identified and assigned the number 00, and 13 Military Munitions Response Program (MMRP) project areas were identified and assigned Risk Assessment Code (RAC) scores.

1.8.6 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 (USACE, 2005c). 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 SI. This document provided a detailed summary of military activities conducted on Culebra Island and the surrounding cayos. The document summarizes planned and/or executed maneuvers and training conducted at the site, including specific time periods, locations, and munitions used. The terrestrial boundaries for MRS 07 coincide with the leased Impact Area #1 identified in the Supplemental ASR (USACE, 2005). Historical documents identified this portion of Culebrita as having been the main artillery impact area used by the Marine Corps during their training exercises. They also used it as a boat firing target. Additionally, the site was used as a Navy aerial strafing target. Ladrón Cay (Cayo Botella) was used by the Navy as a bombing target. Appendix B: Maps, Figure B-21, identifies the target impact areas.

1.8.7 2009 NON-TIME-CRITICAL REMOVAL ACTION (NTCRA)

Ellis Environmental Group, LC (EEG), under contract to the USAESCH, provided non-time-critical removal operations on Culebra Island and adjacent cayos in PR. The areas included in this surface clearance were: Cerro Balcon, Culebrita, and the adjacent cayos, including Cayo Botella, Cayo Tiburon, Los Gemelos, Cayo del Agua, Cayo Geniqui, Cayo Lobo, and Cayo Alcarraza. The activities and results of the NTCRA for Culebrita and the Cayos are summarized as follows:

- Culebrita: The field work scheduled for the site focused on 82 acres in the northwest sector of the island formerly used as a strafing range. Field work was not completed as planned for the lack of an approved explosives safety submittal in time for the field work to be started.
- Cayos: Cayo Botella, Cayo Alcarraza, Cayo Los Gemelos, Cayo Lobo, Cayo del Agua, Cayo Tiburon, and Cayo Geniqui were recommended for surface clearance. The following MEC items were located within the search areas of the NTCRA: BDU33 25-lb practice bombs, MK106 5-lb practice bombs, 5-inch 54 MK41 projectile.

1.8.8 2009 NON-TIME CRITICAL REMOVAL ACTION (NTCRA) CULEBRITA AND CULEBRA BEACHES

USA Environmental, Inc. (USAE), under contract to the USAESCH, provided non-time-critical removal operations on Culebrita and Culebra beaches. The areas included Flamenco Beach and Culebrita beaches A through E (see Figure 1-2).

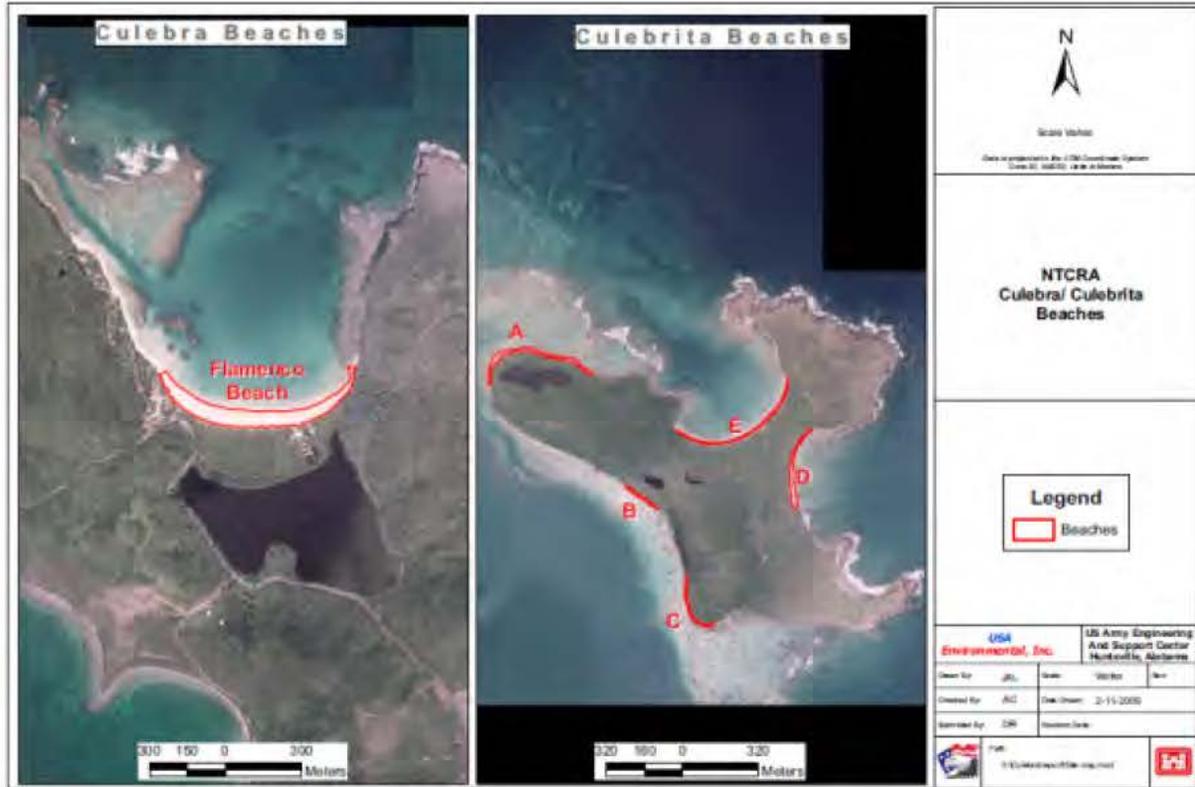


Figure 1-2: Beach Areas in which the NTCRA Field Work was Conducted

The following table (Table 1-4) provides the MEC/MPPEH/MD results for the Culebrita beaches NTCRA.

Table 1-4: MEC/MPPEH/MD Results for the Culebrita Beaches NTCRA

Culebrita Beach A	
Identification	Quantities
20mm MD	3
75mm MD	9
20mm MEC	6
20mm MPPEH	6
Culebrita Beach B	
No MD/MEC/MPPEH discovered	
Culebrita Beach C	
No MD/MEC/MPPEH discovered	
Culebrita Beach D	
No MD/MEC/MPPEH discovered	
Culebrita Beach E	
No MD/MEC/MPPEH discovered	

1.8.9 2007 SITE INSPECTION

Parsons conducted a SI to determine whether the Culebra Island FUDS warranted further investigation under the MMRP (Parsons, 2007). Due to the presence of MEC and MD observed during previous investigations and during the SI field visit, 12 of the 13 MRSs at the Culebra Island FUDS were recommended to proceed to an RI/FS. MRS 02 and MRS 07 were recommended to proceed to an RI/FS.

1.8.10 2013 REMEDIAL INVESTIGATION

Explosive Ordnance Technologies, Inc. (EOTI) conducted a RI for MRS 02 - Cerro Balcon and Adjacent Cays, MRS 04 – Flamenco Lagoon Maneuver Area, MRS 05 – Mortar and Combat Range Area, and MRS 07 – Culebrita Artillery Impact Area.

RI fieldwork was conducted from 11 October 2010 to 25 March 2011, in accordance with the approved Final MMRP WP (EOTI, 2010) and decisions made during technical project planning (TPP) sessions. The fieldwork included geophysical investigations, during which surface and subsurface metallic anomalies were investigated along predefined transects throughout MRS 04,

No investigations were conducted in MRS 02 due to the lack of rights-of-entry (ROE) in the Cerro Balcon area and the inability of field teams to access the cayos, which comprise the remainder of MRS 02. The cayos are difficult to access due to steep terrain, the potential for rough seas, and inadequate landing areas. The field teams attempted access to the cayos but were deterred by severe weather conditions. While access to all of the cayos is prohibited, Cayo Lobo and Cayo Yerba are more accessible than the other cayos by recreational users (trespassers).

During the investigation of MRS 07, 49 pieces of MD were found, totaling 43 pounds. MD included items associated with mortars, 3-inch projectiles, 20mm projectiles, flares, fuzes, small arms ammunition, and unidentifiable fragments. MEC discoveries consisted of a MK 5 Mod 0 rocket and a Charge, Demolition, Flex Linear, MK 8. The investigation confirmed that MD and MEC were located on the surface and in the subsurface of MRS 07.

1.9 PREVIOUS UNDERWATER VISUAL SURVEY DATA

Phase 1: The primary purpose and scope of the EBS (EBS Report completed in April 2014) was to perform an in-depth study designed to gather the data necessary to determine the U/W habitat within MRSs 07 and MRS 02 cayos (water areas) for use in subsequent phases of a RI/FS (Phases 2 and 3). The EBS was not to perform an in-depth biological study; rather, it was to document the conditions in the actual area where the RI activities would take place. The results of the EBS Report were presented during the TPP Meeting held on 16 January 2014. Included in the EBS Report is data related to MPPEH that was observed during EBS field activities. MPPEH data will be included in the overall RI evaluation and associated qualitative MEC hazard assessment.

The following EBS field activities were conducted:

- Phase 1A: Hydrographic Surveys (Deployment of Multi-beam Bathymetry and Side Scan Sonar systems); Field work was completed in June 2013.
- Phase 1B: U/W Visual Surveys (U/W Video/still camera systems and snorkeling); Field work was completed in August 2013.

Phase 2: A DGM survey utilizing the transect design developed from Phase 1 was completed in accordance with the approved Phase 2 WP. Transect acreage that was not completed due to severe weather conditions or due to the shallow water depth along transect segments was deferred to Phase 3 for completion. The DGM survey post analysis of the data identified the presence or absence of potential target areas within the MRS water acres. The potential target areas were further evaluated to facilitate the development of a Field Investigation Plan for the intrusive investigation work and MC assessment for MRS 02 and 07. The Phase 3 WP's Field Investigation Plan is required to complete the characterization of the MRSs and determine the nature and extent of any MEC/MC contamination.

- Phase 2 mobilization was started on May 28, 2015 and was completed on June 5, 2015.
- Phase 2 field work commenced on June 6, 2015 and was completed on August 17, 2015.
- Phase 2 demobilization was completed on August 19, 2015.

All activities involving work in areas potentially containing MEC hazards were conducted in full compliance with USAESCH, USACE, DA, and DoD requirements regarding personnel, equipment, and procedures, and with OSHA Standard 29 CFR Part 1910. In addition, field personnel adhered to the established *USACE Final Standard Operating Procedure for Endangered Species and Conservation and Their Critical Habitat During Underwater Investigations with Addendum 1, DERP-FUDS Property No. I02PR0068, Culebra Island, Puerto Rico* (CESAJ, February 2015).

1.10 INITIAL SUMMARY OF HAZARD FROM MEC

1.10.1 MRS 07 CULEBRITA ARTILLERY IMPACT AREA WATER ACREAGE

MRS 07 includes the northern portion of Culebrita as well as Cayo Botella. The Marines used this 375-acre area as an artillery impact area between 1936 and the late 1940s. The United States and the United Kingdom used Cayo Botella for an aircraft bombing/rocket target in 1969. Munitions suspected of being used on MRS 07 include: 20mm projectiles, MK 44 and MK 45 flares, live and practice bombs up to 500 pounds, 3-inch and 6-inch projectiles, mortars, 5 inch Zuni rockets, 2.75-inch rockets, small arms ammunition as well as British bombs and rockets. The surrounding waters of Cayo Botella and Culebrita were included as part of the Impact Area #1 and 75mm Impact Area in which 75mm projectiles were documented as used. Culebrita beaches are used recreationally, and many boats visit the island each year therefore human receptors are potentially exposed to MEC in the underwater acres. Depth of water has some limiting factor by adding barrier to overcome, i.e., the deeper the water, the more significant the barrier. The water acreage surrounding MRS 07 experiences rough sea conditions and high tidal currents. In the unconsolidated sediment areas, these conditions increase the likelihood of exposing MEC that was previously buried below the marine sediment or covering up MEC that might have been exposed. In addition, the heavy sea conditions and significant storm events may cause the migration of MEC from its original location of impact or reported point of discovery.

1.10.2 MRS 02 SURROUNDING CAYOS

MRS 02 includes the surrounding islands of, Cayo Lobo, Cayo Lobito, El Mono, Cayo del Agua, Cayo Yerba, Cayo Raton, Alcarraza, Los Gemelos, Piedra Stevens, Cayo Tiburon, Cayos Geniqui, and Cayo Sombrerito, encompassing approximately 660 acres. The Navy conducted fleet maneuvers and FLEXs on MRS 02 between 1923 and 1941. During these exercises, the surrounding cayos were heavily bombarded with high-explosive bombs, projectiles, and rockets, as well as illumination and practice rounds. Training continued through the 1950s and 1960s, and in the early 1960s, aerial bombardment was expanded from Los Gemelos and Alcarraza to most of the cayos on the east and west side of Culebra. Training continued until 1975. There are beach areas which residents and tourists may visit, limiting the exposure to the shallow waters to a large population of recreational users. However, when conditions allow, the cayos are visited by SCUBA Divers, snorkelers, and fishermen. Therefore, human receptors are potentially exposed to MEC in the underwater acres of MRS 02. Depth of water has some limiting factor by adding a barrier to overcome, i.e., the deeper the water, the more significant the barrier. The water acreage surrounding the cayos experiences rough sea conditions and high tidal currents. In the unconsolidated sediment areas, these conditions increase the likelihood of exposing MEC that was previously buried below the marine sediment or covering up MEC that might have been exposed. In addition, the heavy sea conditions and significant storm events may cause the migration of MEC from its original location of impact or reported point of discovery.

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2.0 TECHNICAL MANAGEMENT PLAN

2.1 OBJECTIVES

The purpose of the Technical Management Plan is to provide the approach and procedures that will be used to manage the tasks required to meet the project objectives. Detailed descriptions of the field tasks for this project are provided under separate chapters and appendices of this WP that include the processes and procedures for: intrusive investigation, MC marine sediment sampling, and the treatment of MD and MEC.

2.2 PROJECT ORGANIZATION

Close coordination and cooperation between the stakeholders, community, regulators, and technical support personnel will ensure successful project completion. Table 2-1 details the key project entities and the roles these organizations occupy in the project.

Table 2-1: Key Project Organizations

Organization	Responsibility Category
USAESCH	Project Management, Implementing District,
Corps of Engineers, South Atlantic Division, Jacksonville District (CESAJ)	Project Management, Geographical District
Parsons and Subcontractors	Project Management, Contractor
PR Environmental Quality Board (PREQB)	Regulator/Review and concurrence of WP and reports
NOAA-NMFS	Stakeholder/Review of WP and reports
NOAA	Stakeholder/Review of WP and reports
USFWS	Stakeholder/Review of WP and reports
PR DNER	Stakeholder/Review of WP and reports
US Environmental Protection Agency (USEPA)	Stakeholder/Review of WP and reports

2.2.1 USAESCH

USAESCH, the implementing agency for execution of the project, provides technical expertise for MEC and MC activities, and serves as the Contracting Officers Representative (COR) for conducting the RI/FS. USAESCH responsibilities include procurement and direction of the prime contractor and the coordination of document reviews and approvals. USAESCH is also responsible for quality assurance (QA) of the contractor's adherence to the Performance Work Statement (PWS) and controlling the budget and schedule.

2.2.2 CESAJ

CESAJ is the Project Manager (PM) for the RI/FS project. CESAJ's responsibilities include the review of project plans and documents, obtaining rights of entry (ROE) to properties in the work area, working with the news media and the public, and coordinating with federal, state, and local stakeholders on issues pertaining to implementation of this project and protection of ecological and cultural resources.

2.2.3 PARSONS

Parsons is the prime contractor to USAESCH for this project. Parsons will provide staff to perform all aspects of fieldwork and provide oversight of field activities. Parsons will assign project personnel based on management and technical experience and abilities. Parsons will subcontract to USAE who will tier subcontract Caribbean Marine Services (CMS) for logistical and boat support. Should additional underwater DGM surveys be required, USAE will tier subcontract Aqua Survey, Inc. (ASI). Parsons will

prepare and submit data reports in accordance with (IAW) relevant USACE guidance and applicable DIDs. The Parsons PM is Ms. Patricia Berry.

2.2.4 PROJECT REGULATORS/STAKEHOLDERS

The stakeholders are the individuals and organizations directly impacted by the RI/FS activities and the utilization of the resulting RI/FS Report data. Stakeholders include (but are not limited to) PR EQB (Regulator), PR DNER, USFWS, USEPA, NOAA-NMFS, NOAA, and Culebra NWR, who participate in the TPP process.

2.3 CONTRACTOR MANAGEMENT TEAM

2.3.1 PROJECT MANAGER

The Parsons PM (Ms. Patricia Berry) is responsible for monitoring overall progress of the Task Order, preparing and submitting monthly progress reports, and ensuring that resources are available. The PM maintains close communication with USAESCH to assess USAESCH satisfaction with Parsons' performance on this Task Order.

2.3.2 PROJECT SAFETY OFFICER

The Project Safety Officer (Mr. Ed Grunwald) is responsible for reviewing and updating the Accident Prevention Plan (APP) and verifying compliance with the plan. The Project Safety Officer is the contact for regulatory agencies on matters of health and safety. The Project Safety Officer verifies compliance with the APP and Site Safety and Health Plan (SSHP) by auditing project activities and instituting corrective actions.

2.3.3 PROJECT QUALITY CONTROL MANAGER

The Project QC Manager (Mr. Robert Crowover) is responsible for reviewing and updating the Quality Control Plan (QCP) and verifying compliance with the plan. The Project QC Manager verifies compliance with the QCP by auditing project activities and instituting corrective actions.

2.3.4 TECHNICAL MANAGER (TM)

The TM (Mr. Tom Bourque) provides logistical support for all field activities in addition to providing technical and report writing support to ensure the technical quality of deliverables to USAESCH. The TM coordinates field activities with the U/W Investigation Team(s) and second tier subcontractors.

2.3.5 PROJECT ENGINEER

The Project Engineer (Mr. Brian Skubin) provides logistical support for all field activities, in addition to providing technical and report writing support to ensure the technical quality of deliverables to USAESCH.

2.3.6 GEOGRAPHICAL INFORMATION SYSTEMS (GIS) MANAGER

The GIS Manager (Mr. Jeff Lewis) is responsible for management and control of the project GIS. The GIS Manager will direct GIS operations occurring locally and remotely, and is responsible for control of data included in and used as part of the project GIS.

2.3.7 PROJECT GEOPHYSICIST

The Project Geophysicist (Mr. Al Crandall) is responsible for the overall technical direction for DGM surveys, to include the following:

- Provide overall technical direction for DGM surveys.
- Supervise data processing and interpretation.
 - Coordinate with the Site Geophysicist (if one is required) to verify the accuracy and completeness of; project DGM documentation and target lists, analog test strip (ATS) testing results, QC results, and related DGM project documentation.

2.4 CONTRACTOR FIELD MANAGEMENT TEAM

The Field Management Team is responsible for the efficient and safe execution of the daily site activities during Phase 3. Appendix L, Dive Operations Plan, provides additional detail regarding the qualifications of the dive team and their responsibilities, and the various field team compositions which are dependent upon the work being accomplished. The following is the Field Management Team and their responsibilities:

2.4.1 SITE MANAGER

The Site Manager (SM) is provided by Parsons and coordinates and manages all field activities while on the work site. The SM ensures conformance with the RI/FS WP and all its associated plans. The SM is Parsons representative on site when the PM is not available. The SM will report administratively and operationally to the PM. The SM for this project is Mr. Jae Yun.

2.4.2 SENIOR UXO SUPERVISOR

The Senior Unexploded Ordnance (UXO) Supervisor (SUXOS) is provided by Parsons and manages/supervises all MEC related field activities while on the work site. The SUXOS ensures conformance with the RI/FS WP and all its associated plans. The SUXOS will report administratively and operationally to the PM. The SUXOS is not required to possess a diver certification [DDESB TP 18 (July 2015)] for Phase 3.

2.4.3 DIVING SUPERVISOR

The PM will designate the Diving Supervisor in writing. During diving operations, the Diving Supervisor has the operational authority and responsibility to conduct the dive operations per the RI/FS WP, Dive Operations Plan, and USAE Dive Safe Practices Manual. The Diving Supervisor is not required to be an Unexploded Ordnance (UXO) Technician. The Diving Supervisor will report administratively and operationally to the SUXOS. UXO Technicians III (UXOTIII) that are SCUBA dive qualified will be designated as alternate Diving Supervisors. This allows for more team flexibility during diving operations.

2.4.4 UXO SAFETY OFFICER (UXOSO)

The UXOSO is provided by Parsons and has the responsibility for enforcement of the overall safety aspects of the RI fieldwork. The UXOSO will provide daily safety briefs and will conduct safety audits of all activities in the Diving Phase of the project. The UXOSO is responsible to the Parsons Corporate Director of Safety and Quality for all safety related issues. The UXOSO will also be SCUBA Dive Qualified. The UXOSO has stop work authority in any matter related to the safety of personnel and equipment involved with the project. Specific duties include:

- Conducting Daily Safety Briefs
- Conducting Daily Safety Inspections
- Conducting Weekly Safety Audits
- Conducting initial site safety orientation training
- Providing periodic safety training on relevant safety subjects
- Completing appropriate Accident Investigation and Accident/Incident Reports, as required
- Acting in an advisory capacity with the PM on safety related issues
- Working directly with the Dive Supervisor and SUXOS to ensure safe completion of operational tasks.
- Notify the Parsons Project Manager in the event of a spill and/or hazardous material(s) release in accordance with Section D.16.2.2 of Appendix D.

2.4.5 UXO QUALITY CONTROL SPECIALIST (UXOQCS)

The UXOQCS is provided by Parsons and is responsible for overseeing the site QCP in all field operations. The UXOQCS will be trained in QC techniques methodology and will be qualified as a UXOTIII. The UXOQCS will also be SCUBA Dive Qualified which allows for the underwater operations to be monitored for QC purposes. The UXOQCS coordinates with the SM and PM for daily operations, and maintains a direct line of communication to the PM, SM, and Field Team. The UXOQCS:

- Conducts daily audits of the DGM teams, equipment and procedures
- Conducts daily audits of the UXO teams, equipment and procedures
- Performs and documents random sampling (by pieces, volume, or area) of all MPPEH collected from the various teams to ensure no items with explosive hazards, engine fluids, illuminating dials and other visible liquid Hazardous, Toxic, and Radioactive Waste (HTRW) materials are identified as MD or range-related debris (RRD) as required for completion of the Requisition and Turn-in Document, DD Form 1348-1A.

2.4.6 UXO QUALITY CONTROL SPECIALIST/SAFETY OFFICER (UXOQCS/UXOSO)

A UXOQCS/UXOSO who is assigned the duties of both UXOSO and UXOQCS is authorized for this project per the requirements set forth in DDESB TP 18 (July 2015). The duties as described for UXOQCS and UXOSO apply to the UXOQCS/SO.

2.4.7 TEAM BIOLOGIST OR MARINE BIOLOGIST

A biologist will be assigned as the sea turtle and marine mammal observer. Sea turtle nesting surveys will take place prior to and during field operations. The biologist performing the nesting surveys will have completed coursework requirements and possesses current marine mammal observer certification and is a qualified turtle monitor. During intrusive operations, a Marine Biologist or Biologist who is trained in marine habitats and/or corals and is also qualified in SCUBA diving may be used to accompany a UXO SCUBA Technician to assist in the identification of critical habitats or corals that may be in the proximity of MEC.

2.5 PROJECT COMMUNICATION AND REPORTING

Communications for this project will generally flow along the lines established by the organization depicted in Figure 2-1. All communications between Parsons and the USAESCH will primarily be directed through the respective USAESCH COR or Contracting Officer. Communication directly between Parsons and other government entities associated with this project will only occur with USAESCH concurrence.

2.6 PROJECT SCHEDULE

The project schedule (see Appendix K) presents the logical sequence of tasks, deliverable due dates, and anticipated number of days to complete each task. The schedule will be updated monthly and will be included in the Monthly Progress Status Reports prepared in accordance with DID WERS-016.02.

2.7 PERIODIC REPORTING

Project Status Reports will be prepared IAW DID WERS-016.02. This report will be submitted monthly. Daily Status Reports will be submitted (see Appendix F for format) and weekly status calls will be conducted during fieldwork operations. When MC sampling is being conducted, reports will be submitted per DID WERS-009.01 paragraph 1.3.2.

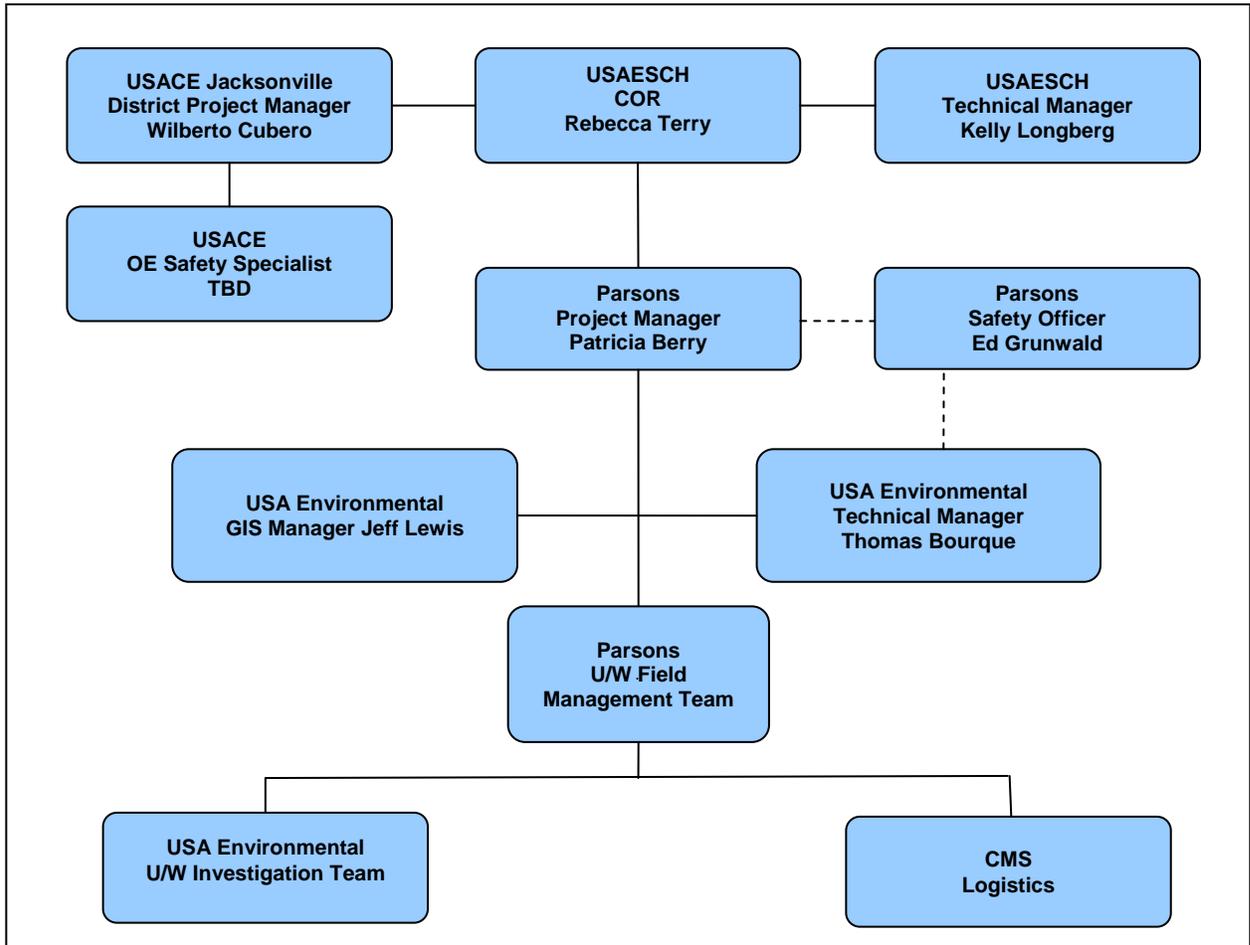


Figure 2-1: Project Management Organization

2.8 SAFEGUARDING DOCUMENTS AND FIELD FILES

Parsons will safeguard project files during field work phases by uploading project files onto the Parsons Corporate server on a daily or weekly basis. If internet access is limited on Culebra, the files will be backed up on a separate portable hard drive.

2.9 COSTING AND BILLING

The budget for the project was negotiated with the USAESCH pursuant to award of contract number W912DY-09-D-0062, Task Order No. 0010. Parsons will submit a monthly invoice to the USAESCH. The Parsons PM is responsible for submitting monthly reports to the USAESCH PM along with the invoice that documents the work performed during the corresponding billing period. Requests for payment will be based on completion of performance milestones as defined in the monthly Project Status Report.

2.10 PROJECT PUBLIC RELATIONS SUPPORT

Public relations support will include participation in public meetings to be held on Culebra. These meetings are in addition to the TPP Meetings. A Public Meeting will be held specifically to present the Proposed Plan. Additional meetings may be held during the period of performance of the project at times to be determined by the Project Delivery Team (PDT). Parsons will prepare and deliver briefings, graphics, maps, posters, presentations, and support question and answer sessions. When required,

Parsons will prepare invitation letters, fact sheets, and meeting notices. Parsons will obtain the meeting sites, perform public notifications and prepare any correspondence necessary to meeting the objectives of this task. To ensure the quality of public meetings, Parsons will coordinate with the USACE Public Affairs Officer or other appropriate USACE representative on all matters of public relations.

2.11 SUBCONTRACT MANAGEMENT

Before subcontract work is performed at the site, Parsons will negotiate and prepare subcontracts that will detail all necessary and appropriate terms and conditions, including the statement of work. Once the subcontract is executed, Parsons will perform periodic reviews to ensure that contractual requirements and milestones are met. These reviews will cover contractual progress, technical progress, and cost and schedule status. Parsons' technical staff will review data generated by the subcontractor as part of subcontract deliverables.

Parsons will maintain supervisory responsibility for all operations. Subcontractors will work under the direction and oversight of Parsons' PM, SM, and/or SUXOS when in the field, and will be monitored by Parsons' UXOQCS/SO. The SM and SUXOS will schedule all operational activities, and a strict accounting will be made of actions performed and activities completed. Throughout their operations, subcontractors will coordinate their operational schedules with Parsons' SM and SUXOS, and strictly adhere to this WP and associated APP.

2.12 MANAGEMENT OF FIELD OPERATIONS

Parsons' PM along with the USAE TM and Project Engineer will coordinate field operations with the Field Management Team. The Project Safety Officer and Project Quality Control Manager will remain off-site but will be available by telephone for consultation on issues of safety or quality. The GIS Manager, who is responsible for control of data included in and used as part of the project GIS, will also be available by telephone for consultation.

2.13 INITIAL CONCEPTUAL SITE MODEL (CSM)

A Conceptual Site Model (CSM) is a description of a site and its environment that can be used to depict the nature of potential contamination, its location, and the possible human and ecological receptors' interactions with the potential contamination. The CSM summarizes which potential receptor exposure pathways for MEC and MC are (or may be) complete and which are (and are likely to remain) incomplete. Exposure pathways are considered incomplete unless *all four* of the following elements are present (USEPA 1989):

- a source of contamination
- an environmental transport or exposure medium
- a point of exposure at which the contaminant can interact with a receptor
- a receptor and a likely route of exposure at the exposure point.

If any single factor was not present, the pathway would be incomplete. An incomplete exposure pathway indicates there are no current means by which a receptor (human or ecological) can encounter MEC or MC and, therefore, no hazards or risks from exposure to MEC or MC would be expected. This information is used to focus the investigation of the site by suggesting which complete or potentially complete exposure pathways need to be evaluated. The CSM is a "living document" based on existing knowledge and, therefore, can, and is, updated throughout the course of the project as more data become available.

2.13.1 MEC AND MC EXPOSURE ANALYSIS

Historical findings and preliminary visual investigations of the U/W areas of the MRS have identified MPPEH on the surface of the seafloor, and a MEC exposure pathway for human and ecological receptors

is potentially complete. The presence of sub-surface MEC is currently unknown, but due to the dynamic nature of marine sediments, its presence is likely.

MC exposure pathways for humans would be through dermal contact with the surface sediments, and ingestion of fish or other biota from the sea that has ingested the MC. Marine water is not used for human consumption on the island. Exposure pathways to ecological receptors would be through ingestion of marine water and other sea life that has ingested MC, and dermal contact with the marine sediments.

The U/W portions of the MRSs are frequented by fisherman, divers, and snorkelers who may encounter MEC on the seafloor. Beach visitors may encounter MEC along the shoreline and in the shallow waters. Sensitive ecological receptors, including sea turtles, coral, and sea grasses, have been identified in the area and could be exposed to MEC present on the seafloor. The MC associated with the MEC that is potentially present on the seafloor could possibly be detectable in underlying sediment once the MEC is removed. Due to the undersea environment, the groundwater migration pathway is incomplete. MC exposure and pathway is potentially complete for ecological receptors in the immediate location of the MEC item, but currents and the dynamic nature of the seafloor would likely dilute the effects.

The RI was designed to assess the presence/nature and extent of surface and subsurface MEC and identify if MC is present in and around MEC found within the U/W portion of the MRSs. The Human Health Risk Assessment and SLRA results will be provided in the RI Report and will factor into potential removal/remediation measures during the FS phase.

The MEC and MC CSM for MRS 02 and MRS 07 are presented in Figure 2-2. The Conceptual Site Exposure Model Diagrams for MRS 02 and MRS 07 are included in the Risk Assessment Work Plan found in Appendix G.

These preliminary CSMs are the initial CSMs for the RI/FS, and were developed in accordance with EM 1110-1-1200. These CSMs are presented as a summary table indicating known or suspected MEC/MC contamination sources, potential/suspected locations and distribution of contamination, related source or exposure media, current and future receptors, and potentially complete exposure pathways.

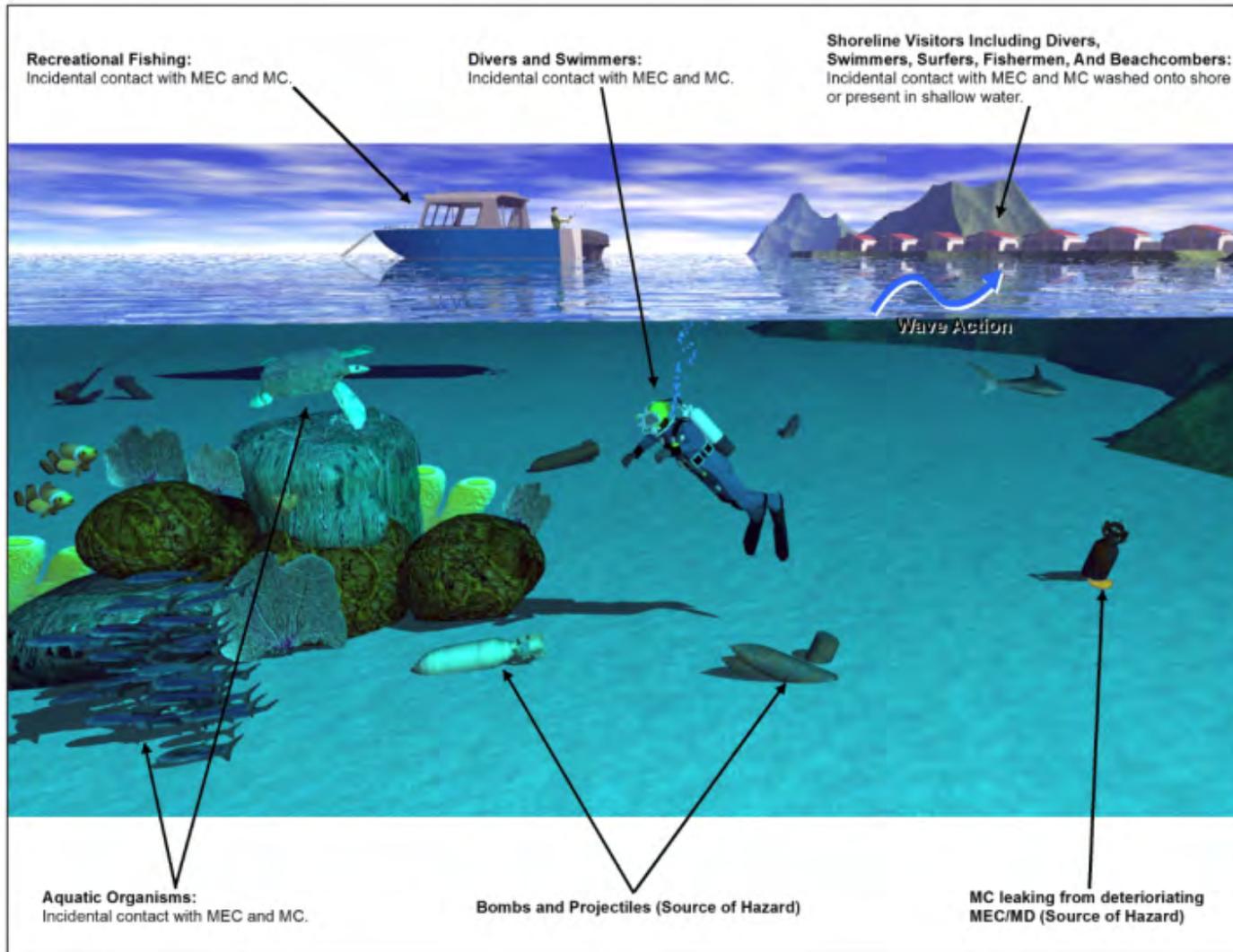


Figure 2-2: MRS 02 and MRS 07 MEC/MC CSM

3.0 FIELD INVESTIGATION PLAN

3.1 OVERALL APPROACH TO MUNITIONS RESPONSE ACTIVITIES

This Field Investigation Plan outlines the site characterization goals, Data Quality Objectives (DQOs), MEC exposure analysis, and the data to be incorporated into the RI/FS Report for Culebra MRS 02 and MRS 07, U/W Acreage. MC exposure analysis can be found in Appendix E, Munitions Constituents Sampling and Analysis Plan (SAP).

3.1.1 SITE CHARACTERIZATION GOALS

The primary goal of the RI/FS MEC investigation is to characterize the nature and extent of MEC and MC for the U/W areas surrounding MRS 02 and MRS 07. MEC has previously been recovered from several land areas on the former military property and may remain on the site as a result of activities conducted by the DoD during training operations and may pose a threat to human health. A geophysical investigation and MEC sampling will be conducted to determine the presence and characteristics of MEC. This will be combined with previous MEC investigation and removal data to complete an RI and FS

Site characterization goals include:

- Document available information pertaining to the nature and extent of MEC within each MRS;
- Identify areas where further investigation is warranted;
- Conduct a field investigation of each MRS to characterize the nature and extent of MEC and MC within the MRS; and
- Perform qualitative assessment of MEC hazards and MC risk at each MRS (The data collected during this investigation will be sufficient to conduct a qualitative hazard assessment for MEC).

The goals identified for MEC for Phase 3 will be achieved by:

- Using analog geophysical transects for transects that were not conducive to the underwater DGM survey during Phase 2.
- Developing anomaly density maps.
- Inspecting transect segments using analog or DGM intrusive investigations in high anomaly density areas. Selected geophysical anomalies will be excavated to identify the presence of MEC/MD.
- Additional bounding transects will be analog-surveyed and excavated to refine the extent of each MEC contaminated area, if a high-density area proves to be a MEC contaminated area.

The site characterization goals for MC are to establish the presence or absence, and the nature and extent of MC contamination above risk action levels. As part of the U/W investigation, marine sediment samples will be collected from within the MRS boundaries to evaluate the presence of MC resulting from DoD activities. The location and number of the samples collected will be determined by MEC/MD findings during intrusive operations.

- A discrete marine sediment sample will be collected by a UXO SCUBA Technician at select MEC in which explosives are exposed to the marine environment and at select MD locations.
- Sediment samples will be collected from a depth interval of 0 to 6 inches at MEC locations in areas where sufficient media is present. The amount of sufficient media is anticipated to be in areas with one inch or more of sediment.
- Samples will only be collected in unconsolidated sediments. If only coral, rocks, or bedrock are present, no samples will be collected.
- Refer to paragraph 3.2.1.16 below and Appendix E, Field Sampling Plan, for specific details.

A secondary goal of the site characterization effort conducted during the RI is to produce sufficient data to facilitate future development and evaluation of necessary remedial alternatives. The field investigation is

designed to support this effort by including sufficient DGM and analog surveys and MC sampling. The data will support the response alternative cost estimates to be developed if an FS is determined to be necessary. The RI/FS will be considered complete upon USACE acceptance of a Decision Document which meets the requirements of ER 200-3-1 and EM-CX Interim Guidance Document 06-04.

3.1.2 DATA QUALITY OBJECTIVES

DQOs are qualitative and quantitative statements that clarify project objectives, define the appropriate type of data, and specify the tolerable levels of potential decision errors that are used as the basis for establishing the quality and quantity of data needed to support decisions. These project specific statements describe the intended data use; the data need requirements; and the means to achieve acceptable data quality for the intended use. DQOs established for the Phase 3 RI activities meet the USEPA QA/G-4HW Guidance's 7 step DQO criteria. Table 3-1 presents the Project DQOs for the Phase 3 RI activities.

Table 3-1: Project Data Quality Objectives

DQO STEPS	Underwater Areas of MRS 02 and MRS 07
1. State Problem(s)	<p>Based on historical data, previous investigations, suspected MPPEH items identified during the EBS visual survey, reports of UXO sightings in the water by civilians, and documented UXO findings on land, MRS 02 and MRS 07 are confirmed to have been used for DoD training operations using munitions with an explosive potential.</p> <p>A. Receptors</p> <ul style="list-style-type: none"> • Human receptors include residents and tourists who use the U/W portions of MRS 02 and MRS 07 for diving, snorkeling, swimming, and fishing. Other potential human receptors include site workers, such as USFWS and/or PR DNER personnel. The U/W portions of MRS 02 and MRS 07 are known to contain threatened and endangered ecological receptors and critical habitats. <p>B. MEC</p> <ul style="list-style-type: none"> • MEC may be present in the U/W (benthic) portion of MRS 02 and MRS 07 that presents an explosive hazard to human and ecological receptors and critical habitats. It is not known whether the condition presents an unacceptable risk that will require remedial response. <p>C. MC</p> <ul style="list-style-type: none"> • MC from munitions remaining on-site and deteriorating in the marine waters, may have contaminated marine sediments present within the MRSs. It is not known whether the condition presents an unacceptable risk that will require remedial response.
2. Identify the Decisions	<p>The decisions that need to be made to guide this investigation are in three general areas:</p> <p>A. Sensitive ecological receptors and critical habitats</p> <ul style="list-style-type: none"> • Determine the presence of and identify Listed Endangered or Threatened Species, proposed for listing species, and critical habitat present in the near vicinity or on MEC/MPPEH. • Determine what removal or treatment procedures and equipment to be used will best protect the ecological resources and still remove or dispose of the hazard. • Determine the acceptable level of hazard to expose UXO Technician SCUBA divers in the process of protecting environmental resources. <p>B. MEC</p> <p>Establish presence/absence of potential target areas within MRS U/W investigative areas; if present, characterize nature and extent of contamination present.</p> <ul style="list-style-type: none"> • Intrusive investigations will determine whether MEC is present or not. Characterize nature and extent of contamination, if present. • Determine the level of acceptable hazard for divers.

DQO STEPS	Underwater Areas of MRS 02 and MRS 07
<p>2. Identify the Decisions (continued)</p>	<ul style="list-style-type: none"> • Establish which anomalies identified in the geophysical/analog investigation will be intrusively investigated. • Transects designed with Visual Sampling Plan (VSP) will determine areas of high density that may indicate a target area. • When MEC are found, determine the treatment method appropriate to the item found which will protect ecological resources and minimize hazard for divers. • Determine what methods and standards will be used to delineate the estimated extent of contamination identified. <p>C. MC</p> <p>Establish presence/absence of MC contamination of marine sediment within MRS underwater investigative areas; if present, characterize nature and extent of MC contamination of marine sediment within MRS underwater investigative areas.</p> <ul style="list-style-type: none"> • Determine the number of samples and locations where samples will be collected. • Determine if levels of detected MC present an unacceptable a risk to human or ecological receptors in a baseline risk assessment.
<p>3. Identify Information Inputs</p>	<p>A. Sensitive ecological receptors and critical habitats</p> <ul style="list-style-type: none"> • Baseline Survey Report data (Relative position of identified endangered species/ critical habitat),Final Supplemental Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat with Addendum 1, DERP-FUDS Property No. I02PR0068, Culebra, Puerto Rico (CESAJ, February 2015) which can be found in Appendix J. • USFWS National Wildlife Refuge seabird nesting information. <p>B. MEC</p> <ul style="list-style-type: none"> • Baseline Survey Report data (Relative position of identified endangered species/ critical habitat, suspected MEC items identified), • Current/ future land use, potential receptors and accessibility (CSMs), • Historical records review (ASR, previous investigations), • Terrestrial RI data, • Presence of surface MEC items or indicators of MEC discovered within underwater investigations of the MRS (Bathymetry, Side Scan Sonar, visual data from geophysical investigation), • Presence of subsurface MEC or indicators of MEC items from information gathered in the intrusive investigation based on data from the geophysical investigation. • Validation of the geophysical equipment and positioning equipment area functioning correctly for daily instrument testing. • Information from additional transects, as necessary, to refine characterization of high density areas, if established. • Phase 2 data and density analyses <p>C. MC</p> <ul style="list-style-type: none"> • MC samples collected from marine sediments on the seafloor surface at intrusive investigation locations where MEC items or MEC items that have been breached are recovered, or in areas indicating high concentrations of MD as defined by the project geophysicist. • The list of MC analytes has been developed from the types of munitions suspected or identified as used at the MRSs and is provided in Appendix E, Part II, QAPP WS #15. • The background levels will be established from marine sediment samples collected in areas separated from locations of MEC/MD.

DQO STEPS	Underwater Areas of MRS 02 and MRS 07
3. Identify Information Inputs (continued)	<ul style="list-style-type: none"> • The screening values: <ul style="list-style-type: none"> - Human Health: Estuarine Sediment: USEPA RSLs, Residential Soil Criteria (TR= 10⁻⁶ and HQ = 0.1) - Ecological: Estuarine Sediment: Pascoe et. al. 2010; Buchman, 2008; or Long et. al. 1995 (See Appendix G for complete citation).
4. Define the Boundaries of the Study	<ul style="list-style-type: none"> • The study boundary defines the population to be sampled and the decision units to which the data will be applied. The horizontal extent of the RI study boundary is defined by the MRS boundary and consists of the U/W (benthic) areas of MRS 02 and MRS 07. • Temporal boundaries: <ul style="list-style-type: none"> - Weather: Eastern trade winds ranging from 8 to 10 knots are the dominant wind pattern throughout the year; however, summer and early fall generate the highest winds (10 knots plus). When winds exceed 10 knots, small craft warnings can cancel field operations on the eastern shores of the Cayos. Winter storms in the North Atlantic create large swell events in Culebra approximately 3 days after they pass in the North Atlantic. The swell events can range from 1 meter to higher than 3 meters when they reach Culebra's Northern Shores. - Listed as Threatened and Endangered Species Breeding Season and Development: The period of time in which field work is acceptable for different field tasks, as the field tasks may impact critical habitats or listed threatened or endangered species. The survey and investigation of transects have no anticipated impacts to the breeding season or the development of a new born species; however, treatment of MEC has the potential for damage to these species. If MEC is discovered during the underwater field work, it may remain in place until the end of the project to allow for adequate coordination with stakeholders. The demolition of MEC through detonation will be scheduled to allow for turtle monitoring to take place per the <i>Final Supplemental Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat with Addendum 1, DERP-FUDS Property No. 102PR0068, Culebra, Puerto Rico</i> (CESAJ, February 2015) which can be found in Appendix J. The hawksbill sea turtle (<i>Eretmochelys imbricate</i>) nesting season encompasses the full year. November to January is the most acceptable period of time in which to perform MEC operations on beaches in order to avoid the sea turtle nesting periods for the leatherback (<i>Dermochelys coriacea</i>) and green sea turtles (<i>Chelonia mydas</i>). September to January is considered the most acceptable period of time in which MEC may be disposed of on the shores of the Cayos, as this period of time minimizes the potential impact to seabirds during nesting season. • Step out radial transects may extend the horizontal boundary as needed to define concentrated munitions use areas (CMUAs). • Vertical Extent: The vertical extent of MEC is from the surface of the seafloor to the maximum depth in which anomalies can be excavated by hand (approximately 24 inches), or to a coral reef, consolidated hard bottom or bedrock, whichever is reached first. Anomalies not resolved due to sub seafloor depths of greater than 24 inches will be documented as unresolved if a signal remains.

DQO STEPS	Underwater Areas of MRS 02 and MRS 07
<p>5. Develop a Decision Rule</p>	<p>A. Characterization of MEC contamination:</p> <p>Geophysical investigation methods will be used to evaluate potential MEC presence. The geophysical investigation determines that metallic anomalies may be present, but doesn't identify the anomaly as MEC. An intrusive investigation will be conducted to determine which metallic anomalies are MEC or are indicators of MEC. Types of equipment used will be chosen based on the type of environment in which the transect is located. Information related to types of equipment is located in Chapter 3, Section 3.2, Underwater Intrusive Investigation, of this WP.</p> <ul style="list-style-type: none"> • Analog UXO Technician Diver/Snorkeler transects or transect segments will be completed by UXO Technician Diver/Snorkelers in accessible⁽¹⁾ investigation areas without risking impacts to natural resources (such as corals) or exposing the divers/snorkelers to unsafe conditions. Areas consisting of unconsolidated sediment may be further investigated during the intrusive phase using Analog and Dig procedures in less than 2m up to the intertidal zone if step out transects are required. UXO Technicians are allowed to walk on unconsolidated sediment when performing step out transects. • Transect horizontal and vertical deviation VSP post analysis: <ul style="list-style-type: none"> - Phase 2 transect horizontal deviation >10m, resulting in a VSP post-analysis data gap, will be filled in by UXO Divers during Phase 3, unless an obstacle is documented or the deviation is not accessible. Note that this horizontal deviation metric may be refined for closed spaced transects (see Figures B-15 and B-16). - Phase 2 transect vertical deviation resulting in a VSP post-analysis data gap will be filled in by UXO Divers during Phase 3, unless an obstacle is documented or the gap is not accessible (see Figures B-15 and B-16). - By carefully monitoring and limiting the horizontal and vertical transect deviations (recollecting exceedance portions of transects that do not document an obstacle), the project team can reasonably assume a 0% false negative rate. Add to this that the goal is to identify areas of elevated munitions use, so we are looking to detect concentrations of munitions. • Dig Selections: <ul style="list-style-type: none"> - If an anomaly detected during the geophysical investigation meets anomaly selection criteria (i.e., is above a background threshold determined by the ATS, for each sensor platform, and based on professional judgment) it is placed on the dig list, and used to generate an Anomaly Density map. If the anomaly is in a high density area (e.g. ≥ 90 targets/acre or ≥ 70 targets above background, and a spatial extent ≥ 2.8 acres), then a minimum of 10 anomalies will be investigated intrusively, not to exceed 10%, to determine if the high density area is MEC contaminated or not. The project geophysicist will propose which potential CMUA anomalies will be investigated, to be confirmed by the Government geophysicist. The dig list following the above criteria can be found in Table 3-4. If no MEC or indicators of MEC are discovered in this limited sampling, an additional 10% DGM targets will be investigated. If MEC or indicators of MEC are discovered prior to the completion of the additional DGM targets being investigated, the remaining DGM targets of the 10% that were added will not be investigated. - A biased selection of low density area or elevated density areas that fail the 2.8 acre extent criteria transect EM targets will be investigated to confirm that these areas are not MEC contaminated. The dig list following the above criteria can be found in Table 3-4. <ul style="list-style-type: none"> o 100% investigation of selected DGM anomalies within Cayos underwater MRS boundaries as listed in Table 3-4. o 100% investigation of selected Tortuga Bay DGM anomalies, due to high human exposure risk - High anomaly density Cayos underwater MRS boundaries will have 10% to 13% DGM anomalies recommended for investigation. Selections generally followed historic flight paths with some extent sampling.

DQO STEPS	Underwater Areas of MRS 02 and MRS 07
<p>5. Develop a Decision Rule (continued)</p>	<ul style="list-style-type: none"> - Investigation of VSP Post-Analysis Data Gaps and DGM planned surveys that were not completed: Divers will use analog and dig along phase II transect gaps and DGM planned survey areas. In areas of consolidated hard bottom, or coral, or veneer sand (e.g., less than 6-in of sand in torpedo areas), divers will use visual detection. • Intrusive Investigation <ul style="list-style-type: none"> - DGM anomalies selected for investigation will be reacquired either visually or by analog underwater all metal detectors (anomalies may be on the surface of the ocean floor or subsurface). - Intrusive investigation will be performed by hand, using hand tools, and will only occur in unconsolidated sediments. Procedures will vary depending on if seagrasses are present or not. The UXO SCUBA Technician will follow the appropriate SOPs when performing intrusive investigations. - The vertical extent for the investigation of MEC is from the surface of the seafloor to the depth capable for hand excavation by UXO Divers (approx. 24 inches) or to coral reef, consolidated hard bottom or bedrock, whichever is reached first. • No Finds: <ul style="list-style-type: none"> - If the UXO Divers cannot locate the DGM target within a 10 ft radius, the DGM target will be remarked and the UXO divers will search within the 10 ft radius; if it still cannot be located, it will be considered a “no find”. A Root Cause Analysis will be conducted if “no finds” exceed 15%. In determining the Root Cause Analysis, the possible migration of the DGM target in unconsolidated sediment will be evaluated. If migration is considered the cause or one of the factors for the “no finds”, an expanded search around DGM targets located in unconsolidated sediment will be required to a radius of 40-ft. • MEC Removal <ul style="list-style-type: none"> - If an item is determined to be MEC and it is deemed unacceptable to be moved for onshore demolition, the MEC item will be left in place. The USACE will coordinate with the PREQB, PR DNER, and Natural Resource Agencies for the underwater detonation of the MEC item. - If an item is determined to be MEC and it has Listed as Threatened or Endangered species attached to the MEC item or affixed to the reef adjacent to the MEC item, and it is determined that removing or detonating the MEC item will harm or injure the Listed Species, the MEC item will be left in place for further determination by the Government. - If a MEC item is deemed acceptable to move by either hand removal or remotely by the use of an underwater lifting balloon, then procedures identified in this Field Investigation Plan will be followed and a determination on how to proceed through coordination with Regulator or Natural Resource Agency is not required. All notices, exclusion areas, and coordination for the movement of MEC will be adhered to per the Explosives Site Plan (ESP). • MEC Hazard Present <ul style="list-style-type: none"> - If no MEC-related items are found in an area based on intrusive investigation, then the area will be considered un-impacted by MEC and no additional investigation (e.g., radial extent transects) will be planned for the Cayo. If anomalies are identified as MEC or indicators of MEC, the extent of the hazard will be bound by radial transects depending on the Phase 2 DGM anomaly density maps and the historical use of the site being investigated (see appendix B: Site Maps). For example, if the identified MEC is a bomb, and the anomaly density map shows a linear high density area indicating a flight path for aerial bomb training, then one radial transect on each side of the Cayo along the assumed flight path would be aligned with the linear density and extend outward to establish extent. If the MEC is a projectile, and the high anomaly density area is more wide spread indicating a range fan, then a set of radial transects aligning with the perceived range fan for undershoot and another set for the overshoot area may be applicable to establish extent. Radial extent transects will be 250m long,

DQO STEPS	Underwater Areas of MRS 02 and MRS 07
<p>5. Develop a Decision Rule (continued)</p>	<p>extending seaward from the Cayo trending along historical flight paths, where known. Radial transect investigations will start seaward and work inward, stopping at the first MEC or indicator of MEC discovered, establishing the maximum extent for that transect. If historical flight paths are not known, radial transects will be designed 360 degrees around the area. The PDT will assess all available information and determine if additional anomalies need to be investigated, or if radial transects or step-out transects that are parallel to the original designed transects for Phase 2 are necessary to document the extent of MEC contamination.</p> <ul style="list-style-type: none"> - If the area is contaminated with MEC, then the MEC hazard present will be evaluated in an assessment supported with data from a Qualitative MEC Hazard Assessment, historical data, and professional judgment. - If unacceptable risk is defined, a FS will be required to assess feasible alternatives for remedial response. If areas of unacceptable risk are not defined, the area (acreage) will be eliminated from further response. <p>B. Characterization of MC contamination:</p> <ul style="list-style-type: none"> • If no MEC or MD is encountered, no MC sampling will be conducted, as there is no source. • An MC sample will be collected at each type of MEC item found, at MEC items having cracked cases and pinhole breaches indicating a low order detonation, and in areas identified by the project geophysicist based on DGM data supporting MD concentration areas. For additional underwater findings of an already sampled munition type, random samples will be collected at a rate of 10%. • Sediment samples will be collected from beneath the munition if the item has been determined to be acceptable to move, otherwise, the sample will be collected adjacent to the munition. Samples will be collected from the down current side of the MEC item at a depth interval of 0 to 6 inches in areas where sufficient media is present. If only coral, rocks, or bedrock are present, no samples will be collected. • If an MC analyte is undetected or is detected at concentrations less than background levels, then the area will be considered uncontaminated by that MC analyte and it will not be investigated further. • In areas where MC analytes are detected at concentrations greater than background levels, as established in the SAP (Appendix E), the analyte will be considered a COPC and retained for consideration in a baseline risk assessment. • If the baseline risk assessment determines the exceedance does not pose an unacceptable risk to human or ecological health, there will be no further investigation. • If the baseline risk assessment determines the contamination is localized to the location of the munition, there will be no further investigation. • If the baseline risk assessment determines an unacceptable risk to human health or ecological receptors, then the TPP team will evaluate the magnitude of the unacceptable risk and further step-out sampling may be planned. • If unacceptable risk is defined, a FS will be required to assess feasible alternatives for remedial response. If areas of unacceptable risk are not defined, the area (acreage) will be eliminated from further response.

DQO STEPS	Underwater Areas of MRS 02 and MRS 07
6. Specify Limits on Decision Errors	<p>Measurable decision errors are limited to the field and analytical QC processes for survey coverage.</p> <p>A. MEC Investigation</p> <ul style="list-style-type: none"> • All intrusive investigation activities will follow this Field Investigation Plan and will be evaluated against the MQOs identified in Table 3-3 below and as stated in Table 4-1 of Chapter 4, Quality Control Plan. <p>B. MC Investigation</p> <ul style="list-style-type: none"> • All sampling and analysis will achieve the MQOs outlined in the SAP (QAPP Worksheets #15 and #22), unless MQO failures can be adequately explained and/or justified.
7. Develop the Detailed Plan for Obtaining Data	<p>A. Characterization of species and habitat</p> <ul style="list-style-type: none"> • The plan for evaluation of species and habitat within the underwater study area was developed in the WP for the EBS. • If endangered and/or threatened species, proposed for listing species, and/or critical habitat within planned investigation areas are encountered, the field team will follow procedures for their protection in accordance with the Final Supplemental Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat with Addendum 1, DERP-FUDS Property No. I02PR0068, Culebra, Puerto Rico (CESAJ, February 2015) which can be found in Appendix J. <p>B. MEC</p> <ul style="list-style-type: none"> • Geophysical investigation methods will be used to evaluate potential MEC presence. An intrusive investigation of DGM anomalies and along analog transects will be conducted to determine if there is evidence of MEC or there are indicators of MEC within the boundaries of the Cayos or Culebrita. Both the investigations of DGM anomalies and along analog transects or transect segments will be performed by UXO Divers. • Analog transects have been identified in areas in which DGM data gaps exist from the Phase 2 field work. DGM anomalies identified during Phase 2 have been selected for intrusive investigation as described in DQO Step 5. • DGM anomalies selected for investigation will be reacquired either visually or by analog underwater all metal detectors then intrusively investigated by hand. If MEC or indicators of MEC are discovered then the extent of MEC will be determined by radial transects. • Upon the completion of the intrusive investigations, any identified MEC will be disposed of by detonation following the successful coordination between the USACE, Regulator, and Natural Resource Agencies. <p>C. MC</p> <p>The detailed sampling plan for field procedures and laboratory analysis is provided in Appendix E, SAP.</p>

Footnotes:

(1) For the purposes of this DQO, "accessible" means:

- For Vessels: That access to the water portions of the MRS is not hindered by water depth, shallow rock or coral formations, or unsafe sea state conditions (consistently rough seas).
- For Snorkeling or SCUBA Personnel: That access to the water portions of the MRS is not hindered by unsafe sea state conditions (consistently rough seas).

3.1.3 DATA INCORPORATION INTO THE RI/FS REPORT

The EBS Report, the Phase 2 and 3 field data, along with pertinent information provided by the local community, and the significant findings within each MRS will be incorporated into the RI/FS Report. Maps will be provided which show the transect designs, locations of the areas surveyed, intrusive investigations, and the locations, type, and nomenclature (if possible to determine) for MPPEH/MEC discovered. Personal Digital Assistant (PDA) GPS/Data Collection equipment will be used to record

location data. The coordinates, brief description, and digital photograph will be electronically recorded for any MEC related items.

Locations and descriptions of craters or target remnants will also be recorded. A digital video, along with a detailed physical description of MEC and the natural resources in which they reside (for items left in place and not disposed of due to anticipated impact to listed threatened or endangered species), will be taken.

3.2 PHASE 3: UNDERWATER INTRUSIVE INVESTIGATIONS

3.2.1 UNDERWATER INTRUSIVE INVESTIGATION DESIGN AND RATIONALE

This section describes the project design and rationale for the intrusive investigative portion of the RI of the U/W areas surrounding MRS 02 and MRS 07. The MEC/MPPEH removal that is incidental to the RI is designed to remove the munitions used at the site which were discovered during Phase 3.

Table 3-2 presents the work elements and the supporting documents where the procedures for the work elements are discussed in detail.

Table 3-2: Project Activities and Supporting Documents

Definable Feature of Work	Supporting Document(s)
Site-Specific Training	Appendix D: APP; Appendix J: SOPs; Appendix L: Dive Operations Plan
SCUBA and Snorkeling Operations	Appendix L: Dive Operations Plan
Underwater Demolition	Section 6; Appendix J: SOPs; Appendix L: Dive Operations Plan; ESP
Surface Demolition	Section 6; Appendix J: SOPs; ESP
Raise Tow and Beach of MEC/MPPEH	Section 3
MPPEH Management	Section 3 & 5; Appendix J: SOPs
MDAS Management	Section 3 & 5; Appendix J: SOPs

Table 3-3 provides the performance metrics for the marine intrusive investigation (Phase 3) that are discussed throughout this Field Investigation Plan.

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Table 3-3: Phase 3 MQOs

Metric/Test	Applicability	Performance Standard	Frequency	Failure Consequence
Geodetic Equipment Functionality	Place GPS antenna directly over known location test point to measure location repeatability daily.	Once daily per instrument as GPS equipment is used without accompanying blind seeding program (i.e., requisition, grid corner location, other debris mapping, and etc.).	Compare measured coordinates with known coordinates to confirm that the offset is: <ul style="list-style-type: none"> • 10 cm for RTK (optional GPS) • <1.5 m for Pro-XRT • <1.5 m for USBL using Pro-XRT • <2m for Geo-XT • <2m for underwater navigation not related to reacquisition • <10-m for handheld GPS 	Affected work fails.
Geodetic Accuracy	Points used for RTK base stations	Project network tied to HARN,CORS, OPUS or other recognized network. Project control points that are used more than once must be repeatable to within 10 cm.	Repeat occupation of each point used monthly.	Reset points not located at original locations or resurvey point.
Analog Repeatability (instrument functionality)	Each operator and instrument cover analog test strip.	Once daily per instrument and operator (before surveys performed).	All items in test strip detected (trains ear daily to items of interest).	Operator or instrument fails.
Transect Deviation	All accessible Analog or DGM Transects	All planned and accessible Analog or DGM transects are followed within +/- 10m	By Transect or dataset	Transect segments exceeding the 10-m offset will be resurveyed.
Anomaly Resolution	Analog and DGM surface and subsurface investigation of anomalies	UXOQCS performs 15% QC on the day's intrusive production. Project Geophysicist will perform at least a weekly review of the intrusive results and compare the results with the DGM Targets millivolt readings.	By Cayo or Culebrita Segment	Project Geophysicist requests for reinvestigation of the analog or DGM anomaly is not resolved or an acceptable explanation (e.g. anomaly is buried below 24 inches, beneath reef substructure, etc.) Then the analog or DGM anomaly will be remarked and reinvestigated.

3.2.1.1 Site-Specific Training

The Parsons Field Management Team will familiarize field personnel, including subcontractors, with the site and will evaluate launching points, ATS site, MEC/MPPEH beaching locations and boat routes, USA magazine location, supporting and storage sites, survey control points, vessel layout and safety equipment and procedures for firefighting on the vessel.

The UXOSO will give a project specific brief on hazards that may be encountered, discuss emergency procedures and provide directions to the nearest emergency care facility. The UXO Diving Supervisor will discuss safe boating techniques and describe the Dive Operations Plan. Briefings will be conducted covering the project WP and its Appendices. Additional focus will be provided for *Final Supplemental Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat with Addendum 1, DERP-FUDS Property No. 102PR0068, Culebra, Puerto Rico (CESAJ, February 2015)* which can be found in Appendix J, Safety Equipment (O2 systems, spine board, etc.), man-overboard procedures, injured or unconscious diver/snorkeler procedures, emergency contact phone numbers, review of the APP and AHAs. All project personnel will be required to read and sign the project WP, APP, AHA, and SOPs.

The primary methods for communication will be covered during the site-specific training. Primary method for communications with the field office from the dive boat will be satellite phone, with alternated communications using VHF Radios and cell phones. Emergency communications for the dive boat will be initiated using VHF Channel 16 with the US Coast Guard (USCG) with follow up communications to the field office using the satellite phone or cell phone. All project team members will be provided a handout with call signs and the team's cell phone number along with all the emergency phone numbers found in the Emergency Management Plan of the Dive Operations Plan. After work hours diving emergencies (i.e., Type 2 decompression sickness) will be reported immediately to the UXOQCS/UXOSO, Diving Supervisor, then the SUXOS. Following the initial report, the SUXOS or Site Manager will report the incident to the USACE COR or on site representative.

Diving requalification dives are conducted during this phase of work, the dive team will demonstrate their efficiency with all underwater equipment that is anticipated to be used during the project. These dives are to be conducted outside of the MRSs and in a safe environment. The team also develops their recovery procedures for an unconscious and injured diver/snorkeler. Once a workable process has been identified and approved by the UXOQCS/UXOSO, the injured diver/snorkeler drill will be exercised and documented by the UXOQCS/UXOSO once per week for the remainder of the field work.

3.2.1.2 Analog Test Strip (ATS) Certification

A land based ATS will be established near the field office in an area free from metal debris. The UXO SCUBA Technicians will process through the land ATS with their analog metal detectors while witnessed by the UXOQCS/UXOSO as a daily QC check when the teams will be performing reacquisition. The ATS layout will be as prescribed below.

An Analog IVS operator and equipment function test process will be implemented to demonstrate that the instrument and operator and the data collection strategies selected for the site perform as intended. The Analog Geophysical Certification includes an ATS without a blind seeding program.

The analog geophysical method selected for the RI is based on previous underwater RI experience as well as the site history and data collection environment. The underwater White's all-metals detector, or a suitable replacement, has been selected for use at the site (see Figure 3-1).



Figure 3-1: SCUBA UXO Divers using the Minilab Excalibur all metals detector

The analog hand-held detectors will be tested at the ATS to confirm that MEC can be detected by the audible tone of the instruments. The ATS will be located in a convenient location with few background anomalies, and will include a combination of small and medium ISOs. ISOs will be buried at depths equal to 3 (3x) and 7 (7x) times their diameter, measured from the ground surface to the object center. All items will be buried in the worst-case orientation for detection: horizontal across-track and their locations measured with the DGPS to document the “as built” ATS. The ATS will have a start and end stake, with traveling line, two small ISOs every 10 ft buried 3x diameter (7.6 cm) and 7x diameter (17.8 cm) along-track, and two medium ISOs every 10 ft buried 3x diameter (15.2 cm) and 7x diameter (35.6 cm) along-track. During the site-specific training phase, each operator will use a White’s all-metals detector, or a suitable replacement, to detect the buried items. If the operator/sensor is able to detect all seed items in the test strip, the equipment will be considered to be in working order.

For each reacquisition dive, the UXO SCUBA Technicians will perform a function check by passing the metal detector over a metal object once on the sea floor (i.e., the buoy anchor, divers SCUBA cylinder etc.,) prior to the start of the reacquisition search process. This will ensure that water has not seeped into the electronics package of the metal detector and the system is operating as designed. Should the equipment fail the function check, the UXO SCUBA Technicians will report the equipment failure to the UXOQCS/UXOSO and replace the instrument and repeat the function check.

3.2.1.3 Geodetic Accuracy

Phase 3 will require different GPS systems for different tasks performed during the investigation. To ensure the positioning systems are functioning as designed and within the planned parameters for the project, the following procedures will be followed:

- Parsons will verify existing control monuments; if the monuments are in good condition and appear to be free of tampering, the monument location will be confirmed by the Trimble PROXRT or equivalent. If the coordinates are within the GPS tolerance of less than 2 meters, the control monument will be considered as satisfactory for use during Phase 3.
- If the control point is assumed to have suffered damage or is determined to not be in the proper location an alternate control point will be used. However, should it be required that a new control

point is needed, Parsons will establish a new survey control on the site using Class I, Third Order control monuments by a local PLS if the planned control points have been removed or damaged to the point that their coordinates are suspect.

- In the event additional control points (base station and check points) are determined to be needed, they will be measured from the established control. The survey team will set up the RTK-DGPS base station on an established control point that was certified by a PR Professional Licensed Surveyor and that has been inspected and determined to be in good condition (i.e., no evidence of tampering or disturbing of the control point). The survey team will locate a suitable area for the new point in close proximity to the old point and will establish the point with a method that is permanent in nature (i.e., rebar with a cap driven into the ground, or a survey nail driven into the asphalt of a road). The RTK rover will be positioned over the control point, held steady with a bi-pod while ensuring that the survey range pole is level. The re-established control point will be measured by the RTK rover and its horizontal coordinates and elevation will be documented for current and future use. The horizontal control will be based on either the English or the metric system and will reference the NAD83 and the UTM Grid System. Any control points established or recovered will be constructed of iron or steel pins, concrete monuments, or other permanent construction method meeting the standards found in EM 1110-1-1002. This construction will ensure recoverability for any current or future work at the site. Parsons will use a PLS registered in PR to install new control points. The northing and easting (X and Y) coordinates for all control points will be presented in a certified letter, or drawing, at the completion of the project. The PLS will provide all required data, and include the project-specific coordinate system, datum, and units (e.g., UTM Coordinate System, Zone 17 North, NAD83, and units in meters).
- Parsons will establish a QC check point at the field office in which the GPS systems used during a day's evolution can be compared. This QC check point will be established by the field team under the guidance UXOQCS/SO. The field team will set up the ProXRT on one of the project control points [Lebron, Vaztigo, Pusito 1, and Pusito 2 (see Appendix B: Figure B-1)]. This establishes the DGPS accuracy. The survey team will then locate a suitable area for the new QC check point and will establish the point with a method that is permanent in nature (i.e., survey nail or suitable substitute). The DGPS will be positioned over the new QC check point, held steady with a bi-pod while ensuring that the survey range pole is level. The new QC check point and its horizontal coordinates and elevation will be documented for current and future use (see Appendix K: SOP 2). The horizontal control will be based on either the English or the metric system and will reference the NAD83 and the UTM Grid System.
- Prior to intrusive investigations or transect surveys the GPSs that will be used for that days evolution will be compared at the QC check point at the beginning of each day. During the morning QC check, if a GPS does not pass the QC check and if the failure is due to satellite signal loss, the QC check can be continued until the GPS satellite signals are reacquired. If the GPS does not pass the QC check, then a replacement GPS will be used.
- Upon completion of the GPS QC check, the team will verify that each GPS component is installed on the vessel correctly and is working properly.

3.2.1.4 Intrusive Investigations of DGM Anomalies

Anomaly density maps and the DGM target selections were created upon completion of the DGM Survey (Phase 2). The density maps and DGM target location selections can be found in Appendix B: Figures B-2 to B-14. Table 3-4 identifies the quantities for DGM Targets for each Cayo.

Table 3-4: DGM Targets

Cayo	DGM Targets	DGM Digs	VSP Bkgnd anomalies/acre	VSP CMUA anomalies/acre	Comments
Del Agua	122	15	50	200	Potential Impact Areas
Raton	15	15	10	70	No Impact Areas
Yerba	29	29	10	70	<1 acre High Density Areas
Mono	7	7	5	50	<1 acre High Density Areas
Lobo	23	23	5	50	<1 acre High Density Areas
Lobito	43	8	5	40	Potential Impact Areas
Alcarraza	132	16	20	150	Potential Impact Areas
Piedra Stevens	3	3	5	45	No Impact Areas
Tiburón	91	12	100	200	Potential Impact Areas
Geniqui	59	16	3	50	Potential Impact Areas
Botella ⁽¹⁾			20	150	Potential Impact Areas
Los Gemelos	115	12	50	200	Potential Impact Areas
Sombrerito	4	4	5	50	No Impact Areas
Culebrita NW	157	17	20	150	Potential Impact Areas
Culebrita Remaining	84	82			
Culebrita Torpedo Area	6	3	20	120	No Impact Areas
DGM Targets	890	262	Proposed DGM Digs		
Footnotes: Cayo Botella DGM Targets/Digs are included with Culebrita Targets/Digs					

Selected DGM anomalies within high density areas will be investigated by the UXO SCUBA Technicians. The intrusive investigation will determine if the high density area is MEC related. If the high density area is determined to contain MEC or indicators of MEC, additional radial transects will be utilized to determine extent. The additional radial transects will be executed by analog and dig.

To mark a DGM anomaly selected for investigation, use the following steps as a guide:

- Marking the position of a potential MEC item that is on the surface of the seafloor.
 - Trimble Pro-XRT DGPS (or suitable replacement) antenna is to be mounted over the gunnel of either the port or starboard side of the vessel.
 - As the vessel approaches the known GPS coordinate, it should maintain its heading while maintaining a speed which is fast enough to maintain the bearing but slow enough to limit the error when the clump is lowered into the water.
 - The navigator who is watching the monitor will tell the helmsman to correct headings as needed during the approach. The gunnel, which has the Pro-XRT DGPS (or suitable replacement) antenna mounted, should pass directly over the MEC item and the navigator should instruct the UXOT assigned to lower the clump and buoy. This should be done as quickly as possible. If the area is known to be sand or grass the clump may consist of a mushroom anchor and buoy. If the area is known to have corals that are not on the List of Threatened or Endangered Species, then soft diver weights with a peanut buoy attached should be used. If the Phase 1 survey results indicate coral that is Listed as Threatened or Endangered Species is present in the area to be marked, an untended snorkeler with a waterproof GPS such as the Garmin GPS map 76cx or similar will snorkel over the DGM anomaly location and will lower the soft diver weight to the bottom, as close to the anomaly GPS coordinates as possible while avoiding corals and possible MEC.
 - When the UXO SCUBA Technicians enter the water, a larger clump with buoy may be taken down to replace the peanut buoy if used, providing a more substantial mark.

The marking of the DGM anomalies selected for investigation with an anchor and clump may create an error of up to 10 ft due to sea state, winds, currents and the drift of the mark. If the EM anomaly is not located within the 10 ft radius of the clump it will be considered a “no find”. The field team will re-mark all DGM anomalies that did not produce either MEC, MD, or cultural debris and they will reacquire the anomaly with the UXOQCS/UXOSO monitoring all aspects of the process. If the DGM anomaly is not located a second time, the DGM anomaly will remain listed as a “no find” until an acceptable explanation for the “no find” can be determined (i.e., the DGM anomaly was likely due to a boat that had anchored on the transect line and the Site Geophysicist field notes indicated the EM platform traversed over a boat’s anchor). A “no find” rate greater than 15% will flag a root cause analysis. In determining the Root Cause Analysis, the possible migration of the DGM target in unconsolidated sediment will be evaluated. If migration is considered the cause or one of the factors for the “no finds”, then an expanded search around DGM targets located in unconsolidated sediment will be required to a radius of 40-ft. The reacquisition of a DGM anomaly will be by either of the following methods depending on the seafloor type:

- Circle line search with analog hand-held detectors. No excavation will take place in rock and coral. When working in and amongst coral the UXO SCUBA Technician will ensure that the analog instrument does not touch corals and the diver will maintain neutral buoyancy to avoid causing damage to coral or consolidated hardbottom. While using a polypropylene (floating line) attached to the buoy line at a height that the line will pass over the coral, the UXO SCUBA Technician will perform a circle line search out to 10 feet from the clump. The full 10-ft radius will be investigated with the analog instrument. Alternate search methods to cover the 10-ft radius search area may be established by the field team. However, prior to instituting a new search method, it must be approved by the SUXOS, Diving Supervisor, and UXOQCS/UXOSO.
- Underwater Navigation System. The target ID and location will be placed in an underwater navigation system utilizing GPS. A floating GPS antenna will be suspended above the UXO SCUBA Technician. The UXO SCUBA Technician will descend down the buoy line and, upon

reaching the buoy's anchor, use the GPS system to route the divers to the DGM anomaly's location.

- Ultra Short Baseline (USBL) Position System. The system to be used is the Tracklink 1500, a commonly used USBL system consisting of a transceiver mounted on the vessel, a transponder which is deployed in the water, and an on board computer which displays the positional data of the transponder via acoustic signals to the transceiver for underwater positioning. Upon the marking of the DGM anomaly in the water, the TrackLink 1500 transponder will be placed on the buoy's anchor after the anchor and buoy has been placed. This will be done by either UXO SCUBA Technician attaching the unit to the anchor or by the boat crew sliding the transponder down the buoy's line. The transponder will communicate with the USBL positioning system on the boat through the transceiver. Accuracy will be dependent on the supporting GPS system used. However, a minimum of 2 meter accuracy will be required. The Diving Supervisor will receive the coordinates of the buoys anchor through the USBL supporting software on the vessel. A bearing and distance from the known position of the buoy's anchor can then be communicated to the UXO SCUBA Technician. The UXO SCUBA Technician will then measure the distance along the bearing (bearings will be corrected for magnetic declination) and use the U/W metal detectors or visual methods to locate the DGM anomaly. The USBL system will be tested daily over known coordinates in the water (i.e., a point will be established on the sea floor near the launch sites of the boats with GPS equipment. The USBL transponder will be dropped on the point to confirm accuracy of the system.) and documented by the Diving Supervisor. The calibration of the system will also be verified during the positional QC checks through the Tracklink Software program. The system will be used at all water depths at the discretion of the Diving Supervisor based on sea or environmental conditions.

Once the DGM anomaly is identified the following data will be collected and documented in the Project Access Database:

- Target ID
- Description of item (MEC by type, MD by type, Cultural Debris by type)
- Item Count
- Dig Date
- Distance from the buoy's anchor
- Bearing from the buoy's anchor
- Depth, inches
- Length and width of excavation site
- If the DGM anomaly is determined to be underneath coral or rock it is to be recorded as such in the Access Database and no further action will be taken.
- Weight (pounds)
- Final Disposition
- Acceptance Sampling QC

The following additional steps will be taken following the investigation of a DGM anomaly:

- Prior to any excavation, a digital photo will be taken of the site. A slate with the Target ID number will be included in the photo.
- Once the excavation is complete, a digital photo will be taken with a tape measure showing the length, width, and depth of each excavation site. A slate with the Target ID number will be included in the photo.
- Spoils from the excavation site will be pushed back into the hole and a photo demonstrating the completed action will be taken. A slate with the Target ID number will be included in the photo.

- Collect digital photos or video of corals that may be impacted if the MEC/MD/Cultural Debris is removed or disposed of through detonation.
- Intrusive results evaluation. Intrusive results will be evaluated as a QC check performed by the Project Geophysicist. The Project Geophysicist will review the intrusive results reported for each selected anomaly. If, in the Geophysicist judgment, the reported object (size, weight, burial depth, quantity) agrees with the DGM signature, then a “pass” for the intrusive results will be recorded in the projects Access Database. If the Project Geophysicist believes that the reported object does not meet the DGM signature, the Geophysicist will flag the target for re-investigation by the intrusive team. If the re-investigation does not produce an item that is representative of the DGM anomaly, the item will be categorized as a “no find”. A No Find rate greater than 15% in an MRS will flag a root cause analysis. In determining the Root Cause Analysis, the possible migration of the DGM target in unconsolidated sediment will be evaluated. If migration is considered the cause or one of the factors for the “no finds”, then an expanded search around DGM targets located in unconsolidated sediment will be required to a radius of 40-ft.
- Intrusive investigation in seagrass areas will follow the procedures identified in Appendix J (*USACE Final Standard Operating Procedure for Endangered Species and Conservation and Their Critical Habitat During Underwater Investigations with Addendum 1, DERP-FUDS Property No. 102PR0068, Culebra Island, Puerto Rico (CESAJ, February 2015)*) –See paragraph 4.3.4 of the SOP).
- MD and cultural debris may be left in place if the removal of the item will cause significant damage to corals or seagrass. If the MD is located in an area heavily used by the public, consideration should still be made concerning the protection of corals and seagrass. However, the MD item should be removed. If the MD is removed, the steps to protect corals and seagrass described in the *Final Standard Operating Procedure for Endangered Species and Conservation and Their Critical Habitat During Underwater Investigations with Addendum 1, DERP-FUDS Property No. 102PR0068, Culebra Island, Puerto Rico, February 25, 2015 (Appendix J)* – Paragraphs 4.3.4, 4.3.6, and 4.3.8 of the SOP and this WP will be followed.

During the handling of MEC/MPPEH items underwater, the minimum number of divers required to perform the task will be used.

Locations of suspected MEC items will be reported to USACE. At no time will locations of items be shared outside of the Parsons Project Team.

3.2.1.5 Investigation of Transects

Per the Phase 2 DGM WP, Phase 3 will include transect segments that the Phase 2 DGM team was not able to complete. A VSP post DGM survey analysis was conducted for each cayo to identify if any additional data gaps existed beyond the transects that were not completed during Phase 2 (see Appendix M: VSP Calculations). For this post DGM survey analysis, the initial VSP design target area was based on the expected munitions and the target size was reduced by 60% for differences expected in underwater MPPEH distribution. No additional data gaps were identified that were accessible (the Cayo Sombbrero gaps are in inaccessible shallow water or on the land bridge to Cayo Norte). For Culebrita, the only island where VSP was used for transect design, the post analysis target size reduction and actual anomaly density ratios resulted in a wider transect spacing than the original design, confirming that the original transect spacing was conservative. Transects have been placed to complete the DGM planned transects with analog and dig transects (Appendix B, Figures B-15 and B-16). The 3-ft wide transects will be investigated by UXO Technician SCUBA divers. In addition to completing the Phase 2 transects, radial transects may be required to determine the extent of a MEC target area. One method to determine the transect placement will be to place the transect so it extends seaward from the CMUA land/water interface, trending along historical flight paths and intersecting any locations of MEC (if there was a discovery of MEC). The length of the radial transect will be 250 meters (the approximate distance that DGM anomalies are demonstrated to exist beyond the CMUA on cayos where this could be measured (e.g., Cayo Botella and Cayo Del Agua) was 250 meters). The radial transects will be 9 ft wide. Three UXO Technicians will conduct an analog assisted visual investigation of the transect starting at sea and

stopping at the discovery of MEC, indicators of MEC, or the MEC item that was previously discovered (if the transect was placed so it intersected with the previously discovered MEC item). The UXO Technicians will be staggered as to insure the analog instruments do not interfere with each other. Examples of how radial transects will be applied to a MEC target area can be found in Appendix B, Figures B-2 through B-14. Transects, transect segments, and radial transects will be completed in the following manner:

- Transects will be marked by an anchor and buoy on each end of the transect or transect segment, and a line will be suspended in the water column to guide the divers on the transect route. The SUXOS will determine the length of transect to be investigated by a dive set. The depth of water and site conditions will have an impact on the progress for each dive team to complete the portions of a transect segment to be completed. Multiple dive sets may be required to complete a transect segment or transect. All lines will be polypropylene which is positively buoyant and will not sink and tangle around corals – divers will ensure that as the lines are deployed they remain free from coral. Immediate intrusive investigation will be conducted to ensure the anomaly is verified and investigated. When the UXOQCS Diver is performing a QC check along transects, the UXOQCS will follow behind the divers, performing a QC sweep of the transect as it is being investigated by the dive team.
- The progress of the intrusive team will be tracked using a Trimble GEOXT (or equivalent) suspended on the surface above the center UXO SCUBA Technician. The track log recording will be provided at the end of each day to the GIS Manager to determine if the MQO's were met for the transect. If the completed transect was outside of the MQO parameters, it will be reworked. However, all data collected from the previous failed transect will be retained for the RI Report.
- If it is determined that the “Underwater Navigation System” or the USBL Positioning System can be used to guide the intrusive investigation team along the transect, it will be used in place of the guide lines/buoys/anchor system. The Trimble GEOXT (or equivalent) will still be suspended above the center diver to maintain the track of and progress along the transect.
- If a MEC/MD item is located, it will be identified, photographed, and a buoy will be deployed to get a GPS position. If the item is to remain in place for further processing, an unmarked clump will be placed close to the MEC item and its GPS position will be recorded. The distance and direction from the MEC will be recorded, provided corals are not impacted by the placement of the clump. If corals interfere with the placement of the clump, a clump will not be used. The clump is to assist in reacquisition during follow-on work phases.

3.2.1.6 Torpedo Area Survey

Area surveys were scheduled for Phase 2 to investigate possible torpedo ranges at Cayo Geniqui and Culebrita Marc Point. These area surveys were not completed due to a continued high sea state that exceeded the Mag ROV's safe operating parameters. The Parsons/USA team will survey the two suspected torpedo sites with UXO SCUBA Technicians. UXO SCUBA Technicians can operate in a higher sea state than the Mag ROV proposed for Phase 2. The UXO SCUBA Technicians will perform a running jack stay survey which will allow three or more UXO SCUBA Technicians positioned within visibility of each other (e.g., staggered and 5 ft apart) and with overlapping fields of view to perform an instrument assisted visual transect covering a significant width of the survey area with each transect. Though multiple jackstay methods may be applicable to an area survey, the primary method follows:

- Two lines (jackstay lines) will be laid as close to parallel to each other as possible at approximately 30 ft apart (30 ft if 3 divers are used, but the separation of the jackstay lines can be increased if more divers are added). The center diver will swim down the length of the jackstay line with additional divers swimming abreast and on either side of the center diver. Upon reaching the end of the jackstay line, the divers will swim over to and then along the second jackstay line. While the divers are transiting the second jackstay line, the first jackstay line is recovered and then placed 30 ft apart on the far side of the second jackstay line, becoming the third jackstay line for the divers to swim. This process is repeated until all of the area is surveyed. Upon completion of the area survey, the GPS track log (GPS will be floated over the center diver; the coverage per pass will be a 15 ft transect width for three UXO divers) will be evaluated and if an area was not

covered by the divers, those gaps in the area survey will be identified and re-investigated following the same procedures identified above. The UXOQCS will perform 15% of the intended planned coverage for that day's evolution. When the UXOQCS is performing underwater QC, the UXOQCS is added to the dive team and will observe the survey procedures of the UXO SCUBA Technicians. When the UXO SCUBA Technicians are investigating unconsolidated sediment areas, the UXOQCS will follow behind the divers with the analog all metals detector (the same type the UXO divers are using) and verify segments of the survey area (see Figure 3-2).

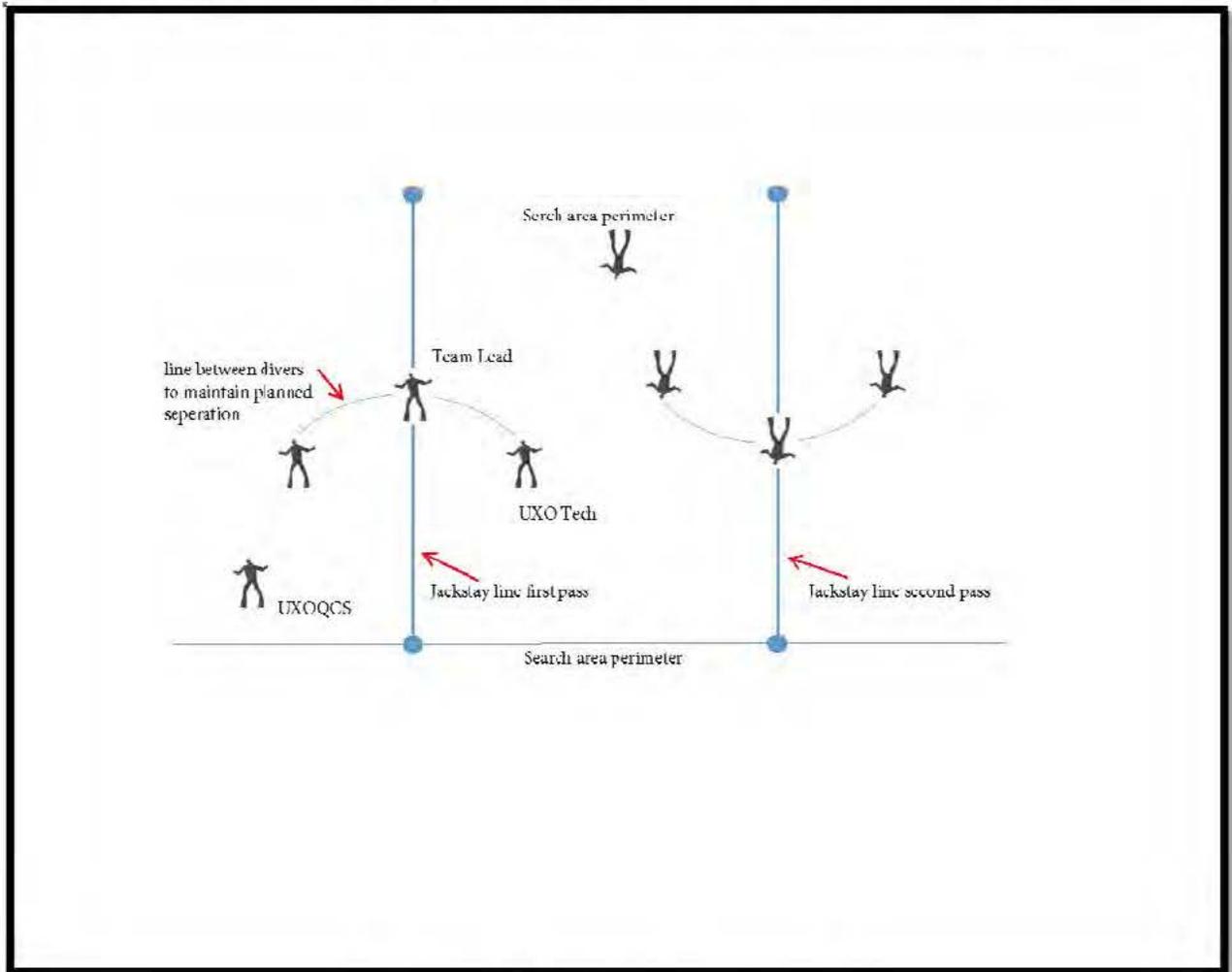


Figure 3-2: Area Survey Technique

3.2.1.7 Reacquire and Investigation of Suspected MPPEH items from Phase 1.

Suspected MPPEH items that were captured on video during Phase 1 will be reacquired by using the Trimble Pro-XRT DGPS to get the vessel as close to the recorded positions. The Phase 1 camera GPS location or the Phase 2 DGM anomaly location will be recorded as the MPPEH/MEC position. UXO SCUBA Technicians will reacquire and document the suspect MPPEH item using the same procedures identified in the previous section.

3.2.1.8 Safety Briefs and Supervisor Checks

Parsons will routinely conduct four distinct team safety and operations briefs during execution of SCUBA and snorkeling operations, as described in the Dive Operations Plan (Appendix L):

- Pre-Dive brief
- Dive Supervisor's Checklist
- Daily Safety Brief
- Post-Dive Debrief.

The Pre-Dive Brief will be completed prior to each SCUBA diving or snorkeling event, while a Daily Safety Brief will be completed prior to commencement of each work day. The Diving Supervisor will provide the Pre-Dive Brief, highlighting both SCUBA diving/snorkeling and MEC related safety precautions. The UXOSO will conduct the Daily Safety Brief.

The briefs will focus on the specific hazards anticipated at each work site during that day's operations and the safety measures that will be used to eliminate or mitigate those hazards. Review of applicable AHA sheets, contained in Attachment 2 of the APP (Appendix D of the WP), will also be conducted. The briefs will also refer to other operations within the area having safety ramifications.

As work progresses and the team's location changes within a site or from site-to-site, any corresponding changes in anticipated hazards or emergency procedures will be reviewed.

In addition, the UXOSO or the Diving Supervisor may hold a safety stand-down at any time a degradation of safety or a safety issue warranting review is noted.

The SUXOS and UXOQCS/UXOSO will ensure that team safe separation distances and the essential and nonessential personnel safe distances are implemented as applicable and as referenced in the ESP.

3.2.1.9 Support/Safety Vessel

A support/safety vessel will maneuver in proximity to the UXOT SCUBA divers/snorkelers, with the distance dependent on the conditions/state of the work site. Maneuvering of the vessel where UXOT SCUBA divers/snorkelers are working will be performed in a way such that the vessel operates in adequate depths, doesn't anchor, etc., to protect natural resources while still supporting field operations. The vessel operator will carry and consult appropriate NOAA nautical charts, NOAA benthic habitat maps, and aerial photographs to locate potential coral reefs, colonized hard bottom, and seagrass areas.

The support/safety vessel will be available during all snorkeling operations in order to quickly respond to any emergencies.

3.2.1.10 Inspection Class ROV Operations (No diver support required)

An inspection class ROV may be used for a collection of optional underwater data, depending upon the situation, site conditions, and on-site determinations made by Parsons field managers. Situations where the ROV may be used to supplement underwater operations include, but are not limited to, the following:

- Visual investigations
- Visual surveys
- QC and safety observations
- Post MEC/MPPEH explosive demolition verifications.

As applicable, a peanut buoy (small buoy with soft diver's weight) will be laid at the anomaly GPS coordinate or general location to be investigated. The ROV Investigation Team will then dive the ROV on the anomaly/location, providing video of the targeted anomaly and the surrounding marine habitat. The ROV has a tethered range of 550 ft, and possesses a forward looking sonar and video. Data is captured via a computer located on the surface. The ROV also possesses real time GPS navigation with corrected position fixes through the GPS antennas located on the unit's tether (see Figure 3-3).



Figure 3-3: Video Ray

3.2.1.11 MEC Identification/Removal

Any suspected or known MEC encountered during excavation will be marked by a buoy and anchor and then the positioning data will be collected. If the MEC discovery is the result of a DGM anomaly investigation, the target ID positioning data will be used. A UXO SCUBA Technician III will evaluate the item found and immediately report the condition of the item to the SUXOS. No UXO will be moved without being identified as acceptable to move and an evaluation of its condition. Approval resides with the SUXOS and UXOSO. If the MEC/MD item is deemed acceptable to move but corals are attached, coordination with the Natural Resource Agencies will be conducted for removal of coral from the MEC/MD item and the coral will be relocated. The procedures for the removal and relocation of coral are described in Appendix C of the *Final Supplemental Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat (Addendum 1)*, DERP-FUDS Property No. 102PR0068, Culebra, Puerto Rico, February 25, 2015 (Appendix J).

If the MEC item is deemed unacceptable to move, meaning that UXO Technicians will not move the MEC item by hand or by any other means while personnel are inside the exclusion zone (EZ) (identified in the ESP), it may be moved by remote means (lifting balloon, deep water lift system, etc.) provided the EZs required by the ESP are maintained during movement.

If an excavated item is considered MEC, it will be uncovered sufficiently to obtain a positive identification of the item and to determine whether or not it is fuzed. Unfuzed MEC may be removed and taken to shore for demolition on one of the beaching locations. A separate determination on demolition will be made by the SUXOS with the concurrence of the USACE OE Safety Specialist (OESS).

Fuzed UXO will not be removed unless it has been determined to be acceptable to move by the SUXOS and UXOSO. The SUXOS will make a determination in each case on how best to dispose of the UXO. If the UXO cannot be safely disposed of under the existing conditions, the USACE OESS will be notified. In no case will the SUXOS authorize or undertake destruction of UXO when there is sufficient reason to believe that the demolition action will result in personnel casualties, property damage, or damage to listed threatened and endangered species.

In some cases, the UXO item may be affixed to the reef or reef substructure. If the UXO item is to be relocated and is approved by the SUXOS and UXOQCS/UXOSO for relocation, a polypropylene line may be tied to the UXO item to separate the item remotely from the reef (remote means will be by boat or from shore, if applicable, while adhering to the ESP).

Security (24 hr guard) on MEC items that are left underwater is not required. Should a MEC item be moved on to land at one of the designated beaching locations, security will be required until the MEC item is disposed of and the hazard eliminated. MEC will not be stored.

3.2.1.12 Raise, Tow and Beach Operations

MEC/MPPEH that is acceptable to move by remote means may be moved to an alternate site for demolition to protect corals, fish populations, and transiting mammals and turtles from injury due to an underwater detonation. To move MEC/MPPEH items remotely, a lifting balloon, deep water lift system or other suitable alternatives will be used for lifting and towing the MEC/MPPEH item to the demolition site. During raise tow and beach operations, the ESP will be followed. The ESP identifies safe separation distances for essential and non-essential personnel both in and out of the water. These safe separation distances will also be enforced for the transit route. The following applies:

- All notifications will be made per the ESP and notifications to the Regulators and Stakeholders will be made by the USACE PM (see Appendix C for contact information).
- Coordination with the Regulators and Stakeholders, to include supporting agencies such as the San Juan Police Department and Culebra Mayor's Office, shall be made as far in advance as possible to identify areas that may need to be restricted due to MEC hazard arcs, to identify agency support, such as perimeter security, and to ensure that public announcements have time to be vetted and approved prior to the start of the operation.
- The SUXOS will seek law enforcement support vessels from PR DNER and San Juan Police Department (Culebra Precinct). PR DNER and San Juan Police Department will be requested to use either their small boats or provide law enforcement personnel on the project support vessels to enforce separation distances. If law enforcement personnel are not available, the support vessels will be used to monitor boat traffic that may encroach into the exclusion zones (EZ). The support vessels will advise the field teams to stop intrusive work until the vessel has been moved outside of the EZ. Should the vessel remain in the EZ, then the field teams will move to other work areas.
- A consolidation point will be identified that is in route to the demolition site in which a MEC item can be lowered and staged should something happen at the beaching location that requires the operation to be temporarily halted.
- Beaching sites within the safe separation distances will be secured and Police Officers posted on the beaches (adhere to safe separation distances for the Police Officers) and along public routes to enforce closure. Minimum separation distances (MSDs) around the beaching site will be enforced (see ESP).
- The MEC item to undergo raise, tow, and beach operations must be free of corals that are on the Listed Threatened or Endangered list. "Listed" corals which might be harmed or damaged by the lifting procedures, should not be in the immediate vicinity of the MEC item. If the MEC/MD item to be moved has corals attached that are "listed or non-listed", coordination with the Natural Resource Agencies will be conducted for removal of the coral from the MEC/MD item and the coral will be relocated. The procedures for the removal and relocation of coral are described in Appendix C of the *Final Supplemental Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat (Addendum 1)*, DERP-FUDS Property No. 102PR0068, Culebra, Puerto Rico, February 25, 2015 (Appendix J).
- Floating lines, such as polypropylene, will be used for all aspects of the operation. This will ensure lines do not sink resulting in damage to corals.
- The MEC item will have a buoy with a line that exceeds the depth of the water by 25%. The buoy will not be attached to the bridle or lifting balloon but must be attached directly to the MEC item.
- The lifting balloon, or suitable alternative, will be attached securely to the MEC item by SCUBA UXO divers, using a bridle attached by cargo straps or line.
- The MEC item must be structurally sound to qualify for raise, tow and beach procedures.

- The bridle should be long enough to allow for the MEC item to be suspended approximately 10 ft into the water column. Tow distance will not be less than 150 meters or the distance calculated using the BEM, whichever is greater (see ESP). If the MEC item is located in water less than 10ft it may be necessary to revise the BEM calculations (depth of towed munition is not to be less than 5 ft) for the Boat and Personnel Withdrawal Distance.
- A remote pull using a polypropylene line may be required to break the munitions free from the bottom, to gain access to secure the bridle. The ESP will be consulted to provide a safe pull distance for the boat from the MEC item. If the MEC/MD item to be moved has corals attached that are "listed or non-listed", coordination with the Natural Resource Agencies will be conducted for removal of the coral from the MEC/MD item and the coral will be relocated. The procedures for the removal and relocation of coral are described in Appendix C of the *Final Supplemental Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat (Addendum 1)*, DERP-FUDS Property No. I02PR0068, Culebra, Puerto Rico, February 25, 2015 (Appendix J).
- A beaching team will have the beaching line flaked out, with the bitter end running to a buoy well away from the beach, to which the tow boat will attach its tow line passing the tow to the beaching crew. The beaching operation will be set up with consideration to ensure that it does not cause a violation in the safe separation distances for essential personnel (see ESP).
- The beaching team will establish a channel with channel buoys to guide the vessel to the munition reference buoy. The munition reference buoy will be placed at the mouth of the established channel with the beaching tow line attached (this line is then picked up by the boat crew, the boat tow line and beaching tow line are connected allowing the beaching team to take over the tow and beaching of the munition). The channel will be inspected by snorkelers or divers to ensure the route is free of proposed or threatened species in depths in which it is anticipated that the munition while under tow may contact the sea floor.

3.2.1.13 MEC/MPPEH Explosive Demolition Operations

MEC demolition operations will follow the ESP. Safety is the primary concern during demolition of MEC and related material. The most obvious requirements are to protect personnel, the public, and the environment from fire, blast, noise, fragmentation, underwater shock wave, and toxic releases. Planned detonation of explosives requires more stringent safety distance requirements than those for ordnance in storage, and such detonation will be conducted in accordance with the requirements outlined in DoD 6055.09-M, EM385-1-97, p.1.2.C.3, EM1110-1-17 App D, and the ESP.

Parsons intends to use electrical demolition procedures for underwater detonations. Depending on local explosives availability, Parsons may use (with the concurrence of the OESS) a Shock Tube Firing System in accordance with SOP OPS 03 in Appendix J for land based detonations. All personnel directly or indirectly engaged in UXO operations will be thoroughly trained and capable of recognizing hazardous explosive exposures. All personnel will be required to read, become familiar with, and adhere to the requirements contained in the ESP and this chapter to ensure all general safety regulations and safe work practices are observed at all times.

All personnel engaged in UXO demolition activities will utilize these procedures. However, situations may warrant additional safety measures, such as fire trucks, medical personnel, and protective clothing. The SUXOS has the overall responsibility for compliance with the minimum requirements listed below and has the authority to increase the requirements as the situation dictates.

All MEC and MPPEH related material containing explosives or hazardous material will be disposed of by detonation using standard demolition procedures as outlined in Technical Manual (TM) 60A-1-1-31 and the SOPs in Appendix J of this WP. Parsons will use electric (either remotely initiated by use of a remote firing device or by a blasting machine) or shock tube firing procedures for positive control of demolition operations. If these methods of demolition are determined to be impractical, Parsons will notify the on-site USACE OESS, who will request local military Explosive Ordnance Detonation (EOD) support. The following paragraphs describe the procedures Parsons will use to detonate MEC and MPPEH.

Throughout MEC demolition operations, the *Final Supplemental Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat (Addendum 1)*, DERP-FUDS Property No. I02PR0068, Culebra, Puerto Rico, February 25, 2015 (Appendix J), Sections 4.4 (Land Based Detonations) and 4.5 (In-Water/BIP Detonations) will be followed to minimize the impact on the environment. Parsons will implement turtle nesting surveys, following the guidelines found in the referenced CESAJ SOP, for MEC beaching sites intended to be used for MEC demolition by detonation if the beaching sites are known or suspected to be used by turtles for nesting.

Parsons will dispose of MEC and MPPEH related materials after:

- Notification of the agencies listed in Appendix C, Points of Contact, and the ESP has been made. This includes Notification to Airmen (NOTAM), Notice to Mariners (NOTM), and notification to the local police.
- Establishment of and confirmation that the EZ is free of non-essential personnel and prior to the MEC items being brought ashore. If MEC items are being disposed of in the water, small boats will be used to monitor the hazard arcs to ensure the EZ is free of non-essential personnel.
- SUXOS coordinates with the USACE OESS and keeps the OESS apprised of all progress.
- All essential and nonessential personnel will maintain the safe separation distances as described in the ESP for underwater or land detonations.

MEC that is acceptable to move may be consolidated within an area to reduce the number of shots and lessen environmental damage. Land based demolition shots may require engineering controls to meet the MSD requirements stated in the ESP.

3.2.1.14 Coordination and Supervision

On-site demolition will be under the direct control of the SUXOS. The SUXOS will be responsible for training all personnel regarding the nature of the materials handled, the hazards involved, and the precautions necessary, and will be present during all on-site demolition operations. The SUXOS will maintain custody of the blasting machine or shock tube initiator. The SUXOS will ensure that the appropriate local authorities are notified prior to daily on-site demolitions (see the ESP).

The SUXOS and UXOSO will be on-site at all times during demolition operations. The UXOSO will monitor compliance with the safety measures contained in the WP and associated documents and, in case of noncompliance, is vested with the authority to stop or suspend operations. Individuals will report the completion of tasks to the SUXOS.

3.2.1.14.1 Hazard Analysis

A hazard analysis will be developed for each MEC/MPPEH. The hazard analysis will take into account human health and safety and Natural Resources as described within the Appendix J: SOP ("USACE SOP for Endangered Species Conservation"). The analysis will also provide recommendations and options for the removal and demolition of the munitions. In relation to any encountered MEC/MPPEH item, no actions will be completed to remove, explosively dispose of, or leave in place (if leave in place, the hazard analysis will recommend with or without cement encapsulation, and will provide justification) without USACE notification and concurrence.

3.2.1.14.2 Land Detonation for Previously Submerged MEC/MPPEH

The UXOT dive team will transport recovered MEC/MPPEH items destined for demolition by detonation to one of the selected beaching areas (see Appendix B: Figures B-17 to B-20). Pre-selection of the beaching/detonation areas is needed to ensure turtle monitoring can take place in accordance with the *Final Supplemental Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat (Addendum 1)*, DERP-FUDS Property No. I02PR0068, Culebra, Puerto Rico (CESAJ, February 2015) found in Appendix J. The use of other sites other than what is proposed and approved in this WP must be coordinated with the USACE COR and PM. How the MEC/MPPEH item is transported will be determined by evaluating the type/fusing/condition and any environmental impacts that may occur due to transport of the item. Each MEC/MPPEH item will require coordination with the USACE PDT and

outside agencies for the transport and treatment of the MEC/MPPEH item. Therefore it is preferable for all demolition operations be conducted as the last phase of the field work. The SUXOS and UXOSO will make the determination if and how a MEC/MPPEH is to be relocated.

A remotely actuated lifting balloon (Mark V/ORCA-MOD 1 MVO 1000 Lifting Balloon with an 1100-pound lift capacity and Acoustic Actuation) can be used to lift the MEC/MD from a safe distance (safe separation distances are addressed within the ESP) (see Figure 3-4). In some cases, the munition may be firmly attached to the sea floor and may have to be separated from the reef remotely by a remote pull from a vessel or other methods determined as safe by the SUXOS and UXOQCS/UXOSO and with concurrence from the USACE COR. Removal of MEC attached to or embedded in coral reef or reef substructure will be carried out in consultation with USACE, project stakeholders and Regulators. If the MEC/MD item to be moved has corals attached that are "listed or non-listed", the procedures for the removal and relocation of coral described in Appendix C of the *Final Supplemental Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat (Addendum 1), DERP-FUDS Property No. 102PR0068, Culebra, Puerto Rico*, February 25, 2015 (Appendix J) will be followed. Planning for the treatment for each MEC/MPPEH item will begin as soon as the item is discovered to ensure the demolition plans are vetted and approved prior to any actions being conducted.



Figure 3-4: Mark V/ORCA-MOD 1 MVO 1000 Lifting Balloon with an 1100-pound lift capacity and Acoustic Actuation

3.2.1.14.3 Underwater and Land Explosive Demolition Operations

Underwater explosive demolition operations may be required to address MEC/MPPEH. Underwater detonations require timely notification and coordination with the USACE and stakeholders. Coordination will be conducted as far in advance of the demolition operation as possible and will follow the ESP and

Appendix C, Points of Contact. The Parsons PM will coordinate with the USACE COR who will work closely with the USACE PM and stakeholders.

Standard U/W demolition procedures will be used, and are reflected in Attachment 1 of the Dive Operations Plan, DSOP 2 Underwater Demolition, and OPS-03 Demolition Disposal Operations on Land. A single, tended diver (using a witness float) will be used to place the explosive charge if it is determined to be safe to do so; otherwise, two divers will be used (witness floats will be attached to divers). Upon completion of demolition actions, all munitions debris will be inspected and removed from the marine environment for further processing. If explosives are still present, the munitions debris will be collected and either a cleanup shot will be done in an U/W sand area or on land at an approved beaching site (see Appendix B: Figures B-17 through B-20.1). Any remaining MD or munitions remnant that is determined to be free of explosives will be inspected and certified as MDAS per Appendix J: SOP OPS 13. The following MPPEH Treatment Flow Diagram (see Figure 3-5) will be used by the Parsons field teams to identify the treatment approach for each MPPEH item.

The *Final Supplemental Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat (Addendum 1)*, DERP-FUDS Property No. 102PR0068, Culebra, Puerto Rico, February 25, 2015, Sections 4.4 (Land Based Detonations) and 4.5 (In-Water/BIP Detonations) (Appendix J) will be followed to minimize the impact on the environment.

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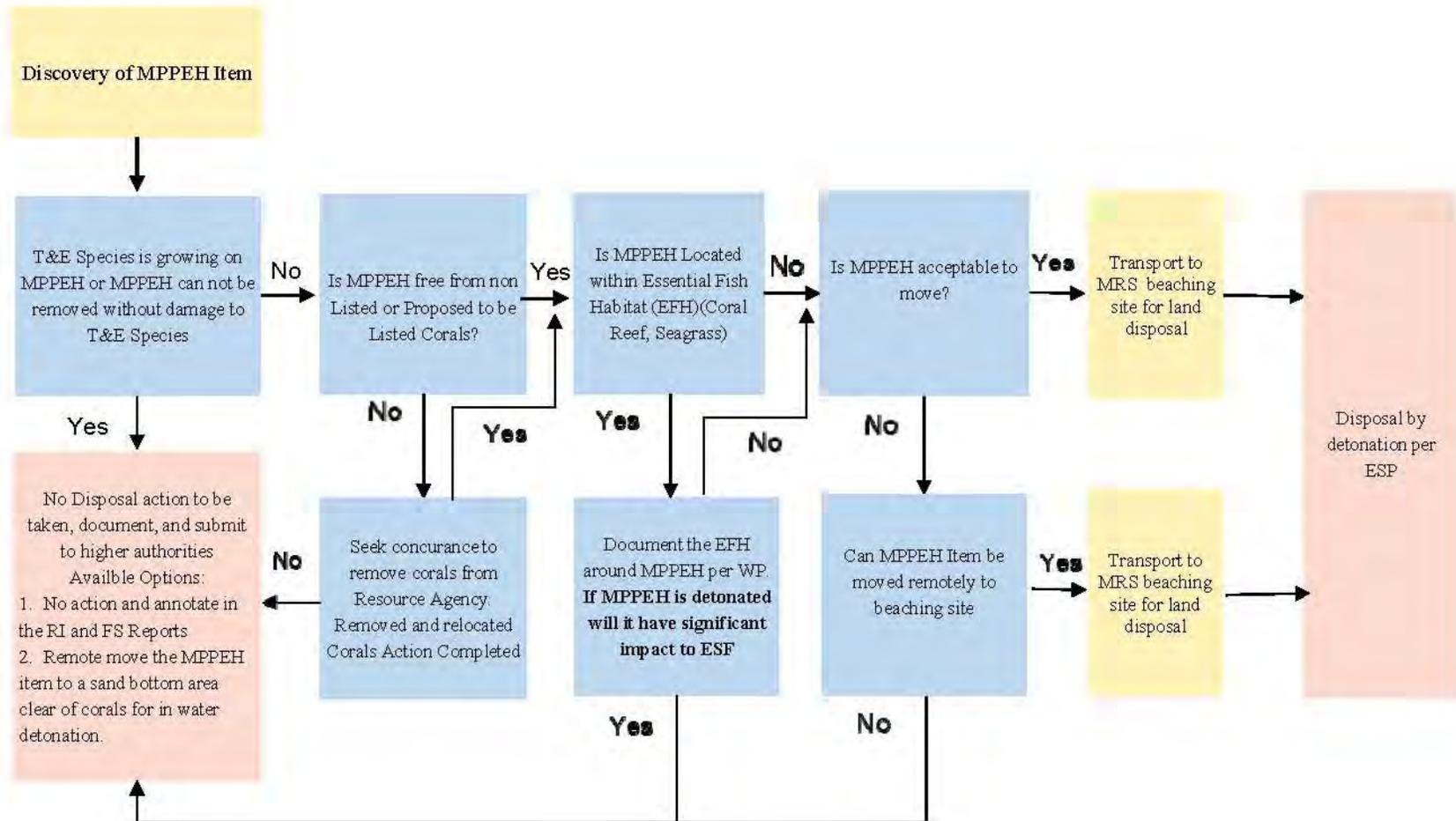


Figure 3-5: MPPEH Treatment Flow Diagram

3.2.1.15 Temporary Storage of MDAS

MDAS may be temporarily stored in a 55-gal locked drum and placed inside the fenced-in USAE magazine compound located at Flamenco Peninsula (see Figure 3-6). MDAS may also be stored in locked drums at the Culebra Police Department.

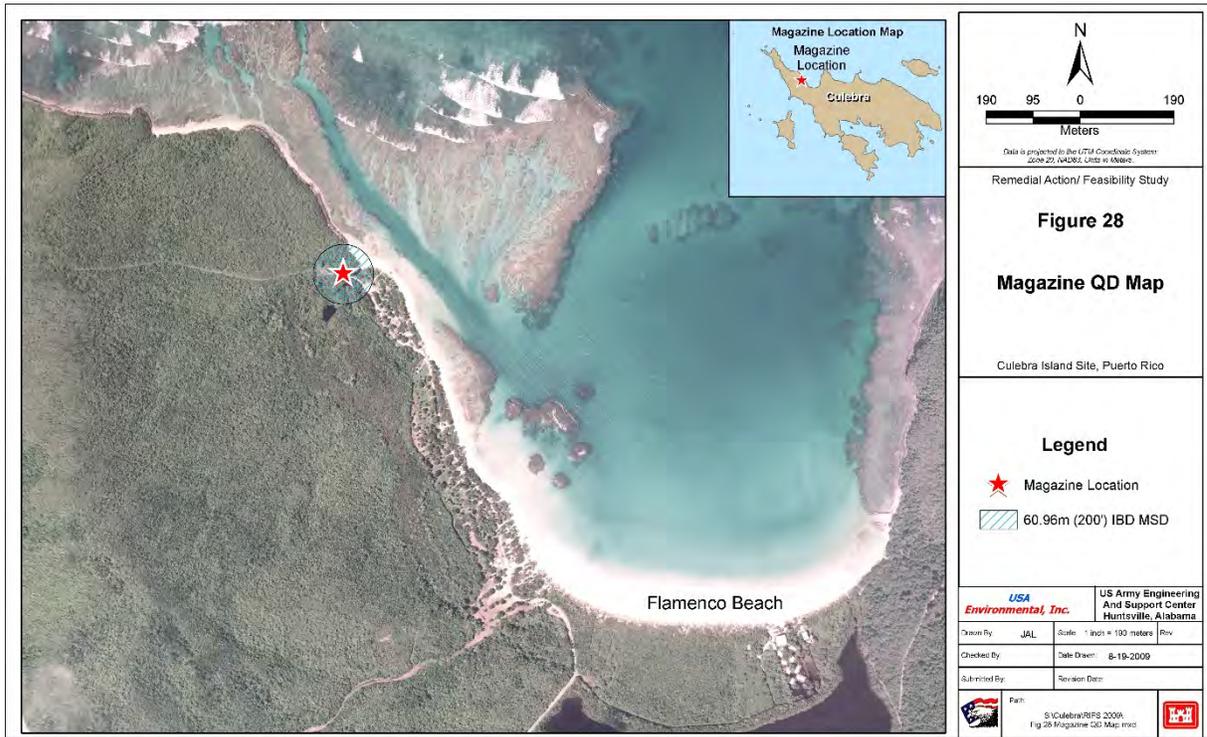


Figure 3-6: USA Magazine Location

3.2.1.16 Environmental Sampling

As part of the underwater investigation of the Culebra Island RI activities, discrete marine sediment samples will be collected from the U/W areas surrounding MRS 02 and MRS 07 to evaluate the presence of MC resulting from DoD activities. The location and number of the samples collected will be determined by MEC/MD findings during intrusive operations.

- A marine sediment sample will be collected by a UXO SCUBA Technician each time a new munition type is found (i.e., 4.2-inch mortar, 5-inch projectile, BDU-33 practice bomb, etc.), at MEC items having cracked cases and pinhole breaches indicating a low order detonation, and in areas identified by the project geophysicist based on DGM data supporting MD concentration areas. For additional underwater findings of an already sampled munition type, random samples will be collected at a rate of 10%.
- Samples will be collected beneath the munitions if the item has been determined to be acceptable to move, otherwise, the sample will be collected adjacent to the munitions. It is anticipated that any MC exceedances encountered will be highly localized.
- Sediment samples will be collected from a depth interval of 0 to 6 inches in areas where sufficient media is present. The amount of sufficient media is anticipated to be in areas with one inch or more of sediment.

- Samples will only be collected in unconsolidated sediments. If only coral, rocks, or bedrock are present, no samples will be collected. All efforts will be made not to harm or harass species located directly adjacent to sample locations.
- Samples in unconsolidated sediment areas where seagrass is present will be collected using the procedures included in Section 6.3.1.1 which describes how intrusive investigations will be conducted in seagrass areas.
- QC samples consisting of Field Duplicates, MS/MSD, and Temperature Blanks will be collected at a frequency stipulated in Table E-1 in the FSP, Appendix E.1.

Two sampling procedures are planned and will be chosen based on the strength of current/wave action at the sample collection area. If the current/wave action at the sample location is non-existent to mild (i.e. in inlets and at depths below the influence of wave action), and results in minimal dissipation of particles, samples will be collected with a disposable plastic hand trowel and placed in a zip-loc bag for transport to the surface. If the current/wave action is strong enough to significantly dissipate particles upon collection, a hand auger with a plastic sleeve will be used to collect samples.

For further details please see Appendix E: SAP.

3.2.2 TIME CRITICAL REMOVAL ACTIONS

The procedures outlined in this WP apply to a RI/FS. Should circumstances justify the need for a Time Critical Removal Action (TCRA), upon direction from the USACE, Parsons will develop procedures in accordance with USACE guidance.

3.3 GEOSPATIAL INFORMATION AND ELECTRONIC SUBMITTALS

This section details procedures that Parsons will use to perform mapping and GIS integration during the Phase 3 field activities.

3.3.1 GIS INCORPORATION

The GIS database will be maintained at the USAE corporate office located in Oldsmar, Florida. The GIS Manager will manage the database, which is used to store preliminary and final, or published versions, of project GIS data. This database is the official project repository of GIS data, including unprocessed feature and attributable data sources that may be used outside the GIS. The Oldsmar-based database is the main location for processing data sources into draft and final GIS products, as well as for production work.

USAE will produce ArcGIS Projects in accordance with the PWS, and will update the GIS as often as necessary to enable Parsons to plan and coordinate daily, weekly, and monthly activities. Acreage clearance estimates will be prepared and revised based on the latest design drawings provided to USAE. The ArcGIS project will be prepared in ArcGIS 9.x format and be compatible with ArcGIS 9.1.

Suspected underwater MEC items will have the original coordinates documented within the GIS. The layers will be completely independent, and produce a concise picture of all clearance activities completed during this contract. Supporting tabular data will be provided in Microsoft Excel and/or Microsoft Access format at the completion of the project.

Throughout the project, USAE will build the GIS database upon existing data, will and integrate the field data into the system. To enhance accuracy of the field data, Parsons will collect the field data using a ruggedized handheld GPS or Toughpads and electronic data collection system, as required. Project data will be downloaded on-site on a daily basis and digitally transferred to USAE's Corporate Headquarters on at least a weekly basis. Upon receipt of the field data, the GIS Manager will perform an accuracy inspection of the data and import this data into the project GIS.

All GIS data will be in ESRI Shapefile or Geodatabase format. Raster data, such as orthophotography, will be in Tagged Image File Format (TIFF) or MrSID-compliant format. Associated databases will be in Microsoft Excel format.

3.3.2 PLOTTING

All control points recovered or established will be plotted at the appropriate scale for the parcel being described. Parcels less than 10 acres will be plotted at 1:200. Parcels of 10-100 acres will be plotted at 1:600 (1" = 50'). Parcels larger than 100 acres will be plotted at 1:2400 (1" = 200'). A sheet index for the project will be prepared that includes enough of the planimetric data to indicate the sheet's geographical location in the project area. This index will be shown on each map with the current sheet crossed-hatched or heavily outlined. If required, a separate sheet file may be utilized for the index.

3.3.3 MAPPING

The location, identification, coordinates, and elevations of all control points recovered or established at the site will be plotted on a map. Control points will be identified on the map by its name and number and the final adjusted coordinates and elevations. The coordinates for points of interest will be shown to the closest 1.0 ft. Locations of individual recovered MEC items will be located to a horizontal accuracy of plus or minus 1 ft within the grid and will be plotted on a map. Maps will have a revision block, title block, index sheet layout, legend, grid lines, scale bar, and a true north arrow. In general, the direction of north will run from the bottom of the file to the top, with no skew. A legend showing the standard symbols used for mapping will be on the map as well as a map index showing the site in relation to all other sites within the project boundary.

3.3.4 DIGITAL DESIGN DATA

All GIS Data will be delivered in ESRI Shapefile format. A READ ME file will be included with delivered data, which will contain basic information about each Shapefile.

3.3.5 COMPUTER FILES AND DIGITAL DATA SHEETS

All final document files will be delivered to USAESCH in IBM and MS Office compatible formats. The drawing and plot data will be provided in the UTM Coordinate System, NAD83, with units in meters. GIS data will be submitted in ESRI Arc Map-compatible format. Raster data, such as USGS Topographic Quadrangles or Orthophotography will be provided in either TIFF or MrSID format. All ArcGIS project files (.mxd) will be supplied with the appropriate final report. In addition to GIS data and project files, maps will be delivered in PDF format for viewing without modification.

All final GIS data generated from this project will conform to the Spatial Data Standards for Facilities, Infrastructure and Environment.

3.4 PERSONNEL QUALIFICATIONS

As required by the specific task, all Parsons personnel and its subcontractors (as applicable) will complete the OSHA 40-hour training course for hazardous waste site workers and an 8-hour refresher course as appropriate. Management and supervisory personnel will also complete supervisory training and refresher training as required by CFR 1910.120 e (4) & (8). Additional site-specific training, in accordance with 29 CFR 1910.120, EM 385-1-1 (USACE Safety and Health Requirements Manual), and ER 385-1-92 (Safety and Occupational Health Document Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) Activities) will be provided to all personnel upon their initial mobilization. A Medical Surveillance Program is in place with the latest examination within the last 12 months. CPR training will be required for Parsons personnel and subcontractors that are participating in field operations.

3.4.1 UXO PERSONNEL QUALIFICATIONS

The Parsons Underwater UXO Team will include UXO Technician III/II who will be qualified personnel, approved by the USACE. UXO personnel must meet the requirements set forth in DOD Explosives Safety Board (DDESB) Technical Paper (TP) 18, Personnel/Work Standards. UXO personnel will be U.S. citizens and be graduates of the either the U.S. Naval EOD School, Eglin AFB, Florida; the U.S. Army Bomb Disposal School, Aberdeen Proving Ground, Maryland; the U.S. Naval Explosive Ordnance Disposal (EOD) School, Indian Head, Maryland; the EOD Assistants Course, Redstone Arsenal, Alabama; the EOD Assistants Course, Eglin AFB, FL or a DOD-Certified equivalent course. Credit for the EOD experience while assigned to the National Guard or Reserve will be based on the actual documented time spent on active duty, not on the total time of service.

3.4.2 ESSENTIAL PERSONNEL OTHER THAN UXO TRAINED TECHNICIANS

Marine biologists and other personnel functioning as survey snorkelers or in a SCUBA diving status, that are considered essential personnel, will be qualified as open water divers by a nationally recognized organization, examples of acceptable certifications follow:

- Professional Association of Diving Instructors (PADI)
- National Association of Underwater Instructors (NAUI)
- U.S. Navy Diving and Salvage Training Center
- U.S. Forest Service Snorkel Safety Program.
- A commercial diving School
- A military School
- A Federal School (e.g., USACE)
- An Association of Commercial Diving Educators (ACDE)-accredited school

Personnel deemed essential for the project but are not qualified as UXO technicians per the applicable requirements of DDESB TP-18 who may be required to SCUBA dive within the MRS will be escorted by UXO SCUBA Technicians and no MEC processes will be conducted (e.g., intrusive operations, handling or otherwise disturbing MEC or MPPEH) during the diving operation.

The Diving Supervisor will maintain personnel files on each diver/snorkeler, to include copies of qualifications, training records, and certificates of qualifications that support the individual's placement and position. Prior to initial assignment or any change in duties/assignment, the Dive Supervisor will review the individual's qualifications, training records, and certificates to ensure the individual is qualified to perform required tasks.

3.4.3 UXO DIVING TECHNICIANS

UXO Diver Technicians will be current in diving qualifications, periodicity, and have current diving medical certification. All UXO Diving Supervisors, UXO Diver Technicians, and Tenders will be certified in SCUBA by one of the following agencies:

- A commercial diving School
- A military School
- A Federal School (e.g., USACE)
- An Association of Commercial Diving Educators (ACDE)-accredited school

Each dive team member will have the experience or training necessary to perform assigned tasks in a safe and healthful manner.

Each dive team member will have experience or training in the following:

- A graduate of U.S. Naval Explosive Ordnance Disposal (EOD) School, if engaged in munitions response diving operations;
- The use of tools, equipment and systems relevant to assigned tasks;
- Techniques of the assigned diving mode, diving operations and emergency procedures.
- Cardiopulmonary resuscitation and First Aid (American Red Cross or equivalent).

In addition, all UXO Diver Technicians will also meet the applicable requirements of DDESB TP-18 for the related position as previously described. All UXO Diver Technicians will be qualified as UXO Technicians II/III.

All UXO Tech III divers will be designated in writing as a Diving Supervisor. However, there will only be one Primary Diving Supervisor for the project. This allows for the Diving Supervisor to participate as required in diving operations by handing over the dive operation to one of the alternate Diving Supervisors.

Parsons will not require a dive team member to be exposed to hyperbaric conditions against the employee's will, except when necessary to complete decompression or treatment procedures.

3.5 INVESTIGATION DERIVED WASTE PLAN

Previous investigations and records detailing historical use of the MRS sites have not identified Recovered Chemical Warfare Materiel (RCWM) or any other hazardous material contamination at the project site. As a result, the project team does not anticipate recovery, handling, or treatment of Investigation Derived Waste (IDW) during the course of the RI/FS investigations.

3.6 RISK CHARACTERIZATION AND ANALYSIS

3.6.1 MEC HAZARD/MC RISK

A qualitative MEC hazard assessment will be provided to assess the hazards of MEC to the sites investigated. The approach provides an assessment of the acute explosive hazards associated with remaining MEC at MRSs by analyzing site-specific conditions and human issues that affect the likelihood that a MEC accident will occur. The qualitative MEC hazard assessment focuses on hazards to human receptors and does not directly address environmental or ecological concerns that might be associated with MEC. The qualitative MEC hazard assessment will be included with the RI report for each MRS. It should be noted that the MC risk assessment activity may not be necessary for areas where there is no evidence of MEC presence. However, the exception to this would be the presence of MC in the surface soil in an area suspected to have been impacted by training activities.

Human health and ecological risk due to potential exposure to MC will be evaluated using the methodology outlined in by the USEPA RAGS and USACE guidance EM 200-1-4, Volumes I and II. The primary methodology for evaluating human health risk will be comparison of environmental sampling analytical data to the appropriate screening levels. A Screening-Level Ecological Risk Assessment (SLERA) may also be required as MRS 02 and 07 contain wildlife refuge areas. The human health and SLERA will be developed in accordance with USACE guidance EM 200-1-4, EM 1110-1-1200, as appropriate, USEPA Risk Assessment Guidance for Superfund. The results will be provided in the RI Report and will factor into potential removal/remediation measures during the FS phase.

The details of the risk characterization and analysis are outlined in the Risk Assessment WP found in Appendix G.

3.6.2 MUNITIONS RESPONSE SITE PRIORITIZATION PROTOCOL (MRSP)

In 2001, Congress directed that the DoD identify and then prioritize their MRSs. The protocol was published as a rule on 5 October 2005 (35 Code of Federal Regulations Part 179). The protocol was designed to: 1) maximize use of the latest MRS-specific data, and 2) be applied early in the munitions response process. The protocol assigns a relative priority to each location in the DoD's inventory of

defense sites known or suspected of containing UXO, Discarded Military Munitions (DMM), or MC, and prescribes procedures for prioritizing the defense sites and general component responsibilities. The site priority ranking is based on the risk posed by potential hazards captured in data entered for three hazard evaluation modules of the Munitions Response Site Prioritization Protocol(MRSPP), explosive hazard evaluation (EHE) module, chemical warfare material (CWM) hazard evaluation (CHE) module, and the health hazard evaluation (HHE) module. Separate MRSPP tables (EHE Tables 1 through 10, CHE Tables 11 and 20, HHE Tables 21 through 28, MRS Priority Table 29, and MRS Background Information, Table A) will be completed for each MRS in the RI Report. Parsons will submit a 30 day public notice which offers to the public involvement with the government to update the MRSPP Tables prior to submitting the Draft Final RI Report.

3.6.3 ANALYSIS OF LAND USE CONTROLS

Parsons will conduct an Institutional Analysis in accordance with EP 1110-1-24 as part of the RI/FS. As Institutional Controls rely on existing powers and authorities of various government agencies to protect the public from MEC hazards, government agencies having jurisdiction over properties containing MEC will be identified and their appropriateness, capability, and willingness to assert controls will be assessed.

For each institution selected for review, Parsons will collect the following information:

- Name of Agency
- Origin of Institution
- Basis of Authority
- Sunset Provisions
- Geographic Jurisdiction
- Public Safety Function
- Land Use Control Function
- Financial Capability
- Desire to participate in the Institutional Control Program
- Constraints to Institutional Effectiveness.

An Institutional Analysis Report will be prepared to document feasible local initiatives that will be used to support development of alternative plans of action. The report will identify and analyze the institutional framework that supports the development of institutional controls for the site. The report will address local initiative strategies available to control or limit access to different areas within the project site, or strategies to implement public safety awareness actions regarding the site. The Institutional Analysis will include discussions with state and local agencies, and with private parties having interests in the sites.

The Institutional Analysis Report will be included in the draft RI Report detailing the Institutional Control Alternatives recommended based on their apparent ability to satisfy project objectives.

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4.0 QUALITY CONTROL PLAN (QCP)

4.1 INTRODUCTION

Parsons recognizes that the USACE is responsible for QA; however, Parsons also has a QA process that starts with top management's commitment and involvement. The process provides a permanent and workable system that allows each employee to understand the job performance expected. The Parsons QA and improvement process ensures that every employee is supported by the actions, procedures, tools, and training required to perform a job according to the requirements. By promoting teamwork and by focusing attention on the solutions, the quality of work can be increased and assured throughout the project.

Parsons Corporation Quality Policy

We are committed to providing quality services and products. We will, as a corporation and as individuals, meet the mutually agreed-to requirements the first time and strive for continuous improvement of our work processes.

The Parsons' QA Policy is based on the work and concepts of several recognized authorities on quality management in the United States, especially Mr. Philip Crosby, Dr. W.E. Deming, and Dr. J.M Juran. These three experts each have different methods of addressing and resolving problems. Parsons has taken unique portions of their concepts and has tailored them to corporate work processes. As a result, Parsons has placed a greater emphasis on the actual elements pertaining to work processes, project requirements, and lessons learned from past performances. These concepts have been developed into a systematic and practical approach for improving quality.

Generally, Parsons' QA Policy relies on four fundamentals, termed the "absolutes of quality". They answer these questions:

- What is quality? Conformance to Requirements
- How do we achieve it? Prevention
- What is our performance standard? Zero defects
- How can we measure quality? *Cost of Doing Things Wrong.*

The Quality Control (QC) process provides a permanent and workable system that allows each employee to understand the job performance expected within the assigned task. The QC and improvement process ensures that the training, actions, procedures, and tools support every employee according to the requirements and in such a manner that we protect the environment and minimize the impact of the project activities. Checklists have been developed to ensure that critical elements are addressed and that QC checks are documented for compliance with the WP, SOPs, policies and procedures. By promoting teamwork and by focusing attention on the solutions, the quality of work is increased and assured throughout the project.

This QCP provides the procedures and methods to be used for the field activities within the selected work areas. This plan addresses organizations and responsibilities, DQOs, QC test methods, audit procedures and pass/fail criteria, field operations, equipment testing maintenance and calibration, QC inspections, and of generated records reporting procedures. The QCP outlines procedures to ensure all personnel meet the qualification requirements and receive the site-specific training to perform the duties of the job for which they were hired and site-specific training requirements for visitors. The QCP also describes how lessons learned are captured, documented and submitted to the Government.

4.2 QUALITY MANAGEMENT STRUCTURE

The following paragraphs describe the organizational structure of the Parsons/USA Quality Management Team during operations at the project site. Names and qualifications of site personnel will be provided prior to mobilization.

4.2.1 PROJECT QUALITY CONTROL MANAGER (MR. ROBERT CROWNOVER)

The Project QC Manager is responsible for reviewing and updating the QCP and verifying compliance with the plan. The Project QC Manager verifies compliance with the QCP by auditing project activities and instituting corrective actions. For this project, the UXOSO and UXOQCS is a dual-hatted position. The Project QC Manager has the following responsibilities:

- Preparation of project QC policies and procedures
- Ensuring timely submission of contract deliverables
- Providing training and assistance to the site project UXOQCS/SO
- Reviewing employee qualification records to ensure accuracy
- Conducting periodic field audits of sites, programs, and projects project activities to ensure QC compliance.

4.2.2 PROJECT MANAGER (MS. PATRICIA BERRY)

The PM is responsible for the overall performance during this project. The PM will develop and implement the site WP and also has the following responsibilities:

- Serve as primary point of contract with the USACE PM and COR
- Monitor project performance, safety, quality, cost, and schedule
- Ensure timely submission of contract deliverables

4.2.3 PROJECT GEOPHYSICIST (MR. AL CRANDALL)

The Project Geophysicist is responsible for the overall technical direction for DGM surveys to include the following:

- Provide overall technical direction for DGM surveys
- Supervise data processing and interpretation.
- Coordinate with the Site Geophysicist to verify the accuracy and completeness of project DGM documentation and target lists, ATS testing results, QC results and related DGM project documentation
- Review all DGM data, confirm that DGM performance metrics are being maintained, and provide notification to USAESCH when data are available for their review.

4.2.4 SITE MANAGER/SENIOR UXO SUPERVISOR (SM/SUXOS) (JAE YUN/TONY CLARK)

The SM and SUXOS are responsible for the day-to-day field operations at the project site. They report directly to the PM and have the following responsibilities:

- Implementation of work plan and QC policies and procedures
- Reporting to the TM on effectiveness, adequacy, and status of the project
- Ensuring the timely submission of contract deliverables
- Coordinating with project personnel for site tasking and schedules
- Reviewing any failures and implementing corrective actions
- Implementing additional guidelines used to assist in the development of site and task specific policies and procedures.

4.2.5 UXO QUALITY CONTROL SPECIALIST/UXO SAFETY OFFICER (UXOQCS/UXOSO) (DAVID RODNEY)

The UXOQCS/UXOSO is responsible for overseeing the site QCP in all field operations. The UXOQCS/UXOSO will be trained in QC techniques methodology and be qualified as a UXO Technician III. The UXOQCS/UXOSO coordinates with the TM for daily operations and maintains a direct line of

communication to the PM, SM, and SUXOS. The UXOQCS/UXOSO reports directly to the Project QC Manager and has the following responsibilities:

- Daily Safety Brief
- Daily Safety Inspections
- Weekly Safety Audit
- Initial site safety orientation training
- Periodic safety training on relevant safety subjects
- Accident Investigation and Accident/Incident reporting, as required
- Acting in an advisory capacity with the PM on safety related issues
- Working directly with the Diving Supervisor and SUXOS to ensure safe completion of operational tasks
- Daily audits of the DGM teams, equipment and procedures
- Daily audits of the UXO teams, equipment and procedures
- Random sampling (by pieces, volume or area) of all MPPEH collected from the various teams to ensure no items with explosive hazards, engine fluids, illuminating dials and other visible liquid HTRW materials are identified as MD or RRD as required for completion of the Requisition and Turn-in Document, DD Form 1348-1A

4.3 DATA QUALITY OBJECTIVES

The data obtained during Phase 3 field operations will be used to prepare the RI Report, which will document the findings of the data collections efforts and field inspection. This data, plus the data previously collected during Phase 1 and Phase 2, will be used to assess the nature and extent of the hazard presented by MEC at the sites in order support recommendations for proposed MEC remedies. The data will be used to develop a hazard analysis, by evaluating and vertically delineating the nature and extent of potential hazards to human health and the environment. This data will provide a basis for determining whether the sites (or portions of the sites) can be NDAI or needs to move forward to the Feasibility Study for analysis of further response actions. The project DQOs are presented in Table 3-1.

4.4 QUALITY CONTROL TEST METHODS AND AUDIT PROCEDURES

This section discusses QC methods and procedures to be used during project operations.

4.4.1 INSPECTIONS

Parsons will conduct inspections to verify whether quality-related activities comply with this QCP. A list of the audit procedures based on the Definable Feature of Work (DFW) is provided in Table 4-1. Internal inspections will address activities performed by the project team. External inspections will address activities performed by project subcontractors, laboratories, and equipment and material suppliers.

The UXOQCS/UXOSO will implement the three-phase control process for each of the DFWs in Table 4-1 to audit/inspect the subtasks for compliance with the approved WP, SOPs and DQOs. The three-phase control process includes the preparatory, initial, and follow-up phase audits/inspections. The inspections are documented using the QC Surveillance Forms prepared for each DFW (located in Appendix F).

4.4.1.1 Preparatory Phase

A preparatory phase inspection is performed prior to the beginning of work on each DFW. The UXOQCS/UXOSO will review the DFW scope and applicable specifications (MQO's) and verify that the necessary resources, controls, and conditions are in place and compliant with the WP before the work activities begin.

4.4.1.2 Initial Phase

The UXOQCS/UXOSO performs an initial phase inspection for each DFW once a representative sample of the work has been completed. The purpose of this inspection is to check the preliminary work for compliance with procedures and contract specifications to verify through inspection and testing the acceptable level of workmanship. The UXOQCS/UXOSO will review the minutes of the preparatory phase to check for omissions and resolve any differences of interpretation by project personnel and the contract requirements.

4.4.1.3 Follow-up Phase

The UXOQCS/UXOSO performs a follow-up phase inspection periodically while work progresses for each DFW. The frequency of the follow-up phase is specified in Table 4-1 by DFW. The purpose of the inspection is to ensure continuous compliance and an acceptable level of workmanship. The UXOQCS/UXOSO will observe the same activities as under the initial inspection and ensure that discrepancies between site practices and approved specifications are identified and resolved. Corrective actions for unsatisfactory conditions or practices will be verified by the UXOQCS/UXOSO prior to continuing work on the affected DFW.

The inspection program is established to provide the following:

- An objective and independent evaluation of compliance with established policies and procedures (WP, SOPs, AHAs, etc.)
- A mechanism for verifying and implementing the corrective actions recommended as the result of inspections.

Personnel performing QC inspections are knowledgeable about and have received training in QC techniques and methodologies, this QCP, and applicable regulations. They will also be technically knowledgeable of the processes being inspected. Inspections will be performed in accordance with written procedures or checklists. Personnel performing QC inspections will not have direct responsibilities in the areas they are assessing.

System and performance inspections will be undertaken. System inspections will evaluate the components of the QC system, including evaluating items such as approach and adequacy of the preparation step, inspection of the schedules and plan delivery dates, and tracking systems for QC activities. Performance inspections evaluate actual QC activities, such as design control, on-site data gathering, calibration and control, inspection and testing activities, and documentation.

Inspecting QC personnel will document inspection results, which will be reviewed by the PM. When unsatisfactory or nonconforming conditions or items are found, the responsible organization will implement corrective actions in a timely manner. Previously unsatisfactory areas will be re-inspected to ensure satisfactory corrective actions have been completed. The results of the inspections will be shared with the team with regard to needed rework and lessons learned.

Records of all inspections will be maintained and controlled as QC records.

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Table 4-1: Definable Features of Work Audit Procedures

Note: QC audits/inspections for each DFW are documented using the applicable Forms located in Appendix F.

Definable Feature of Work	Reference	Audit Procedures	QC Phase	Frequency of Audit	Pass/Fail Criteria	Action if Failure Occurs
Mobilization & Site Specific Training	WP Sec-2.4.4; WP Table 3-2; WP section 3.2.1.1 through 3.2.1.2; Section 3.4; Section 4.1 Form Personnel Qualification Verification Form; MEC Training Documentation Form	Visual Observation and Document Review	PP/IP/FP	Once, and follow-up as required	All personnel required for the work activities have been identified, are available, and meet the requirements and qualifications for the positions, or waivers from the USAESCH have been obtained.	Document deficiency and report to SUXOS and PM for resolution, follow-up to verify compliance before personnel are assigned project tasks
	WP Section 4.8	Visual Observation and Document Review	PP/IP/FP	Once, and follow-up as required	All personnel are properly trained and certified to operate equipment and machinery.	Document deficiency and report to SUXOS for resolution, follow-up to verify compliance before personnel operate equipment and machinery
	WP and APP	Document Review	PP/IP/FP	Once, and follow-up as required	All field personnel have reviewed the WP and APP.	Document deficiency and report to UXOQCS/SO and SUXOS for resolution, follow-up to verify compliance before personnel commence assigned project tasks
	APP Form Safety Meeting Attendance Log	Document Review	PP/IP/FP	Once, and follow-up as required	All personnel have signed the Employee Sign-off Forms for the Site Safety and Health Plan (SSHP), the Certificate of PPE training and all AHAs have been completed.	Document deficiency and report to UXOQCS/SO for resolution, follow-up to verify compliance before personnel commence assigned project tasks

Definable Feature of Work	Reference	Audit Procedures	QC Phase	Frequency of Audit	Pass/Fail Criteria	Action if Failure Occurs
	APP	Document Review	PP/IP/FP	Once, and follow-up as Material is Introduced to Project	Material Safety Data Sheets are available on-site for all hazardous materials used or encountered onsite	Document deficiency and report to UXOQCS/SO for resolution, follow-up to verify compliance before personnel are exposed to the hazardous material of concern
	WP Section 2.6 Project Schedule	Visual Observation and Document Review	PP/IP/FP	Once and Follow-up as Required	All equipment is received on island as needed to support the project schedule.	Document deficiency and report to SUXOS for resolution
	SSHP	Visual Observation and Document Review	PP/IP/FP	Weekly	Break and rest areas established in accordance with reference.	Document deficiency and report to SUXOS for resolution prior to initiating project tasks
	App J Final Supplemental SOPs for Endangered Species Conservation and their Critical Habitat with Addendum 1 (CESAJ February 2015)	Visual Observation and Document Review	PP/IP/FP	Once and Follow-up as Required	All field personnel have received a review of the SOP from the team biologist or other qualified (USFWS, NOAA specialists, etc.)	Document deficiency and report to SUXOS for resolution prior to initiating project tasks
ATS Certification	WP Sec- 3.2.1.2; 4.5.1	Visual observation	PP/IP/FP	Daily as required	Divers and equipment detect all buried ISO's at ATS or in designated water column	Deficiency will be reported to SUXOS and personnel/equipment will undergo remedial training and certification

Definable Feature of Work	Reference	Audit Procedures	QC Phase	Frequency of Audit	Pass/Fail Criteria	Action if Failure Occurs
	WP Sec- 3.2.1.1; 3.2.1.2	Visual observation	PP/IP/FP	Once	ATS Established and documented (position of ISOs depth, orientation, date established etc.)	Deficiency will be reported to SUXOS and personnel/equipment will undergo remedial training and certification
Geodetic Equipment Functionality	WP Sec- 3.2.1.3 Table 3-3; WP Sec 4.5.1	Visual Observation and Document Review	PP/IP/FP	Daily as required	Geodetic Equipment to be used for that days field work is confirmed to be within tolerances once each day.	Document deficiency and report to SUXOS for resolution prior to initiating project tasks
Intrusive Investigation	WP Sec-3.1.3; 3.2.1.4; 6.3.1.2; App. L	Document review	PP/IP/FP	Daily as required	Investigation Team captured MEC/MD location, recorded with video footage if unburied, and documented surrounding underwater environment	Deficiency will be reported to SUXOS and personnel/equipment will undergo remedial training and certification
	WP Sec- 3.2.1.4. Section 6 Appendix F: Forms Intrusive (Phase 3) Prep Initial and Follow up	Visual Observation and Document Review	PP/IP/FP	Daily as Required	Pre-operations checks performed on detection equipment and Dive Equipment	Deficiency will be reported to SUXOS and personnel/equipment will undergo remedial training and certification
	WP Sec- 3.2.1.5, Sec 6; App. J; Form: MEC Accountability Log SSHP/ESP	Document Review	IP/FP	Daily as required	Additional intrusive transects investigated; Locations of suspected MEC recorded; Threatened and Endangered Species Identified around MEC; The above items reported to USACE	Deficiency will be reported to SUXOS. UXOQCS will verify resolution procedure

Definable Feature of Work	Reference	Audit Procedures	QC Phase	Frequency of Audit	Pass/Fail Criteria	Action if Failure Occurs
	WP Sec 3.2.1.4	Visual observation	IP/FP	Daily as required	"No Finds" greater than 15%.	Deficiency will be documented and reported to SUXOS. A Root Cause Analysis will be conducted (see Section 3.2.1.4). Corrective action will be documented and implemented.
	WP Table 3-3. Anomaly Resolution	Visual Observation and Document Review	IP/FP	Daily and weekly as required	UXOQCS performs 15% QC on the day's intrusive production with no failures. Project Geophysicist will perform at least a weekly review of the intrusive results and compare the results with the DGM Targets millivolt readings.	Project Geophysicist requests for reinvestigation of the analog or DGM anomaly is not resolved or an acceptable explanation (e.g. anomaly is buried below 24 inches, beneath reef substructure, etc.) Then the analog or DGM anomaly will be remarked and reinvestigated.
	SSHP/ESP	Visual Observation and Document Review	PP/IP/FP	Daily	Work zones and exclusion zones are properly established.	Document deficiency and report to SUXOS for resolution prior to initiating project tasks
Intrusive Investigation Small Boat Operations	WP Sec- 3.2.1.8, App. J	Visual Observation	IP/FP	Daily as Required	Vessel operating in a manner to protect natural resources but remains functional in field operations	Deficiency will be reported to SUXOS and boat operator will perform remedial training and certification.
	WP Sec- 6.3 DSOP 2, SOP App. J	Visual Observation	IP/FP	Daily as Required	Vessel operator carrying and utilizing appropriate documentation to identify natural aquatic resources	Deficiency will be reported to SUXOS and boat operator will perform remedial training and certification.

Definable Feature of Work	Reference	Audit Procedures	QC Phase	Frequency of Audit	Pass/Fail Criteria	Action if Failure Occurs
Underwater Demolition Surface Demolition	ESP WP Table 3-2 Sec- 3.2.1.12 through 3.2.1.13 Sec- 5, Sec 6.3.3 Explosive Demolition Review Checklist; Explosive Usage Record Form; Explosive Vehicle On Site Inspection	Visual Observation and Document Review	PP/IP/FP	Upon each occurrence	Coordination and notification requirements have been complete; Proper demolition of MEC/MPPEH completed. Munitions debris inspected and removed for further processing	Deficiency will be documented and reported to SUXOS. UXOQCS will verify resolution procedure
Raise, Tow, and Beach of MEC/MPPEH	WP Sec- 3.2.1.13.3	Visual Observation	PP/IP/FP	Daily as required	Remote means employed for breaking-free of munitions from the bottom/moving of MEC determined not acceptable to move	Deficiency will be documented reported to SUXOS. UXOQCS will verify resolution procedure
	WP Sec 3.2.1.13.3 through 3.2.1.13.4, WP Fig. 3-4	Visual Observation	PP/IP/FP	Daily as required	MEC free from Listed corals prior to performing lift	Deficiency will be documented reported to SUXOS. UXOQCS will verify resolution procedure
MPPEH Management MDAS Management	WP Sec- 3.2.1.14	Visual Observation and Document Review	IP/FP	Daily as required	MPPEH items properly recorded, contained, and stored	Deficiency will be documented reported to SUXOS. UXOQCS will verify resolution procedure
	Form MDAS Accumulation Form	Visual Observation and Document Review	IP/FP	Daily as required	MDAS items properly recorded, contained, and stored	Deficiency will be documented reported to SUXOS. UXOQCS will verify resolution procedure

Definable Feature of Work	Reference	Audit Procedures	QC Phase	Frequency of Audit	Pass/Fail Criteria	Action if Failure Occurs
Monitoring for marine mammals and sea turtles during water borne operations	App. J Final Supplemental SOPs for Endangered Species Conservation and their Critical Habitat with Addendum 1 (CESAJ February 2015) App F: Form "Daily Observer Log" WP Section 6.3.4	Visual Observation and Document Review	IP/FP	Daily as Required	Daily Observer Log Sheet is completed and submitted daily following the parameters described in the listed SOP.	Deficiency will be reported to SM/SUXOS and personnel will undergo remedial training on completing and maintain the logs.
Environmental Sampling	App E: SAP	Visual Observation, Document Review, DQCR. Data Validation. Refer to QAPP in App E	PP/IP/FP	Upon analysis of MS/MSD/FD samples to be collected at rate of one for 20 primary samples collected.	Refer to WS # 28, WS #35, WS #36 of QAPP in App E.	Deficiency will be documented and reported to PM. Project Chemist will verify resolution procedure

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4.4.2 DEFICIENCY MANAGEMENT

All deficiencies or nonconforming conditions (as defined in the pass/fail criteria in Table 4-1) discovered during inspections or other QC functions will be noted on the Preparatory, Initial, and Follow-up Form(s). The form will identify, at a minimum, any corrective action required, the individuals reviewing and approving the actions, and the actions taken to prevent recurrence. A log will be maintained to document and track corrective actions to closure, and will be included in the RI Report. The UXOQCS/UXOSO will be responsible for tracking deficiencies to closure and reporting their status on daily reports and log forms (see Appendix F for the forms).

4.4.2.1 Root Cause Analysis

If a requirement failure occurs, a root cause analysis will be performed by the UXOQCS/UXOSO who will then present the findings to the PM and CDSQ with suggested or required corrective actions (see Root Cause Analysis form in Appendix F). Once approved by management, the team will implement the corrective actions. The Root Cause Analysis and corrective actions will be attached to the weekly QC Report. All target reacquisition and intrusive quality control measures and metrics will be documented, with copies sent to the appropriate personnel for review and inclusion in other documents as deemed necessary.

Figure 4-1 illustrates the flow of the root cause and effect process that the UXOQCS/SO will use to determine failure causes.

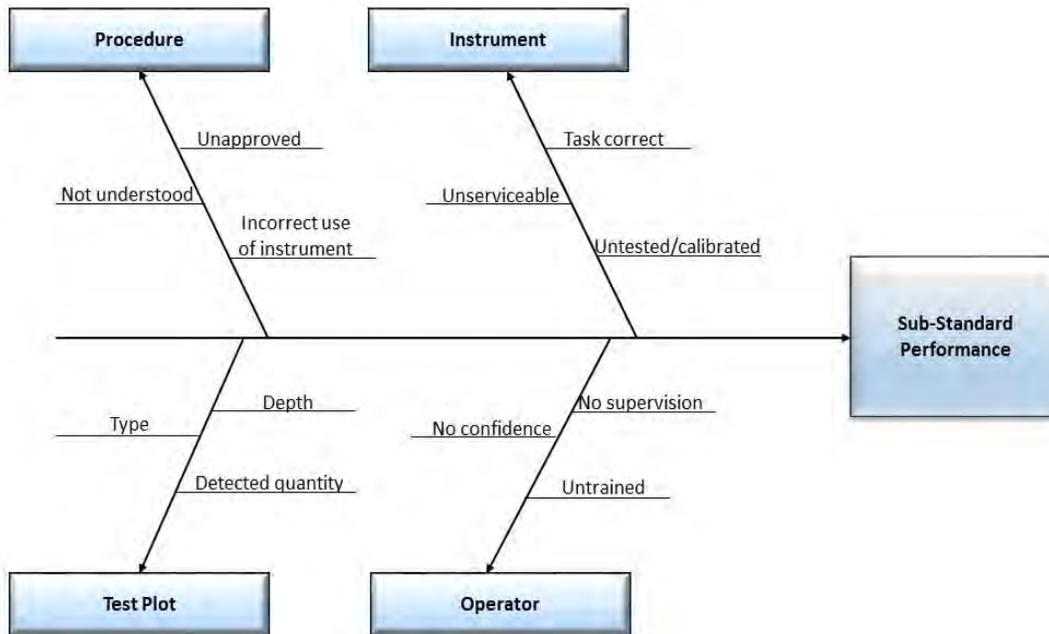


Figure 4-1: Cause and Effect Process

4.4.2.2 Corrective Actions

Following the root cause analysis and approval of corrective actions by management, project personnel will implement these actions to correct the problem. Potential remedies to be considered may include the following:

- Supplemental training of personnel
- Changes of equipment or modification to equipment currently in use
- Acquisition of supplemental equipment
- Implementation of new procedures or modification to existing procedures
- Changes in QC procedures.

The UXOQCS/UXOSO will document the application of the corrective actions on the QC inspection form. Through follow-up phase surveillance, the UXOQCS/UXOSO will verify that the corrective action implemented has rectified the deficient condition and is sufficient to prevent recurrence.

4.5 FIELD QUALITY CONTROL INSPECTIONS, AUDITS AND REPORTS

The UXOQCS/UXOSO is responsible for verifying that site personnel perform operational checks of instruments and equipment prior to using them on-site. The UXOQCS/UXOSO will periodically check the project logbooks listed below to ensure the log entries are complete and accurate. Inspections will be performed daily at random, with unscheduled checks of the site in general to ensure personnel accomplish all work as specified in the WP. The UXOQCS/UXOSO will utilize the process outlined in Figure 4-2 and Table 4-1 to ensure all field tasks meet quality standards prior to submittal for the QA process. The UXOQCS/UXOSO will submit a report to the SUXOS detailing the results of these checks.

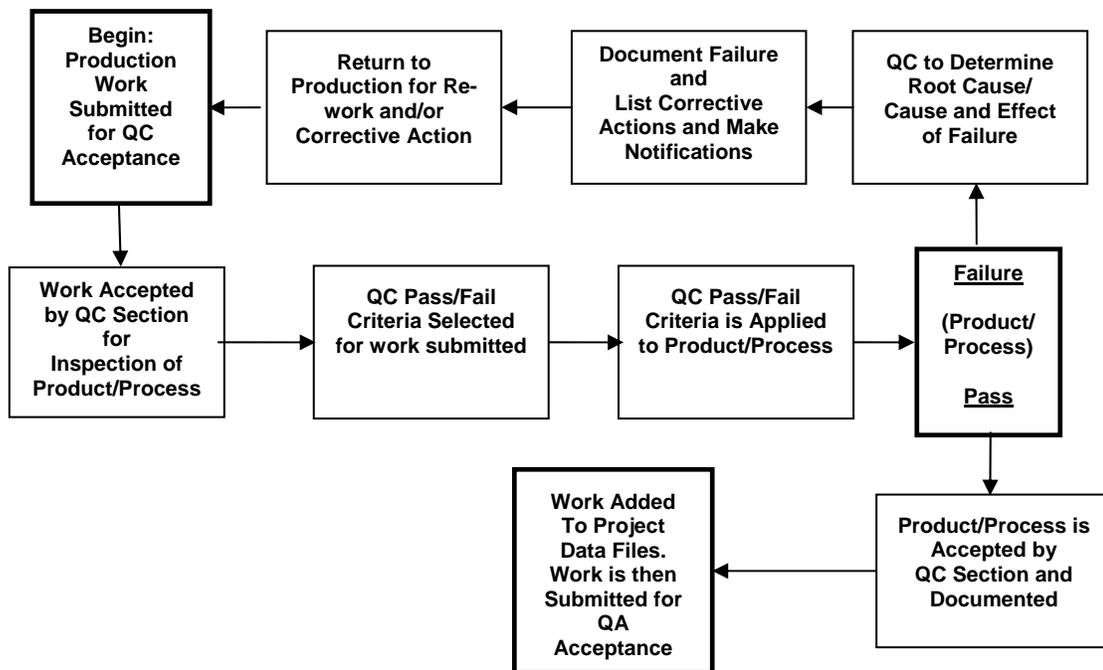


Figure 4-2: Quality Control Process

4.5.1 EQUIPMENT TESTING PROCEDURES AND FREQUENCY

Instruments and equipment, such as navigational, video, and data analysis and transfer systems, used to gather and generate site specific data, e.g., GPS, geophysical data (results of geophysical tests will be recorded in the Access Database) to support the field activities, will be tested with sufficient frequency (see Section 3, Table 3-3) and in such a manner as to ensure the accuracy and reproducibility of results. Instruments or equipment failing to meet the standard will be repaired or replaced. Replaced instruments or equipment must meet the same specifications for accuracy and precision as the item removed from service. Operator proficiency will also be evaluated regularly for proper instrument set-up, operation, survey technique, and data transfer. Items such as cellular telephones, satellite phones, and radios will be tested for serviceability at the start of each workday. Results of these tests will be recorded in the Daily Log. Items failing these tests will be repaired or replaced prior to operations commencing. Daily tests for the geophysical equipment will include once daily functionality of the analog instruments, once daily ATS data collection, and the once daily geodetic accuracy and function test for the GPS equipment designated for that days use. Note that if a failure is noted during the initial ATS, the daily ATS may be reattempted a maximum of two times in a day before declaring an equipment, ATS procedure, or ATS seed item failure.

4.5.2 MAINTENANCE

The UXOQCS/UXOSO will check field logbooks to ensure that maintenance of vehicles and equipment are performed on a regular schedule and in accordance with the manufacturer recommendations or owner's manual for equipment requiring regular upkeep. The operating and maintenance manuals (if available) will be maintained with the equipment. A copy of each maintenance manual will be consolidated into a single binder and maintained in the field office by the UXOQCS/UXOSO.

Parsons will coordinate scheduled maintenance of the following equipment in accordance with manufacturer recommendations or the owner's manual.

- Vehicles
- Vessels (Boats)
- DGM equipment
- ROV
- Data Acquisition Systems
- Personal Protective Equipment
- Communications Equipment
- GPS Equipment, and PDA
- Emergency Equipment.

Geophysical instruments will be checked on the test strip daily and after any repairs. They will be required to demonstrate a consistent detection rate for all seed items. Repair or replacement of parts will meet the manufacturer specifications and recommendations. The UXOQCS/UXOSO will document and maintain records pertaining to the testing, repair, and/or replacement of equipment on site.

Repair or replacement parts will meet the manufacturer requirements and be installed by personnel authorized to replace parts or make repairs. Records pertaining to the testing, repair, or replacement of instruments and equipment will be maintained on-site by the UXOQCS/UXOSO.

4.5.3 LOGS AND RECORDS

Activity Logs will be maintained daily, as applicable; all entries will be in ink. Logbooks will be bound and pages consecutively numbered. Logbooks and records may be supplemented by the use of preprinted forms (e.g., safety inspection forms, safety briefings, etc.). These forms help to ensure uniformity of activities being conducted, inspected, and reviewed. Forms are located in Appendix F of the WP. The following logbooks and records will be maintained on-site and are subject to inspection by the UXOQCS/UXOSO.

4.5.4 UXO QUALITY CONTROL REPORTS

The UXOQCS/UXOSO will prepare daily QC Reports (see Appendix F, Daily Quality Control Inspection, Audit, and Production Log). These reports will be kept on-site and include the following information:

- The periodic assessments of work performed
- Significant QA/QC problems and corrective actions taken
- Conformance or non-compliance issues
- Work progress
- Lessons learned, and change recommendations
- Signature of the UXOQCS/UXOSO.

4.5.4.1 Daily Journal

The Daily Journal will be maintained by the SUXOS; this journal provides a summary of all operations conducted on-site, to include:

- Date and recorder of information
- Start and end time of work activities
- Work stoppage
- Visitors and escorts
- Weather conditions
- Changes to the WP, SSHP, policies or procedures
- Injuries and /or illnesses
- Safety briefings
- MEC encountered
- Relevant events and training
- Signature of the SUXOS.

4.5.4.2 Field Logbooks

The Field Logbooks are maintained in a neat and legible manner by the Supervisory Personnel to record site activities and field data and to provide an historic record of site activities, including:

- Date and team location
- Personnel and work performed
- Equipment and instrument checks
- Injuries and/or illnesses
- Changes to work instructions
- Work stoppage
- Visitors
- Daily Observer Log Sheets (see Appendix F)
- Other relevant events
- Signature of Supervisor

4.5.4.3 Safety Logbook

The UXOQCS/UXOSO will maintain the Safety Logbook. This logbook is used to record all safety matters associated with the project site, including:

- Safety briefings and/or meetings
- Training
- Safety inspections and audits performed
- Work stoppage due to safety issues
- Visitors
- Accidents, incidents, and near misses with corrective action taken
- Site control measures
- Other relevant events
- Date and teams checked
- Signature of the UXOSO

4.5.4.4 Quality Control Logbook

The Quality Control Logbook will be maintained by the UXOQCS/UXOSO. This logbook is used to record all QC matters associated with the project site, including:

- Equipment testing and results
- QC inspections performed
- Work stoppage due to QC issues
- Equipment monitoring results
- Non-conformance reporting
- Other relevant events
- Date and teams checked
- Signature of UXOQCS/SO

4.5.4.5 Training Records

Training records will be maintained on-site and monitored by the SM as necessary. These records contain any licenses, permits, certificates, or other qualifying data, to include:

- Date and nature of training
- Personnel attending and instructor(s)
- Visitor training and briefings
- Signature of instructor and SUXOS, UXOSO, or UXOQCS.

4.5.4.6 Underwater MEC/MD and Intrusive Results

The underwater MEC/MD and intrusive results will be compared to the original DGM responses as part of the anomaly resolution procedure. The results will be catalogued by the SUXOS in the daily reports, project forms, and updated in the Access Database. The UXOQCS/UXOSO will maintain the intrusive results to rectify discrepancies in records should they occur. At a minimum, the records will include:

- Date and target identifier
- Identification of item(s) located
- Classification
- Distance from marked target location and depth encountered
- Type, condition, depth, and location of any MEC encountered

- Disposition of MEC
- Other relevant data
- Signature of Supervisor

4.5.4.7 Photographic Records Database

The Photographic Records Database will be maintained by the SM. This database is used to record all photographs taken on the project site. These photographs are used to document MEC encountered, and before, during, and after work, and/or site conditions. Photographs will include:

- Date and time taken
- Unique identifying number(s) relating to the Photographic Logbook
- Location photograph was taken
- Brief description of the subject matter.

4.5.5 DAILY REVIEW OF FIELD DATA

During daily field activities, or at least once daily, the UXOQCS/UXOSO will review field data to ensure accurate classification and documentation of recovered MEC related items. This review will allow for reconstruction of what an item was and whether or not its classification is correct.

4.6 CONTRACT SUBMITTAL QUALITY CONTROL PROCESS

Documents required under this contract will be developed and maintained by a project team consisting of the Parsons PM, TM, Project Engineer, Project Geophysicist, GIS Manager, and Project Quality Control Manager. These team members will contribute their corporate knowledge and experience to the documents to ensure technical quality.

- The PM will take the lead in the development of contract documents, and will schedule a peer review and a QC review in sufficient time to meet project milestones for delivery of submittals.
- The TM and Project Engineer will provide technical writing support to develop the documents, and will review completed documents to ensure accuracy and completeness.
- The PM will review and supply information and documents to ensure accuracy and completeness of procedures and reports.
- The Project Geophysicist will ensure a technically sound approach to fieldwork, and accuracy and completeness of reporting on geophysical data. All geophysical data will be prepared, maintained, submitted, and archived in accordance with DID WERS-004.01.
- The GIS Manager will develop digital database and maps, overlays of beaches and exclusion zones, and other spatial data. The GIS Manager will prepare all drawings or maps needed for submittals, and will perform QC of civil survey data. All geospatial data will be prepared, maintained, submitted, and archived in accordance with DID WERS-007.01.

After the project team has performed a review of documents, the Project Quality Control Manager will perform a QC review to ensure overall quality and completeness.

Comments on submitted documents will be directed by project personnel to the appropriate subject matter expert for resolution.

Changes to final WPs will be submitted by the PM to the Quality Control Manager for concurrence. Upon receiving concurrence, the PM submits the change as a Field Change Request to the USACE PDT for approval (see Appendix F for Field Change Request form). The approved Field Change Request is then provided to the Stakeholders. The PM is responsible for ensuring that the changes are posted to the hard copy on file and that all field personnel are made aware of the changes.

4.7 FIELD QUALITY CONTROL INSPECTIONS, AUDITS, AND REPORTS

Project QC inspections, audits, and reports are planned for the DGM survey. Refer to previous sections for the inspections, reviews, corrections, and reports required.

The UXOQCS/UXOSO is responsible for the accomplishment of operational checks of instruments and equipment by site personnel. The appropriate log entries will be made. Inspections will be performed daily at random, with unscheduled checks of the site in general, to ensure personnel accomplish all work as specified in the WP. The UXOQCS/SO will utilize the processes outlined in Table 4-1 and Figure 4-2 to ensure all field tasks meet quality standards prior to submittal for the QA process. The UXOQCS/UXOSO will submit a report to the SM detailing the results of these checks.

4.8 QUALIFICATIONS AND TRAINING

4.8.1 EMPLOYEE QUALIFICATIONS

The SUXOS will maintain personnel files on each employee at the project site. These files include copies of necessary licenses, permits, training records, certificates of qualifications, and resumes that support the employee's placement and position. Prior to an employee's initial assignment, or before any change in duties or assignment, the SUXOS will review the employee's files to ensure necessary qualifications are met. All site records and documentation are subject to inspection and review by the UXOQCS/UXOSO.

- Site UXO personnel must meet the minimal qualifications as outlined in DDESB TP-18, dated 20 December 2004.
- Dive personnel must also meet the requirements set forth in the PWS, USACE requirements, and applicable sections of 29 CFR 1910.120, Subpart T.

4.8.2 EMPLOYEE TRAINING AND SITE SPECIFIC REQUIREMENTS

Parsons ensures that only qualified and properly trained personnel are assigned to positions on project sites. Prior to mobilization of personnel, Parsons ensures that training required by Parsons, OSHA 29 CFR 1910.120, and the EM 385-1-1 has been completed for all personnel assigned to the project as shown in Table 4-2.

Table 4-2: Training

Training Course	Personnel Attending
40-Hour HAZWOPER Training	All personnel who have not previously received this training or who do not qualify for certification through documented experience or training equivalent to that in paragraphs (e)(1) through (e)(4) of 29 CFR 1910.120.
8-Hour Supervisor Course	All management and supervisory personnel. This includes the SUXOS, UXOSO, UXOQCS, and UXO Technicians III.
8-Hour Refresher Course	All site personnel, except those who have completed their initial 40-Hour HAZWOPER training within the past year.
First Aid and Cardiopulmonary Resuscitation (CPR) Training	CPR training will be required for Parsons personnel and subcontractors that are participating in field operations.
30-Hour OSHA Construction Safety Course	Training Requirement for UXOSO IAW with EM 385-1-1, Section 01.A.17
Protected Species Identification Training/Briefing	All site personnel

Prior to the start of operations, all personnel will receive the following as a minimum:

- Familiarization with the WP and its policies and procedures
- APP/SSHP/AHA/SOP orientation
- Emergency Response Plan training
- PPE training
- Environmental considerations peculiar to the operations on the project site
- Instruction and training on equipment usage and safe work practices
- Daily safety training outlining the day's activities.

Visitors to the site will be provided with a site orientation and safety briefing prior to entering the exclusion area (while on-site, visitors will be escorted at all times by a UXO Technician).

Training is conducted by the SUXOS, UXOQCS/UXOSO, or other designated personnel and records of attendance are maintained on-site. Certificates of Training are issued when applicable.

4.9 LESSONS LEARNED PROGRAM

Parsons will develop a Lessons Learned Program (LLP) to provide for the exchange of information regarding problems that may occur during the response RI activities on this project site.

4.9.1 LESSONS LEARNED PROGRAM OBJECTIVE

The objective of the LLP is to capture and share experience or recognized potential problems or better business practices to:

- Prevent the recurrence of repetitive design/execution deficiency
- Clarify interpretation of regulations or standards
- Reduce the potential for mistakes in high risk/probability areas of concern
- Pass on information specific to an installation or project
- Promote a good work practice that should be ingrained for repeat application
- Promote efficient and cost-effective business practice.

4.9.2 TEAM RESPONSIBILITIES

The project team will be responsible for identifying and submitting lessons learned for review and approval. Throughout this MEC response activity, team members will consider how their experiences might be appropriate for the LLP.

4.9.3 PROJECT MANAGEMENT RESPONSIBILITY

The PM will review and approve all lessons learned for submittal to the USACE PM for potential discussion with the PDT during After Action Reviews.

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5.0 EXPLOSIVES MANAGEMENT PLAN

5.1 GENERAL

This plan outlines the procedures Parsons/USAE will use in managing the explosives used to complete the fieldwork at MRS 02 and MRS 07. USAE has been subcontracted to manage the purchase and delivery of explosives and to provide the PR Permitted Blaster when explosives are used to dispose of MPPEH/MEC. The procedures are in accordance with the following regulations:

- DOD 4145.26-M, Contractor's Safety Manual for Ammunition and Explosives
- DOD 6055.9-M, DoD Ammunition and Explosives Safety Standards
- Applicable Sections of the Department of Transportation (DOT), 49 CFR Parts 100-199
- Army Regulation (AR) 385-64, Ammunition and Explosives Safety Standards
- AR 190-11, Physical Security of Arms, Ammunition and Explosives
- Engineer Manual (EM) 1110-1-4009 Engineer Manual, Ordnance and Explosives
- EP 1110-1-18 Engineer Pamphlet, Ordnance and Explosives Response
- Explosive Law for Commonwealth of Puerto Rico
- USACE EM 385-1-97, Explosives Safety and Health Requirements Manual
- USACE EM 385-1-1, Safety and Health Requirements Manual
- Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) Publication 5400.7, Federal Explosives Laws and Regulations.

5.2 ACQUISITION

Parsons/USAE will use commercial explosives obtained through a local explosives supplier for demolition and venting of MEC. USAE has an ATF permit to purchase, store, and use explosives and will supply commercial demolition material for demolition and venting operations. USAE personnel have a letter of clearance from the Bureau of Alcohol, Tobacco, Firearms and Explosives (BATFE) for the use of explosives. As required by the Commonwealth of PR, USAE will have a Blaster's License issued for the RI/FS. USAE will provide the explosives distributor a certified statement of the intended use of the explosive material. The ATF permit will be posted on-site and will be available for Federal, state, or local inspection.

5.2.1 DESCRIPTION AND ESTIMATED QUANTITIES

If required, USAE will store explosives on-site in the Type II magazine approved in the ESP dated November 2013. USAE will store (not to exceed) 31 pounds of bulk and initiating explosives on-site. It is Parsons/USAE's intention to deliver explosives directly from the vendor and use them the same day, thereby avoiding storage.

5.2.2 ACQUISITION SOURCE

USAE will purchase explosives from licensed commercial suppliers such as Alba Explosives, Manati, PR. The USAE PR Blaster will be authorized, in writing, to request and receive explosives from the commercial suppliers.

5.2.3 LISTING OF PROPOSED EXPLOSIVES

Table 5-1 lists the types and quantities of explosives that may be used.

Table 5-1: Typical Explosives and Quantities for RI/FS

Type of Explosive	Descriptions	Quantity
1 lb	Booster Black Cap	20 ea
Electric Caps	Rock Star Detonators	100 ea
Detonating Cord	80 Grain	1 roll 500 ft
Perforators	19.5 gram Shaped Charges	50 ea

5.3 INITIAL RECEIPT

Shipments of explosives will be by vessel or by commercial carrier from the explosives supplier. The explosives supplier is responsible for all permits and documentation required by Federal, Commonwealth of PR, and local regulations for movement of explosives to the air terminal or transit to the marina. USAE will sign for the explosives and take custody and responsibility for continued transport as needed. Parsons will coordinate with the Mayor's Office and the PR State Police to receive and transport the explosives to the Type II magazine or to the site identified for the demolition operations.

5.3.1 PROCEDURES FOR RECEIPT OF EXPLOSIVES

Upon receipt, the type, quantity, and lot number of each explosive item will be checked against the shipping manifest and recorded on the Explosives Usage Form and the Daily Operations Journal (see Appendix F, Forms).

5.3.2 PROCEDURES FOR RECONCILING DISCREPANCIES IN QUANTITIES SHIPPED AND RECEIVED

The SUXOS will reconcile the delivery shipping documentation with the requested amounts ordered and received. The SUXOS will not sign for or accept shipments with shortages or overages until the discrepancies are corrected.

5.4 STORAGE

On-site storage of explosives is anticipated.

5.4.1 ESTABLISHMENT OF STORAGE FACILITIES

Explosives will be stored in the existing ATF Type II magazine, previously sited on Culebra (Figure 5-1). Parsons/USAE will comply with ATF, Federal, and local storage and compatibility criteria and procedures, including the required DDES approved ESP.



Figure 5-1: Site of Type II Magazine

USA will maintain the magazine in compliance with the magazine criteria and quantity distance (QD) requirements established in ATF Regulation ATF P 5400.7 and DoD 6055.9-M, DoD Ammunition and Explosives Safety Standards.

5.4.2 PHYSICAL SECURITY OF STORAGE FACILITIES

The Type II magazine and the blasting cap box that is mounted on the side of the Type II magazine will be locked with high security padlocks (2) meeting ATFP 5400.7 Section 55.208 (a) and will be enclosed by a chain link fence IAW 6055-9 M, and EM 1110-1-4009. The magazine and cap box will remain locked except when receipts and issues are being made. The two locks on both the magazine and cap box will require two different keys. One key will be kept by the SUXOS and the second key will be kept by the UXOQCS. The SUXOS will maintain the key to the fence enclosing the magazine. The magazine storage

area will be inspected each work week by the SUXOS and UXOQCS/UXOSO to ensure the integrity of the enclosure.

5.5 TRANSPORTATION

Transportation of MEC and explosives will comply with all Federal, state, and local regulations. Permits are not required under CERCLA for on-site or on Federal installations for transportation of explosives or conventional military munitions. Parsons will request permission from the Mayor's Office to use the docks at PR DNER or the Ferry Dock in the City of Dewey, Culebra, PR. Coordination will be made with the PR State Police to provide an escort during transport of any explosives to or from the magazine to each MRS on the island, or to the docks on the island. From the docks, explosives will be transported by water to MRS 02 or MRS 07. Parsons/USAE plans to transport newly purchased explosives to the island of Culebra using helicopters.

5.5.1 PROCEDURES FOR TRANSPORTATION FROM STORAGE TO DEMOLITION LOCATION

IAW with DOT regulations, Parsons/USAE will transport explosives in IME-22 containers for transportation to the demolition sites. Parsons/USAE will comply with the following:

- Initiating explosives, such as blasting caps, will remain separated at all times. Blasting caps may be transported in the same vehicle as long as they are in a separate IME-22 container (49 CFR 173.63) and secured away from other items.
- Compatibility requirements will be observed.
- Only UXOTIII and above may be issued with and can transport explosive materials. The receiving party will sign the receipt documents for accountability.
- Operators transporting Hazard Division (49 CFR 173.50) 1.1 explosives will have a valid driver's license.
- Drivers will comply with posted speed limits but will not exceed a safe and reasonable speed for conditions. Vehicles transporting explosives off-road will not exceed 25 MPH.

Personnel will not ride in the cargo compartment with explosives or MEC.

5.5.2 EXPLOSIVES TRANSPORTATION VEHICLE REQUIREMENTS

Explosives will be transported in closed containers in the beds of vehicles whenever possible. The load will be well braced and, except when in closed vehicles, covered with a fire-resistant tarpaulin or placed in an appropriate shipping container.

- Initiating explosives, such as blasting caps, will remain separated at all times. Blasting caps may be transported in the same vehicle as long as they are in a separate container and secured away from other items.
- Compatibility requirements will be observed.
- Only UXO Technicians III and above may be issued explosive materials and may transport them. The receiving party will sign the receipt documents for accountability.
- Operators transporting explosives will have a valid driver's license.
- Drivers will comply with posted speed limits but will not exceed a safe and reasonable speed for conditions. Vehicles transporting explosives off-road will not exceed 25 MPH.
- Personnel will not ride in the cargo compartment with explosives or MEC.
- Vehicles transporting explosives or MEC will be inspected prior to load-out using the Motor Vehicle Inspection form DD FORM 626 (Appendix F), and will be properly placarded.
- Vehicle engine will not be running and the wheels will be chocked when personnel are loading/unloading explosives.
- Beds of vehicles will have a bed liner, dunnage, or sand bags to protect the explosives from contact with the metal bed and fittings.

- Vehicles transporting explosives will have a First Aid kit, two 10-BC rated fire extinguishers, and a means of communications.

5.5.3 TRANSPORTATION BY VESSEL

Movement of explosives from Culebra to MRS 02 and MRS 07 water boundaries will require the use of a contracted and licensed vessel. Transport of explosives by waterborne vessel requires adhering to the applicable sections contained in 49 CFR (DOT) and U.S. Coast Guard directives.

Specifics, such as safety requirements, placarding, stowage, security, personnel, and emergency procedures are detailed in the SOP Explosives Transportation – Open Water Vessels, contained in Appendix J.

5.6 RECEIPT PROCEDURES

The SUXOS will strictly control access to all explosives. All receipts, issues, and usage of explosives will be properly documented and verified through physical count by the UXOQCS/UXOSO.

5.6.1 RECORDS MANAGEMENT AND ACCOUNTABILITY

Upon receipt, the type, quantity, and lot number of each explosive item will be checked against the manifest and recorded on the Explosives Usage Form (Appendix F). The original receipt documents and an inventory will be maintained on file by the SUXOS. All original explosive records will be forwarded to USAE Oldsmar for archive in accordance with ATF regulations and requirements. ATF requires USAE to maintain explosive records for commercial purchases for a period of 5 years. Copies of all records will be maintained on-site by the SUXOS and be available for inspection by authorized agencies. Their respective lot number will track explosive items until the item is expended or transferred to Government control and accountability.

5.6.2 AUTHORIZED INDIVIDUALS

Parsons/USAE is required to provide commercial suppliers with documentation of individuals authorized to request and receive explosives. The individual authorized to receive and issue explosives is the USAE assigned certified PR Blaster. On site, the SUXOS will designate, in writing, the individual who is authorized to transport and use explosives (in most cases this will be the USAE Certified PR Blaster).

5.6.3 CERTIFICATION

The USA Certified PR Blaster performing demolition and SUXOS will sign and date the explosives usage form certifying that the explosives were used for their intended purpose.

5.6.4 PROCEDURES FOR RECONCILING RECEIPT DOCUMENTS

The Certified PR Blaster and UXOQCS/UXOSO will be responsible for performing a review of the explosives usage record under the supervision of the SUXOS. If there is a discrepancy between the amount received and the amount of explosives consumed, then these individuals will review the receipt documentation to see if the records are correct. If the records review does not reconcile the discrepancy, then it will be reported to the Contracting Officer and USAE-Oldsmar for investigation.

5.7 INVENTORY SCHEDULING

Explosives will be inventoried at least weekly by the SUXOS (or approved designee), the UXOQCS/SO, and a Team Leader. Complete inventories will also be conducted after any issues/turn-ins of demolition material.

5.7.1 STORAGE FACILITY PHYSICAL INVENTORY PROCEDURES

The SUXOS will strictly control access to all explosives. All issues and turn-ins of explosives will be properly documented and verified through physical count by the SUXOS or his approved designee. On receipt, the type, quantity, and lot number of each explosive item is recorded on the Magazine Data Card (see Appendix F).

The SUXOS will review all requests for explosives from the individual operating sites and only sufficient explosives for the day's operations will be requested and issued. Issues of explosives will be recorded on Explosives Usage Records, deducted from the Magazine Data Cards, and annotated in the daily journal. This procedure will ensure that the issued explosives are accounted for while they are in the possession of individual users. The end user of explosives will certify on the Explosives Usage Record that the explosives were used for their intended purpose. Entries made on the Explosives Usage Records and Magazine Data Cards will be verified through physical count by the UXOTIII when drawing or turning-in the explosives and will be verified by the UXOQCS.

- At the end of each demolition operation the UXOQCS/UXOSO and the Demolition Team UXOTIII will reconcile the entries on each Explosives Usage Record, and will turn these records over to the SUXOS. The record of ordnance items destroyed with the explosives consumed will be kept in the SUXOS daily log.
- Entries made on the Explosives Usage Records and Magazine Data Cards will be verified through physical count by the Demolition Team UXOTIII when drawing or turning in the explosives, and the UXOQCS/UXOSO will verify the record.

5.7.2 PROCEDURES FOR RECONCILING INVENTORY DISCREPANCIES

As the Certified PR Blaster will only be present during transport and blasting operations, the SUXOS, UXOQCS, and a UXOTIII will be responsible for performing a weekly inventory of the explosives within the magazine. If there is a discrepancy between the inventory and the volume of explosives within the magazine, then they will review the Magazine Data Card and Explosives Usage Record to see if the inventory records are current. If the records review does not reconcile the discrepancy, then it will be reported to the USACE OESS, Contracting Officer, and PM for investigation.

5.7.3 INVENTORY SCHEDULING

The SUXOS, UXOQCS, and a UXOTIII will perform weekly inventories of the explosives within the magazine.

5.7.4 REPORTING LOSS OR THEFT OF EXPLOSIVE MATERIALS

If it is confirmed that ordnance or explosives are missing, then the SUXOS will contact the Contracting Officer immediately by telephone and in writing within 24 hours. The USACE OESS, Parsons PM and USAE-Oldsmar will be notified following the notification of the Contracting Officer. USAE-Oldsmar will notify ATF and immediately begin an investigation.

5.7.5 PROCEDURES FOR RETURN TO STORAGE OF EXPLOSIVES NOT EXPENDED

Explosives that were issued for use but were not expended will be returned daily to the magazines at the completion of demolition operations. The Demolition Team UXOTIII will return the unused explosives to the storage magazine and record the items on the Magazine Data Card and Explosives Use Record.

5.8 DISPOSAL OF REMAINING EXPLOSIVES

ATF requires an accounting of all explosives purchased and used; therefore, at project completion all unused explosives still in the sealed containers will either be disposed of by detonation, or by transferring custody and accountability to an incoming contractor, a Government agency, or returned to the distributor.

5.9 ECONOMIC ANALYSIS

Because of ATF requirements and prohibition for returning used open packaging, these explosives will be consumed at the site. An economic analysis of the explosives disposal alternatives will not be required.

5.10 FORMS

Parsons will use internal forms Magazine Data Card and Explosives Usage Record for explosives receipt, issue, inventory, and DD Form 626 for vehicle inspections. These forms are in Appendix F.

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6.0 ENVIRONMENTAL PROTECTION PLAN

6.1 GENERAL

This Environmental Protection Plan (EPP) has been specifically developed to address environmental protection issues associated with performing the U/W RI field activities identified in this WP. Specifically, this plan is intended to provide adequate procedures to safeguard the environmental condition of land and water in and around each MRS, beaches and access routes, and to mitigate and/or minimize the environmental impact from project operations.

Appendix J contains the *Final Supplemental SOP for Endangered Species Conservation and their Critical Habitat (Addendum 1)*, DERP-FUDS Property No. I02PR0068, Culebra Island, Puerto Rico (CESAJ, February 2015), which includes the *SOP for Endangered Species Conservation and their Critical Habitat during Underwater Investigations* as Appendix A. The final SOP provides specific procedures for DERP-FUDS operations in Culebra and surrounding cayos and is being referenced by section into this EPP. **Adherence to these SOPs will be strictly enforced.**

6.1.1 DEFINITIONS

For the purposes of this plan, the definitions of “Environmental Protection” and “Environmental Impact” are as follows:

- Environmental Protection: Preservation of the environment in its natural state to the greatest extent possible.
- Environmental Impact: Disturbance, damage, and/or contamination of the soil, air, water, and/or natural resources, including wildlife and wildlife habitat.

6.1.2 ENVIRONMENTAL GOALS

The following are the environmental goals of the project:

- Perform operations in a manner that minimizes the disturbance of corals, seagrasses, sediment, and other U/W resources.
- Perform operations in a manner to avoid impact to Listed Threatened or Endangered Species and/or their habitats.
- Leave the investigation footprint areas in as near a natural condition as operationally possible.
- Implement the procedures designed to protect the environment as agreed to during coordination with project stakeholders and regulators.

To accomplish these goals, Parsons will implement procedures to avoid impacts to listed/protected species; avoid or minimize sensitive and critical benthic habitat physical disturbances, air and/or noise pollution (e.g., make all attempts to move MEC to beaching areas for land demolition); manage site wastes; and control water pollution throughout this project. These procedures will focus on preventing contaminants from leaving the source, from entering potential contaminant transport pathways, and from reaching receptors.

6.1.3 ENVIRONMENTAL COORDINATION

The SM or SUXOS will coordinate all land resources management, waste management, pollution control, and abatement activities with the on-site USACE OESS and PDT, to include USFWS/NOAA NMFS/PR DNER personnel. Photographs of cultural debris recovered from the MRS work sites will be sent to PR DNER to receive permission to dispose of the debris in the local land fill.

6.1.4 PROJECT STAKEHOLDERS:

The project stakeholders are those individuals and organizations directly impacted by the survey activities. Stakeholders include (but are not limited to):

- PR DNER

- PR EQB
- Culebra NWR
- USEPA
- USFWS
- NMFS
- NOAA

The stakeholders listed above participate in the TPP process for Culebra FUDS projects.

6.2 ENVIRONMENTAL BASELINE SURVEY RESULTS

The main island of PR and its associated islands support 82 federally listed threatened and endangered species consisting of 33 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 archipelago. Of the 82 federally listed species, 16 are known or are suspected to occupy Culebra Island and/or the associated cayos. In addition to the federally listed species, two state-listed species are known to occupy Culebra Islands. The federally and state-listed species include both terrestrial and marine life. The federally listed species of most concern for the wildlife refuge are the green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricate*), leatherback sea turtle (*Dermochelys coriacea*), and loggerhead sea turtle (*Caretta caretta*). Due to declining populations, the pillar, elkhorn, rough cactus coral, lobed star, mountainous star, boulder star, and staghorn corals in the surrounding waters are federally listed as threatened species.

According to the NWR System, portions of Culebra Island and 22 of the associated cayos are considered NWR area. The three largest cayos are Culebrita, Cayo Norte (privately owned), and Cayo Luis Peña. These resemble Culebra in that they all have sandy beaches, rugged coastline, and gentle to steep hills. Vegetation ranges from moderate to extremely dense. The smaller cayos are primarily solid rock with sparse or no vegetation. A few of the smaller cayos have small beaches; however, most are rugged rock all around.

According to the PR DNER and the 2005 Puerto Rico Comprehensive Wildlife Conservation Strategy, the conservation priority areas for Culebra and associated cayos are as follows:

- Designated Critical Habitat
- All of the lagoons on Culebra
- All beaches around Culebra
- Flamenco Peninsula
- Punta Soldado
- Ensenada del Cementerio
- Puerto del Manglar
- Los Caños
- Culebra's surrounding islets (cayos)
- The Canal Luis Peña Marine Reserve.
- Resaca Mountain

6.2.1 OBSERVED BENTHIC HABITAT TYPES

6.2.1.1 Description of Observed Benthic Habitats in MRS 02 and 07

The following section provides a description of the results from the benthic habitat analysis performed by Parsons/USAE. Parsons/USAE utilized the data collected for hydrographic and U/W towed camera video surveys which includes snorkeler video surveys during Phase 1, along with the NOAA benthic GIS, to

characterize the benthic habitat classifications. According to the NOAA GIS effort (Kendall, M.S., et al. 2001), there are 26 distinct benthic habitats located within near shore waters of PR and the U.S. Virgin Islands. The NOAA dataset was loaded into GIS software and used in conjunction with the results of Phase 1A and 1B surveys in evaluating benthic habitats present within the survey areas. During the course of completing the EBS analysis, it was observed that the benthic habitats located within the water portions of MRS 02 and MRS 07 consist primarily of unconsolidated sediments (sand), submerged vegetation (seagrass/macroalgae), and coral reef/hardbottom (colonized and uncolonized pavement) habitats. For the purposes of evaluating the implementability of subsequent RI fieldwork actions (conducting geophysical surveys and intrusive investigations), Parsons simplified these bottom types into two main benthic habitats, unconsolidated sediments/submerged vegetation and coral/hard bottom classifications. The following paragraphs summarize the observations for these two classifications.

6.2.1.2 Unconsolidated Sediments/Submerged Vegetation

The unconsolidated sediments habitat classification consists primarily of mud or sand with varying coverage (density) of submerged vegetation (seagrass and macroalgae). Submerged vegetation populated the unconsolidated sediment habitats over much of the survey area. For MRS 02, both mud and sand cover were observed with sand being the majority of this classification. In MRS 07, sand was observed to be the primary cover, given the amount of wave energy present in most areas. A moderate amount of unconsolidated sediments within MRS 02 and MRS 07 were observed to be adjacent to hard bottom areas where sand cover over hard bottom is present. Some areas contained individual corals or rocks that were distinctive, but made up a very small percentage of the total cover. Species identified in this habitat type included, but are not limited to: *Thalassia testudinum* (turtle grass), *Syringodium filiforme* (manatee grass), *Dictyota sp.* (Y-branched algae), *Halimeda sp.* (leaf algae), *Penicillus dumetosus* (bristle ball brush algae), *Caulerpa sp.* (feather algae), *Udotea sp.* (Mermaid's fans), and *Galaxaura sp.* (tubular thicket algae). These areas can be seen in SSS mosaic as being flat with no relief or sand ridges.

6.2.1.3 Colonized or Uncolonized Hard Bottom and Coral Reef

The second observed class consisted of colonized or uncolonized hard bottom and coral reef. This class also included scattered coral or rock in unconsolidated sediment. In both MRS 02 and MRS 07, the majority of hard bottom structure was considered to be the pavement cover in the form of flat, low-relief, solid carbonate rock with coverage of macroalgae, hard coral, zoanthids, and other sessile invertebrates that are dense enough to have begun to obscure the underlying surface. The various species identified included, but are not limited to: *Briareum abestinum* (corky sea fingers), *sea rods* (various species), *Pseudopterogorgia sp.* (sea plumes), *Gorgonia ventalina* (common sea fan), *Acropora palmata* (elkhorn coral), *Acropora cervicornis* (staghorn coral), *Porites porites* (finger coral), *Dendrogyra cylindrus* (pillar coral), *Madracis sp.* (finger coral), *Orbicella annularis* (lobed star coral), *Orbicella faveolata* (mountainous star coral), *Orbicella franksi* (genus *Orbicella sp.* formerly known as *Montastrea sp.*) (boulder star corals), *Dichocoenia stokesi* (elliptical star coral), *Siderastrea sp.* (starlet coral), and *Diploria sp.* (brain corals). These areas can be seen in the SSS mosaic as appearing rough in texture and having closely packed light and dark spots caused by the high reflectivity and vertical relief of the structures.

6.2.2 PRESENCE OF ESSENTIAL FISH HABITATS

Essential fish habitat (EFH) is identified for species managed in Fishery Management Plans under the Magnuson-Stevens Fishery Conservation and Management Act. EFH is the habitat necessary for managed fish to complete their life cycle, thus contributing to a fishery that can be harvested sustainably. EFH applies to each life stage of approximately 1,000 managed species. Different life stages of the same species often use different habitats. Habitat types used by different life stages of fish include sand bottoms, submerged aquatic vegetation, coral reefs, and mangrove areas. Submerged aquatic vegetation helps stabilize sand and mud bottoms, filter polluted runoff, provide living space and refuge from predators. It acts as a food source as well as a nursery area for fish, crabs, and other aquatic species. Coral reefs support sharks, turtles, and more than 4,000 species of fish worldwide. They offer refuge from predators as well as places to feed and reproduce. Mangrove areas serve as spawning grounds, nurseries, and shelter for different life stages of various fish. As identified by the NOAA EFH mapper, the waters around Culebra have the potential to be EFHs for corals, queen conch, two species of lobster,

three species of shark, and 43 different species of fish at either certain stages of or through their entire life cycle.

6.2.3 PRESENCE OF THREATENED AND ENDANGERED SPECIES

6.2.3.1 Federally Listed Species Potentially Present

6.2.3.1.1 Endangered Species:

- *Balaenoptera musculus* (Blue whale)
- *Balaenoptera physalus* (Fin whale)
- *Megaptera novaeangliae* (Humpback Whale)
- *Balaenoptera borealis* (Sei Whale)
- *Physeter macrocephalus* (Sperm Whale)
- *Eretmochelys imbricata* (Hawksbill Sea Turtle)
- *Dermochelys coriacea* (Leatherback sea turtle)
- *Epinephelus striatus* (Nassau grouper) – Commonwealth of PR listing
- *Epinephelus itajara* (Goliath grouper) – Commonwealth of PR listing
- *Trichechus manatus* (Antillean Manatee)

Manatees are most abundant along the south and east coasts of the main island, particularly in the area of Fajardo and Ceiba and in the Jobos Bay area between Guayama and Salinas.

6.2.3.1.2 Threatened Species:

- *Epinephelus striatus* (Nassau grouper)
- *Hippocampus spp.* (Sea horses) – Commonwealth of PR listing
- *Chelonia mydas* (Green sea turtle)
- *Caretta caretta* (Loggerhead sea turtle)
- *Acropora cervicornis* (staghorn coral) is found in shallow waters from 1 to up to 160 feet depending on water conditions (though rarely seen below 60 feet). Colonies form antler-like racks of cylindrical branches that often grow in great tangles. The surface is covered in small, protruding, tubular corallites. Live staghorn coral is brown to yellow-brown. Once abundant throughout the region, it suffered mass mortality since the early 1990s in many areas due to white band disease. Though it was not observed in waters greater than 20 feet during the video transect survey, it has the potential to be in deeper water, therefore, all areas of reef within both MRSs were considered to have staghorn present.
- *Acropora palmata* (elkhorn coral) is found in shallow waters from 1 to up to 55 feet depending on water conditions (though rarely seen below 35 feet). Colonies form flattened branches resembling the horns of moose or elk. The surface is covered in small, protruding, tubular corallites. Live elkhorn coral is brown to yellow-brown. Once abundant throughout the region, it suffered mass mortality since the early 1990s in many areas due to white band disease. Though it was not observed in waters greater than 20 feet during the video transect survey, it has the potential to be in deeper water, therefore all areas of reef within both MRSs are considered to have elkhorn present.
- On September 10, 2014 the NMFS published a final rule in the Federal Register (79 FR 53851) to implement a final determination to list 20 coral species as threatened, under the Endangered Species Act (ESA) of 1973, as amended (effective date listed as October 10, 2014). Five of these species are known to occur in Puerto Rico including:
 - *Dendrogyra cylindrus*, (pillar coral)
 - *Mycetophyllia ferox*, (rough cactus coral)

- *Orbicella annularis*, (lobed star coral)
- *Orbicella faveolata* (mountainous star coral)
- *Orbicella franksi* (genus *Orbicella* sp. formerly known as *Montastrea* sp.) (boulder star coral)
- On September 2, 2014 NMFS published a final rule in the Federal Register (79 FR 38213) to list the Central and Southwest (SW) Atlantic Distinct Population Segment (DPS) of scalloped hammerhead shark (*Sphyrna lewini*) as threatened species under the ESA. NMFS is also considering critical habitat for the Central & SW Atlantic DPSs.

Both MRSs 02 and 07 contain live specimens of the staghorn, elkhorn, *Orbicella franksi* formerly known as *Montastrea* sp (boulder star coral) and pillar corals. These MRSs are in the Puerto Rico unit of elkhorn and staghorn coral critical habitat (CH) as well as CH for the green sea turtle (*Chelonia mydas*) for the planning of future activities (See Table 6-2 for known coral locations as found in the Environmental Baseline Survey Report, Underwater Portions of MRSs 07 and 02, Culebra, Puerto Rico (Parsons, 2014)).

6.2.3.2 Critical Habitat

Critical habitat (CH) is designated for the survival and recovery of species listed as threatened or endangered under the ESA. CH includes those areas occupied by the species, in which are found physical and biological features that are essential to the conservation of an ESA listed species, and which may require special management considerations or protection. As of 2 September 1998, all waters surrounding Culebra from the high water mark out 3 nautical miles, as well as the surrounding cayos, were designated as CH for the green sea turtle (*Chelonia mydas*). Green sea turtles (*Chelonia mydas*) are generally found in fairly shallow waters (except when migrating) inside reefs, bays, and inlets. The turtles are attracted to lagoons and shoals with an abundance of marine grass and algae. Open beaches with a sloping platform and minimal disturbance are required for nesting. These conditions are present at both MRSs 02 and 07. In addition MRS 02 and MRS 07 are in the Puerto Rico unit of elkhorn and staghorn coral CH.

6.2.3.3 Threatened or Endangered Species Observed

During all Phase 1 and Phase 2 survey activities, avoidance measures were strictly followed as defined in the USACE SOP, *Final Endangered Species and Conservation and Their Critical Habitat During Underwater Investigations (Addendum 1)*, DERP-FUDS Property No. 102PR0068, Culebra Island, Puerto Rico. Threatened species observed included *Dendrogyra cylindrus* (pillar coral), *Orbicella franksi* formerly known as *Montastrea* sp (boulder star coral), *Acropora cervicornis* (staghorn coral), and *Acropora palmata* (elkhorn coral) as well as green sea turtles (*Chelonia mydas*). During phase 1A operations, the Multibeam Bathymetry Survey (MBS) transducer was at the same depth as the vessel hull. The altitude of the SSS towfish was monitored real-time during survey operations and the cable tender was in constant communication to insure the towfish did not contact the bottom. During phase 1B, the previously collected bathymetry was displayed along with the NOAA chart in relation to the vessel position to predict depth changes and allow the camera to be raised before contacting the bottom.

At MRS 02, no sea turtles were observed. Staghorn and/or elkhorn corals were observed at 8 of the 12 cayos. *Montastraea* sp (star corals) were present at all cayos. *Dendrogyra cylindrus* (pillar coral) was observed at 7 of the cayos of MRS 02.

At MRS 07, one hawksbill sea turtle (*Eretmochelys imbricate*), currently on the endangered species list, was encountered during the Phase 1 survey activities. It was observed during the video transect survey off of transect 1B. It was on the surface, greater than 50 meters to seaward of the vessel, and appeared to swim off in the opposite direction. Constant observation did not show the turtle to reappear and as the turtle was beyond 50 meters, the survey continued at idle speed. The survey vessel departed the survey area at idle speed to insure no accidental contact would be made should the turtle reappear suddenly. Green sea turtles (*Chelonia mydas*) were observed within Tortuga Bay. Turtles ranged in size from approximately 1 ft to 3 ft long. None were observed within 50 meters of the survey vessel while the surveying was underway. When the vessel was moored, turtles were seen within a 20 meter radius

around the moored vessel as the turtles swam past the vessel. Since the vessel was moored and was not moving, the vessels presented no risk to the turtles. During snorkeling operations, turtles were observed by the snorkelers and avoidance measures were taken, ensuring the turtles were not harassed. Table 6-1 provides the locations of where sea turtles were sighted during Phase 1. Table 6-2 provides the locations and findings for the spot investigations. Elkhorn corals were seen off the southern coast of Culebrita, off the north and east sides of Cayo Botella, and on the shallow reefs on the east and west sides of Tortuga bay. Staghorn coral was seen in the same areas as the elkhorn coral as well as along much of the western side of Culebrita and south of Cayo Botella. *Montastraea* sp (star corals) were observed as a basic reef building coral within the MRS.

Table 6-1: Sea Turtle Sighting Summary Table

Type	Date	MRS	Lat/Long
Green Sea Turtle (<i>Chelonia mydas</i>)	8-13-13	MRS 07	18 19' 11.36 N / 65 13' 36.81 W
Hawksbill Sea Turtle (<i>Eretmochelys imbricate</i>)	8-21-13	MRS 07	18 18' 40.25 N / 65 13' 16.54 W
Green Sea Turtle (<i>Chelonia mydas</i>)	8-22-13	MRS 07	18 19 10.26 N / 65 13' 49.06 W
Green Sea Turtle (<i>Chelonia mydas</i>)	8-22-13	MRS 07	18 19.141'N / 65 13.721' W

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Table 6-2: Biological Spot Investigations

Location ID	Description	Longitude	Latitude	Benthic Habitat Classification
MRS 02- 1	Sea Rods (various species), <i>Pseudopterogorgia sp.</i> (sea plumes), <i>Gorgonia ventalina</i> (common sea fan)	249726.43	2031627.21	Coral Reef and Colonized Hardbottom
MRS 02- 2	Sea Rods (various species), <i>Pseudopterogorgia sp.</i> (sea plumes), <i>Gorgonia ventalina</i> (common sea fan), <i>Orbicella sp. formerly known as Montastrea sp *</i> (star corals), tube sponges, barrel sponges	249821.26	2031714.42	Coral Reef and Colonized Hardbottom
MRS 02- 3	Sea Rods (various species), <i>Pseudopterogorgia sp.</i> (sea plumes), <i>Gorgonia ventalina</i> (common sea fan)	249855.21	2031792.68	Coral Reef and Colonized Hardbottom
MRS 02- 4	Sea Rods (various species), <i>Pseudopterogorgia sp.</i> (sea plumes), <i>Gorgonia ventalina</i> (common sea fan), tube sponges, barrel sponges	249713.83	2031892.54	Coral Reef and Colonized Hardbottom
MRS 02- 5	Sea Rods (various species), <i>Pseudopterogorgia sp.</i> (sea plumes), <i>Gorgonia ventalina</i> (common sea fan), tube sponges, barrel sponges	249834.94	2031818.98	Coral Reef and Colonized Hardbottom
MRS 02- 6	Sea Rods (various species), <i>Pseudopterogorgia sp.</i> (sea plumes), <i>Gorgonia ventalina</i> (common sea fan), <i>Orbicella sp. formerly known as Montastrea sp *</i> (star corals), <i>Dendrogyra cylindrus*</i> (Pillar coral)	247252.68	2029037.45	Coral Reef and Colonized Hardbottom
MRS 02- 7	Sea Rods (various species), <i>Pseudopterogorgia sp.</i> (sea plumes), <i>Gorgonia ventalina</i> (common sea fan), <i>Orbicella sp. formerly known as Montastrea sp *</i> (star corals), <i>Dendrogyra cylindrus*</i> (Pillar coral), tube sponges, barrel sponges	248402.92	2027703.33	Coral Reef and Colonized Hardbottom
MRS 02- 8	Sea Rods (various species), <i>Pseudopterogorgia sp.</i> (sea plumes), <i>Gorgonia ventalina</i> (common sea fan), <i>Orbicella sp. formerly known as Montastrea sp *</i> (star corals), tube sponges	248902.44	2027287.05	Coral Reef and Colonized Hardbottom
MRS 02- 9	Sea Rods (various species), <i>Gorgonia ventalina</i> (common sea fan), <i>Orbicella sp. formerly known as Montastrea sp *</i> (star corals)	262809.01	2029008.98	Coral Reef and Colonized Hardbottom
MRS 02- 10	Sea Rods (various species), <i>Pseudopterogorgia sp.</i> (sea plumes), <i>Gorgonia ventalina</i> (common sea fan), <i>Orbicella sp. formerly known as Montastrea sp *</i> (star corals), barrel sponges	263384.72	2029791.64	Coral Reef and Colonized Hardbottom
MRS 02- 11	Sea Rods (various species), <i>Pseudopterogorgia sp.</i> (sea plumes), <i>Gorgonia ventalina</i> (common sea fan)	263458.07	2029906.42	Coral Reef and Colonized Hardbottom
MRS 07- 1	<i>Syringodium filiforme</i> (manatee grass), <i>Halimeda sp.</i> (leaf algae), <i>Dictyota sp.</i> (Y-branched algae)	264295.84	2027175.63	Submerged Vegetation-Macro algae
MRS 07- 2	<i>Syringodium filiforme</i> (manatee grass), <i>Thalassia testudinum</i> (turtle grass), <i>Halimeda sp.</i> (leaf algae), <i>Dictyota sp.</i> (Y-branched algae)	264370.40	2027027.82	Submerged Vegetation-Macro algae
MRS 07- 3	<i>Syringodium filiforme</i> (manatee grass), <i>Thalassia testudinum</i> (turtle grass), <i>Halimeda sp.</i> (leaf algae), <i>Dictyota sp.</i> (Y-branched algae) <i>NOTES: (*) indicates a species currently listed as threatened or endangered</i>	264487.59	2027041.54	Submerged Vegetation-Macro algae

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6.3 MEASURES TO AVOID OR MINIMIZE POSSIBLE IMPACTS TO THE ENVIRONMENT

The following paragraphs present the measures that will be implemented to avoid or minimize impacts to threatened or endangered species and their habitat during underwater investigation activities. The field teams will be provided with a Chart/Map Book that provides the results of the Phase 1 EBS depicting the locations of benthic habitats and threatened or endangered species that were identified during the EBS. The Chart/Map Book will be used as part of the daily briefing to identify areas with specific natural resource concerns.

6.3.1 PHASE 3: INTRUSIVE INVESTIGATIONS AND ENVIRONMENTAL SAMPLING

6.3.1.1 Underwater Intrusive Investigations

Phase 3 activities consist of U/W intrusive investigations of selected EM anomalies located along the RI (or EM) transects that were mapped as part of Phase 2. Parsons will be using UXO SCUBA Technicians (meeting DDESB TP-18 requirements) to perform intrusive investigations of these anomalies. Intrusive or excavation of the anomalies will only take place in unconsolidated sediments. If seagrass is present, the proper method for excavating for anomalies in seagrass is identified in Appendix J (Supplemental Standard Operating Procedures for endangered Species Conservation and their Critical Habitat). If the seagrass beds are discontinuous or they do not allow for the replanting of the seagrass per Appendix J, photo documentation will be conducted and the intrusive investigation will be continued. During intrusive investigations in seagrass beds, the field team will minimize damage to the seagrass by keeping the excavation of the DGM anomalies as small as possible, and by not removing cultural debris that may cause the uprooting of seagrass. Prior to each excavation in seagrass, photos will be captured of the excavation site with a slate identifying the target ID number. Upon completion of the intrusive investigation, measurements will be taken of the excavation site (length, width, depth) and recorded by photo. Following the data collection the spoils from the excavation site will be pushed back into the hole.

6.3.1.2 Underwater Detonations

MEC items and the surrounding environment will be documented by both digital photo and video prior to any action to the MEC item being taken. The proposed course of action for treatment will be communicated to the USACE PDT for discussion and coordination with the Stakeholders and the Natural Resource Agencies. Upon direction from the USACE COR Parsons will continue with or modify the proposed course of action.

To the extent possible, U/W detonations will be kept to a minimum. The preferred option is to move the munition either by hand or by remote means to one of the proposed beaching areas for demolition (See Appendix B, Site Maps). This removes the munition from the water, reducing the environmental impacts due to underwater shockwave, blast, fragmentation (localized), or noise impacts created by underwater detonations. However, if the munition cannot be brought to shore but it can be taken to an area with lower risk to the environment, such as a sandy bottom, this is considered to be an acceptable alternative, but it does not eliminate the hazards of shockwave, blast, localized fragmentation, or noise. Blow in place will only take place if the surrounding area that will be affected by the detonation does not contain corals that are Listed Threatened or Endangered Species, or seagrass which is a sea turtle critical habitat. Additional precautions will be taken for sea turtles and marine mammals prior to performing U/W detonations as are explained in Appendix J, *Final Supplemental Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat* - see section 4.5. MEC items that have corals that are Listed Threatened or Endangered Species growing on or near them may have to be left in place for further evaluation and direction from higher authorities and not undergo a detonation.

Post detonations will be documented by both digital photo, and video of the detonation site and all surrounding areas showing any effect, or lack thereof, to the environment due to demolition operations.

6.3.2 GENERAL CONSERVATION MEASURES

For general conservation measures as they apply to marine habitat and Listed Threatened or Endangered Species, see Appendix J, *Supplemental Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat* (Section 4.1).

6.3.3 DETONATION AREAS AND SEA TURTLE NESTING MONITORING

The SUXOS, in consultation with the Biologist, will use the MSD found in the ESP to determine if an identified turtle nest is inside or outside of the hazard arcs of a proposed beaching and detonation site. If the turtle nest is inside the arcs, mitigation measures such as using sandbags to reduce the fragmentation hazard, may be used to reduce the fragmentation distance and reduce the hazard arcs to an acceptable distance. If the turtle nests are still within the MSD, an alternate site will be selected for the beaching and demolition of the MEC item.

Detonation areas will not require any removal of coastal vegetation.

Section 3.2.1.134.2 discusses the location for the proposed detonation sites. The proposed detonation sites are located in MRS 02 and MRS 07 and were selected due to the high DGM anomaly count or as a location that is unencumbered by reef, which will allow for the munition to be pulled ashore as it is floated by a lifting balloon. The cayos selected are uninhabited and eliminate the fragmentation hazards to the main island of Culebra, provided attention is placed on the size of the munition and the demolition site used. The largest of the munitions that present a potential for fragmentation to reach Culebra should be disposed on the Cayo Lobo site, as it provides a natural cliff barrier to reduce fragmentation towards Culebra and the detonation site distance to Culebra exceeds the fragmentation distances. The site also is a rock beach and will not be affected by turtle nests.

Any areas proposed for use as staging or detonation areas that form part of the Culebra NWR will be closely coordinated with the Refuge Manager, PREQB as the lead Regulatory Agency, and PRDNER who has Maritime Terrestrial Zone and/or Puerto Rico Coastal Zone jurisdiction.

Monitoring will be conducted daily by qualified personnel (e.g., biologist, marine biologist, environmental scientist, among others) to identify the potential presence of new nests or sea turtle tracks during the activity period (*Final Supplemental SOP for Endangered Species Conservation and their Critical Habitat (Addendum 1)*) (CESAJ, February, 2015).

If sea turtle nests are found at a detonation site, Parsons personnel will notify USACE, who will notify the FWS Boquerón Endangered Species Specialist, NMFS Boquerón Office, and PR DNER POC. If agreed, the nest locations will be clearly marked and the staging area will be relocated. This information will be documented as described in this section.

6.3.3.1 Anchoring

Anchoring on established seagrass beds is prohibited IAW Appendix J: *Final Supplemental SOP for Endangered Species Conservation and their Critical Habitat (Addendum 1)* (CESAJ, February, 2015), Section 4.3.8. Parsons field teams will anchor small boats in areas with sand bottoms in waters with depths of at least 4 ft. The ROV and underwater camera, or snorkeling, can be utilized to survey the underwater area to ensure the condition of the seafloor is known prior to anchoring. If mooring buoys are available, these will be used rather than deploying an anchor.

If during the underwater investigation work, any “listed” coral is injured, whatever activity causing the damage will be stopped, the injured “listed” coral will be photographed and left in place and the USACE PM, USCG, NMFS Boquerón Office and PR DNER should be immediately notified. If listed corals are injured, the Parsons PM will also contact the NOAA Office of Law Enforcement at 1-800-853-1964. The following information must be provided:

- The time, date, and location (latitude/longitude) of the incident
- The name and type of the vessel involved

- The vessel's speed during the incident
- A description of the incident
- Water depth
- Environmental conditions (e.g. wind speed and direction, sea state, cloud cover, and visibility)
- The type of coral or description, if possible
- A description of the damage caused to any coral, if possible.

If the vessel runs aground, the operator will perform the following:

- Turn off the engine.
- Do not try to use the engine to power off the reef, hardbottom or seagrass.
- Raise the propeller, and allow the boat to drift free.
- Radio the Coast Guard, Marine Patrol or VHF Channel 16 for assistance.

If any "listed" coral or seagrass is injured, the Parsons PM will follow the procedures described above for damage to "listed" corals.

During an emergency to save a vessel or to protect the crew, such as during a boat fire or loss of power with the vessel on a lee shore, the vessel captain has an obligation to take whatever measures he deems necessary to protect the boats passengers and crew. The above anchoring restrictions will not apply. For additional information on anchoring guidance and restrictions, see Appendix J, *Final Supplemental SOP for Endangered Species Conservation and their Critical Habitat (Addendum 1)* (CESAJ, February, 2015), Section 4.3.

6.3.3.2 Seabirds

The cayos surrounding Culebra are known nesting areas for shorebirds, seabirds, and sea turtles. Although seabirds may be present on the cayos year round, the majority of shorebird and seabird nesting occurs during the spring and summer months. Critical times that MEC should not be detonated because of seabird activity is between the months of April through September; this would also be applicable of most sea turtle nesting. All work schedules will be coordinated with the responsible natural resource agencies to avoid or mitigate possible disturbance of sensitive species during nesting seasons.

6.3.3.2.1 The Roseate Tern (*Sterna dougallii*) is listed as threatened and the Brown Pelican (*Pelecanus occidentalis*) was delisted due to recovery but is being monitored. A complete list of seabirds that occur in the project area is included in Appendix J the SOP for USACE Final Standard Operating Procedure for Endangered Species and Conservation and Their Critical Habitat with Addendum 1, DERP-FUDS Property No. I02PR0068, Culebra Island, Puerto Rico (CESAJ, February 2015). Within this SOP Appendix D Lists the following seabirds found in **Table 6-3** and **Table 6-4** that visit Culebra and the Cayos of MRS 02.

Table 6-3: Culebra Archipelago Seabirds

Species Name	Nesting?	Species Name	Nesting?
Audubon's Shearwater	Yes	Least Tern	Yes
Masked Booby	Yes	Great Shearwater	No
Brown Booby	Yes	Manx Shearwater	No
Red-footed Booby	Yes	Wilson's Storm-Petrel	No
White-tailed Tropicbird	Yes	Leach's Storm-Petrel	No
Red-billed Tropicbird	Yes	Double-crested Cormorant	No
Laughing Gull	Yes	Common Tern	No
Royal Tern	Yes	Arctic Tern	No
Sandwich Tern	Yes	Pomarine Skua	No
Cayenne Tern	Yes	Black Noddy	No
Roseate Tern	Yes	Herald's Petrel	No
Bridled Tern	Yes	Brown Pelican	Yes
Sooty Tern	Yes	Magnificent Frigatebirds	No*
Brown Noddy	Yes		

*Need to be confirmed; potential areas for nesting occur.

Table 6-4: Seabird Areas on Culebra Archipelago

Seabird areas on Culebra Archipelago	Bird Name	Observed or Nesting	Nesting Period	Resident or Migratory
Flamenco Peninsula	Sooty Tern	nesting	March to September	Migratory
Luis Peña Cay	Audubon's Shearwater	nesting	February to July	Migratory
	White-tailed Tropicbird	nesting	February to September	Migratory
	Red-billed Tropicbird	nesting	May to September	Migratory
Del Agua Cay	Audubon's Shearwater	nesting	February to July	Migratory
	White-tailed Tropicbird	nesting	February to September	Migratory
	Bridled Tern	nesting	April to August	Migratory
	Brown Noddy	nesting	April to August	Migratory
Ratón Cay	Audubon's Shearwater	nesting	February to July	Migratory
	Red-billed Tropicbird	nesting	May to September	Migratory
	Roseate Tern	nesting	April to July	Migratory
	Bridled Tern	nesting	April to August	Migratory
	Brown Noddy	nesting	April to August	Migratory
Yerba Cay	Audubon's Shearwater	nesting	February to July	Migratory
	Red-billed Tropicbird	nesting	May to September	Migratory
	Roseate Tern	nesting	April to July	Migratory
	Bridled Tern	nesting	April to August	Migratory
	Sooty Tern	nesting	March to September	Migratory
	Brown Noddy	nesting	April to August	Migratory

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CULEBRA ISLAND SITE, PUERTO RICO

Seabird areas on Culebra Archipelago	Bird Name	Observed or Nesting	Nesting Period	Resident or Migratory
Lobo Cay	Audubon's Shearwater	nesting	February to July	Migratory
	White-tailed Tropicbird	observed	February to September	Migratory
	Red-billed Tropicbird	observed	May to September	Migratory
Lobito Cay	Audubon's Shearwater	nesting	February to July	Migratory
	Red-billed Tropicbird	nesting	May to September	Migratory
	Laughing Gull	nesting	April to September	Migratory
	Royal Tern	nesting	May to July (Sept to April)	Migratory
	Sandwich Tern	nesting	May to July (Sept to April)	Migratory
	Cayenne Tern	nesting	May to July	Migratory
	Bridled Tern	nesting	April to August	Migratory
Noroeste Cay	White-tailed Tropicbird	nesting	February to September	Migratory
	Bridled Tern	nesting	April to August	Migratory
	Sooty Tern	nesting	March to September	Migratory
	Brown Noddy	nesting	April to August	Migratory
Molinos Cay	White-tailed Tropicbird	nesting	February to September	Migratory
	Red-billed Tropicbird	nesting	May to September	Migratory
	Roseate Tern	nesting	April to July	Migratory
	Bridled Tern	nesting	April to August	Migratory
	Sooty Tern	nesting	March to September	Migratory
	Brown Noddy	nesting	April to August	Migratory
Alcarraza Cay	Audubon's Shearwater	nesting	February to July	Migratory
	Red-billed Tropicbird	nesting	May to September	Migratory
	Masked Booby	nesting	Throughout the year	Resident
	Brown Booby	nesting	Throughout the year	Resident
	Bridled Tern	nesting	April to August	Migratory
	Sooty Tern	nesting	March to September	Migratory
	Brown Noddy	nesting	April to August	Migratory
Matojo Cay	Audubon's Shearwater	nesting	February to July	Migratory
	Red-billed Tropicbird	nesting	May to September	Migratory
	Royal Tern	nesting	May to July (Sept to April)	Migratory
	Laughing Gull	nesting	April to September	Migratory
	Sandwich Tern	nesting	May to July (Sept to April)	Migratory
Geniquí Cays	Red-billed Tropicbird	nesting	May to September	Migratory
	Brown Booby	nesting	Throughout the year	Resident
	Laughing Gull	nesting	April to September	Migratory
	Bridled Tern	nesting	April to August	Migratory
	Brown Noddy	nesting	April to August	Migratory
	Red-footed Booby	nesting	Throughout the year	Resident

Seabird areas on Culebra Archipelago	Bird Name	Observed or Nesting	Nesting Period	Resident or Migratory
Culebrita Island	Audubon's Shearwater	nesting	February to July	Migratory
	White-tailed Tropicbird	observed	February to September	Migratory

6.3.3.2.2 Seabirds are pelagic birds. This means that they just come to land to nest and after that, they pass the rest of the time flying over the ocean looking for food. The nesting season of seabirds consists of the period of time that birds are present or near lands doing courtships, nesting area selections, nesting periods, etc. This period is finished when fledglings or juveniles abandon the colony area. The most critical months in Culebra Island for seabirds are from February to August. During this period, the seabirds, and depending on the species, are in the process of courtship, selection of nesting areas, laying eggs, feeding their chicks, and protecting their fledglings from predators. Areas more used by birds in the Culebra Archipelago are Yerba, Molinos, Alcarraza, Geniqui, Lobito, Agua, Raton and Matojo cayos, and Flamenco Peninsula.

6.3.3.2.3 The most common and dangerous perturbations in the seabirds colonies are predators and human disturbances. In the Culebra offshore cays, introduced predators such as cats and rats, can eat eggs and chicks. Also, other predators (i.e., goats and deer) in the cays can manipulate and change the nesting habitat by grazing. Human disturbances as loud noise made by jet skis, boats, and other sources, or just the presence of one or more persons near the colony(ies) may cause abandonment of nests by adults which may cause eggs overheat and predated by ants, rats, or cats. It is very important not to disturb the colonies during nesting season. Any work or activity necessary to do near or in colony areas should be completed outside of nesting period.

6.3.3.2.4 Field work will be implemented on the Cayos outside of nesting season. During field operations the team biologist will assess each cay for the presence of nesting seabirds to determine if the scheduled field operation can be conducted. In addition, prior to a munition demolition by detonation, a qualified observer will check the beach and adjacent waters surrounding the cayo for the presence of protected and listed seabird species by scanning the area with 10 X 50 binoculars. The qualified observer (team biologist) will also survey the beaches for signs of bird nesting. If bird nests are found within the detonation site and/or blast impact area, no detonation will be conducted in that area. If any protected bird species are within 200 meters of the detonation site, the MEC detonation will be delayed until after the animal(s) leave the area. In addition, if blast impacts will extend into nearshore waters, a qualified observer for sea turtles and marine mammals shall be required. If these species are observed the detonation shall be postponed until the animal has left the impact zone or more than 30 minutes have elapsed since it was last sighted.

6.3.3.2.5 All on-site project personnel will be instructed during site orientation training of the potential threatened and endangered species in the area and of the need to avoid harming these plants and animals. On-site personnel will be instructed that civil and criminal penalties exist for harming, harassing, or killing birds, manatees, sea turtles, dolphins, or whales, which are protected under the Marine Mammal Protection Act of 1972, the ESA of 1973, and PRDNER Regulation Number 6766 for the preservation of vulnerable species and species in danger of extinction (February 11, 2004).

6.3.4 SPILL CONTROL AND PREVENTION

All fueling and maintenance of vehicles will be performed off-site at appropriate commercial or private facilities. If a severe leak of fuel or other fluids, such as antifreeze or transmission fluid, occurs in the field because of a tank puncture or a ruptured line, the following procedures should be implemented.

- Promptly berm the site with dirt so that the fuel or fluid does not spread along the ground surface.
- Apply oil-absorbing material such as sorbent booms, sawdust or kitty litter to the spill.
- Report the spill to National Response Center (NRC), at 1-800-424-8802 and to PR DNER and follow their instructions for cleanup. It is anticipated that this cleanup usually will involve digging up and drumming contaminated soil, and subsequently disposing of it in an approved landfill.

Spills of gasoline into the sea water will be reported to the NRC, USCG, PR DNER, and EPA through approved channels.

- The fuel tank will not be filled to more than about three-quarters full to prevent overflowing in the field.

6.3.5 ALL STORAGE AREAS

No storage areas are anticipated within any of the MRS water areas.

6.3.6 VEHICULAR ACCESS ROUTES

Phase 3 field activities will be conducted on water, with no access to the MRS by vehicle.

6.3.7 TREES AND SHRUBS PROTECTION AND RESTORATION

It is unlikely that any trees will be removed during the Phase 3 field work. Therefore, no provisions for tree restoration are required.

6.3.8 TEMPORARY FACILITIES

Parsons will not establish a site trailer command post. Trash will be collected and dumpsters will be dumped or removed, as appropriate.

6.3.9 DECONTAMINATION AND DISPOSAL OF EQUIPMENT

This project does not involve any hazardous materials or hazardous wastes.

6.3.10 MINIMIZING AREAS OF DISTURBANCE

Procedures for minimizing areas of disturbance are described throughout this EPP and include complying with the procedures in Appendix J, *Final Supplemental SOP for Endangered Species Conservation and their Critical Habitat (Addendum 1)* (CESAJ, February, 2015).

6.4 PROCEDURES FOR POST-ACTIVITY CLEANUP

All wastes will be removed from each site immediately upon completion of each day's field activities. Therefore, no post-activity cleanup will be required.

6.5 AIR MONITORING PLAN

Air monitoring is not being performed during this RI. Parsons work procedures are designed to minimize vapors, gases, and particulate emissions.

6.6 PRELIMINARY IDENTIFICATION OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) AND "TO BE CONSIDERED" INFORMATION

As amended, the 1986 Superfund Amendments and Reauthorization Act (SARA), Section 121(d)(2) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires that on-site remedial actions attain (or waive) Federal and more stringent State applicable or relevant and appropriate requirements (ARARs) of environmental laws upon completion of the remedial action. The revised National Contingency Plan of 1990 (NCP) requires compliance with ARARs during remedial actions as well as at completion, and compels attainment of ARARs during removal actions to the extent practicable, considering the specifics of the situation.

The "Applicable" portion of the term is defined as:

- Cleanup standards, standards of control, and other substantive requirements, criteria or limitations promulgated under Federal environmental or state environmental or facility citing laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a

state in a timely manner and that are more stringent than Federal requirements may be applicable.

The “Relevant and Appropriate” portion of the ARAR term is defined as:

- Cleanup standards, standards of control, and other substantive requirements, criteria or limitations promulgated under Federal environmental or state environmental or facility citing laws that, while not ‘applicable’ to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be relevant and appropriate.

Although compliance is not required, in order to incorporate guidance and other information into the alternatives developed, some remedial actions identify “To Be Considered (TBC)” criteria which are defined as:

- Non-promulgated advisories, criteria, and guidance are not ARARs, but may sometimes be useful in developing a CERCLA remedy. When this is the case, at the discretion of the lead agency, they can be specified as “To-Be-Considered (TBC)” criteria. TBC criteria can be taken into consideration during evaluation of remedial alternatives, but unlike ARARs, identification of TBCs is not mandatory nor is compliance with TBCs a selection criterion for a remedial action.

The documents that are TBC are incorporated as appropriate into the RI and FS reports and are not called out in a table, to avoid confusion with the ARARs. Compliance with these documents is not required under CERCLA or the NCP, therefore, no tabulation is provided.

Any substantive environmental or facility citing requirement has the potential to be an ARAR. To assist in identification, ARARs are divided into three categories: chemical-specific ARARs, location-specific ARARs, and action-specific ARARs. These three categories are defined as follows:

- Chemical-specific ARARs are promulgated health-based or risk-based numerical values that establish the acceptable amount or concentration of a chemical that may remain in, or be discharged to, the ambient environment. Where more than one requirement addressing a contaminant is determined to be an ARAR, the most stringent requirement should be used. Risk-based screening levels (for example, EPA Regional Screening Levels) are not considered chemical-specific ARARs because they are not promulgated.
- Location-specific ARARs generally are restrictions placed on the concentration of a hazardous substance or the conduction of activities solely because they are in special locations. Requirements addressing cultural resources, historic places, floodplains, wetlands, or sensitive ecosystems and habitats are potential location-specific ARARs.
- Action-specific ARARs are usually technology or activity-based requirements or limitations placed on actions taken with respect to remedial/removal actions, or requirements to conduct certain actions to address particular circumstances at a site. Regulations that dictate the design, construction and operating characteristics of air stripping units, incinerators, landfills or other waste management facilities are examples of action-specific ARARs. No action-specific ARARs have been identified for this site.

ARARs are identified during the response process prior to issuance of the ROD/DD, and they may continue to evolve over time. The NCP requires the lead agency to formally request ARARs from support agencies at completion of the RI. For an alternative to pass into the detailed analysis stage of the RI/FS, and thus become eligible for selection, it must comply with its ARARs or a waiver should be identified and the justification provided for invoking it. An alternative that cannot comply with ARARs, or for which a waiver cannot be justified, should be eliminated from consideration for further discussion as a potential alternative. Updates to ARARs are then requested during development of the FS as details of remedial alternatives become known. Thus, potential ARARs are initially identified on a broad basis, refined to specific requirements during the FS, and finalized at signature of the DD.

As the RI/FS process continues, the list of ARARs will be updated, particularly as the response actions are selected and reviewed by state and federal agencies. ARARs will be used to establish the appropriate extent of site cleanup; to aid in scoping, formulating, and selecting proposed treatment technologies; and to govern the implementation and operation of the selected remedial alternative. As part of the FS, primary consideration should be given to remedial alternatives that attain or exceed the requirements of the identified ARARs. Throughout the RI/FS, ARARs are identified and used by taking into account the following:

- Contaminants suspected or identified to be at the site;
- Chemical analysis performed or scheduled to be performed;
- Types of media (air, soil, groundwater, surface water, and sediment);
- Geology and other site-specific characteristics;
- Use of site resources and media;
- Potential contaminant transport mechanisms;
- Purpose and application of potential ARARs; and
- Remedial alternatives considered for site cleanup.

The potential ARARs identified for the RI are presented in Table 6-5. The primary means of MEC treatment will be to remotely remove the munition to land for detonation. If consolidation on land and land detonations are conducted, then compliance with RCRA 40 CFR 264, Subpart X would be required for consolidation of munitions for demolition.

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Table 6-5: Potential ARARs

Requirement	Status /Synopsis of Requirement	Action to be Taken to Attain Requirement
<p>Endangered Species Act (USC Title 16 chapter 35§1538)</p>	<p>Relevant and Appropriate - Location-Specific/The Endangered Species Act (ESA) protects federally listed species (fish, wildlife, and plants) which are either endangered or threatened and preserves critical habitat. The substantive requirement within the Act prohibits the "taking" of listed species [reference: 16 USC 1538; 50 Code of Federal Regulation (CFR) 17.95; 50 CFR 226.208]</p>	<p>When evaluating remedial alternatives, consideration must be given to avoiding impacts to the endangered species and its habitat. USACE in coordination with NOAA, NMFS, USFWS and PR DNER authored the:</p> <p><i>Final Supplemental SOP for Endangered Species Conservation and their Critical Habitat</i> (CESAJ 2014).</p> <p>The processes identified in the above-listed SOP provide procedures that allow for the RI to be completed and avoid impact to endangered species. A remedial alternative which "takes" an endangered species or destroys its habitat does not qualify as a suitable remedial alternative because the ESA ARAR would not be satisfied. Either a different alternative which does not impact the endangered species should be pursued or an exception allowing the taking of the species is needed, or a waiver of the ARAR is required.</p>
<p>Marine Mammal Protection Act of 1972 (USC Title 16 Chapter 31 §1372(a))</p>	<p>The MMPA provides: protection for marine mammals, marine mammal products, the sustainability of Marine Mammal Populations through conservation and management and the MMPA recognizes that the marine mammal population is below their optimum sustainable levels. 50 CFR Subchapter C Part 216</p>	<p>When evaluating remedial alternatives, consideration must be given to avoiding impacts to the endangered species and its habitat. USACE in coordination with NOAA, NMFS, USFWS and PR DNER authored the:</p> <p><i>Final Supplemental SOP for Endangered Species Conservation and their Critical Habitat</i> (CESAJ 2014).</p> <p>The processes identified in the above-listed SOP provide procedures that allow for the RI to be completed and avoid impact to Marine Mammals. Any remedial alternative that causes injury or kills a marine mammal does not qualify as a suitable remedial alternative. Remedial alternatives that provide protection to Marine Mammals is preferred over seeking waivers from ARARs.</p>

7.0 PROPERTY MANAGEMENT PLAN

7.1 DESCRIPTION

7.1.1 This Property Management Plan provides detailed information on the types, quantities, and sources of equipment and materials that will be required to perform field and office operations on this project. Field operations include all activities to be performed to complete the fieldwork. Office operations include all tasks performed in support of project management and the implementation of project work in the field through completion consistent with the requirements of the PWS. The types of equipment recommended, selected, and proposed for this work are those that have been tested and proven in the industry and, therefore, are reliable to use in performing the various activities associated with this project. The quantities proposed are needed to help perform the work in a timely and cost effective manner as dictated by the project schedule.

7.1.2 Government-furnished property (GFP) or contractor-acquired property (CAP) is not planned to be used for this cost plus fixed fee phase of the task order. However, in the instance that GFP or CAP is obtained, the property will be properly maintained and controlled in accordance with this Property Management Plan, which is written in accordance with Federal Acquisition Regulation (FAR) subpart 45.5, Defense Federal Acquisition Regulations System (DFARS) Part 245, and DoD Manual 4161.2-M.

7.1.3 The PM is responsible for ensuring that a system to meet the requirements brought forth by this Property Management Plan is prepared, implemented, and enforced. If the PM designates a Property Manager for this project, the Property Manager will be responsible for oversight of project property operations on behalf of the PM and will provide feedback about compliance with the plan.

7.2 PROJECT RENTAL EQUIPMENT

7.2.0.1 Most equipment will be rented from vendors with proven records of furnishing well-maintained, reliable, and updated equipment that can be used to successfully complete the field and office operations.

7.2.0.2 Although the procurement of rental equipment may be conducted by the project management or procurement team, reception, documenting, and tracking of the equipment in the field will be conducted by the Site Manager. The PM will ultimately be responsible for ensuring that the tracking is being conducted.

7.2.1 RECEIVING

7.2.1.1 When rental equipment or vehicles are received on-site, it must be inspected for damages to see if it meets the specifications, and to confirm that the appropriate maintenance and function is supported by proper documentation. The person responsible for conducting the inspection will be the Site Manager or the technical lead for the team that will be using the equipment, e.g., Lead Sampler, SUXOS, etc. The receiving and returning process for rental equipment is accomplished on a Rental Equipment Form provided in Appendix F. The Rental Equipment Form will be created for each piece of equipment received (e.g., geophysical instrument, multi-parameter water meter) or equipment package if the rental equipment will be returned at the same time (e.g., the recorder and various components of a geophysical instrument – this equipment can be logged on the same form).

7.2.1.2 If orders are received damaged or short of what was ordered, the vendor will be contacted immediately to rectify the shortage or damage. The Rental Equipment Form will be completed for the order with the damage/shortage noted. Damaged equipment will be segregated and tagged as unusable until it is replaced or repaired. Photographs will be taken of the rental equipment, noting packaging methods (when received) and any damage noted. These photographs will not only help in the documenting receipt condition, but will also be used for reference when re-packaging for returning the items to the vendor.

7.2.1.3 Rental equipment will be listed in the Daily Report once it has been received on site. This report will list the item, vendor, assignment, rental cost, date on site, and date off site.

7.2.2 TRACKING RENTAL EQUIPMENT

Long-term rental equipment (greater than 1 month) will be inventoried and tracked monthly. This will be accomplished by filing the Rental Equipment Form and using them to inventory monthly, noting any condition changes. Once equipment is found to be unserviceable, an exchange will be arranged with the vendor.

7.2.3 RETURNING EQUIPMENT

7.2.3.1 Rental equipment will be returned to the respective vendor as soon as it is no longer required on site. Extending the time on site without reason only contributes to unnecessary costs to the project and to risks of loss or damage.

7.2.3.2 When equipment is no longer needed, the Rental Equipment Form and photos will be pulled from the file and used for repackaging and shipping. Care will be taken to ensure that the return shipment of this rental equipment is well documented. First, components being returned to the vendor must match those listed as those received. If additional components were received as separate shipments following the initial receipt of equipment, the extra components gathered during the duration of the field effort should be packaged and returned separately, as they were received. Second, the instruments and items being returned should be packaged as it was received. If packaging material was not kept on site, similar packaging material will be purchased for return shipments. Third, photographs will be taken which documents the condition of the items being returned, as well as the way that the equipment was packaged. If custody seals, etc. are used photographs should be taken of these as well. Fourth, the shipping company name and tracking numbers will be recorded on the form. Lastly, the person shipping the equipment will follow up with the vendor to ensure the equipment was returned in satisfactory condition. Photographs and forms will be maintained in the project files.

7.3 ACQUISITION AND TRACKING PROCEDURES FOR GOVERNMENT PROPERTY

The procedures outlined below include the procedures for acquisition, identification, tracking, and disposition of CAP or GFP (if provided). Currently, there is no plan to acquire CAP or GFP.

7.3.1 ACQUISITION

7.3.1.1 Equipment will be procured or purchased for all aspects of project activities during this field effort. All items acquired by means other than furnished by the government will follow adequate procurement policies and procedures that have been approved by Defense Contract Management Agency. An evaluation will be performed whether to rent or purchase needed equipment. When possible, equipment will be priced through three different vendors and the most economical option will be selected. In certain cases involving special maintenance and calibration requirements for an instrument, a sole-source vendor may be used.

7.3.1.2 The Government may furnish the contractor property for this project. Normally, this is accomplished by identifying the property in the contract or, if provided subsequent to issuance of the contract, through a contract modification adding the GFP. When the property is received, it will be inspected for condition before signing for it. If government property is received in unserviceable status, a written statement will be created containing all relevant facts, such as cause or condition and a recommended course of action, if overages, shortages, or damages and/or other discrepancies are discovered to the Government Property Assessor. The Government may require the contractor to repair the property at the Government's expense. Upon receipt, the asset property will be bar tagged for tracking and identification purposes, and recorded in the property database unless a Property Manager has been officially assigned to manage the project property. If one has, then a list of the GFP should be sent to the Property Manager so he/she can add it to the master property database and records file.

7.3.2 RECEIVING

7.3.2.1 When property is received on-site, it must be inspected for damages and to see if it meets the specifications of what was ordered. The receiving process for property is accomplished on a Material Receiving Report (MRR). Appendix F includes an example MRR. MRRs are completed on everything

received except purchases of services and expendable items. The MRR will notate the MRR number, the purchase document number, date, condition of items, bar tag number, serial number, any damages or shortages and the name and signature of the person completing the MRR. The completed MRR will be maintained in a permanent record file along with the acquisition document for audits, reporting and project close-out activities. The PM or his/her designee will use the MRR to update the property database, maintain the official property records.

7.3.2.2 If orders are received damaged or short of what was ordered, then an Overage/Shortage/Damage (OSD) Report must be completed and sent to the procurement official. A copy of the OSD Report along with the MRR will be kept in a "pending" file until the discrepancy is resolved by procurement. Once it has been resolved, the documents go into a completed file. An example of an OSD Report is provided in Appendix F.

7.3.3 TRACKING

A 100% physical inventory of all government CAP/GFP will be conducted at least annually on non-consumable items purchased on time and materials tasks for this project. When applicable, the serial number, model or manufacturer, date purchased, present location of item, cost, current status (functional, need of repair, needs batteries, etc.), and a description of the item are recorded on the inventory list.

7.3.4 LOSS NOTIFICATION

At the time an incident occurs involving the loss, destruction or damage to government property, the person most knowledgeable about the incident must complete a Loss/Damage/Destruction (LDD) Report and submit it through the PM to the Property Manager. An example of an LDD Report can be found in Appendix F. The report must provide sufficient detail about the facts in the incident so that the reader will know exactly what happened. The facts must include the date of incident, names of those involved, name of person filing the report, estimated cost to repair the item(s) affected, description of the item to include bar tag and serial number, make and model and a detailed explanation about how the incident occurred.

7.3.5 PROPERTY STORAGE

Government property will be maintained in a secure area/container when not in use. The area/container must adequately protect the property from the elements and must be locked to avoid unauthorized entry.

7.3.6 ULTIMATE DISPOSAL

Disposition of property occurs when the property has been written off, damaged, or becomes excess to the needs of a current task order. An inventory of the project's property will be conducted at project close-out and the results will be balanced against the prior property inventories. LDD Reports will be prepared to account for any damaged, destroyed or missing items that have not been addressed in an LDD Report prior to close-out.

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**8.0 INTERIM HOLDING FACILITY SITING PLAN FOR RECOVERED CHEMICAL WARFARE
MATERIEL**

NOT APPLICABLE

Not authorized by the Performance Work Statement.

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9.0 PHYSICAL SECURITY PLAN FOR RECOVERED CHEMICAL WARFARE MATERIEL SITES

NOT APPLICABLE

Not authorized by the Performance Work Statement.

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10.0 REFERENCES

The following are references that may apply to the overall RI/FS project and RI field activities. Following their substantive requirements will ensure compliance with Section 121 of CERCLA and listed federal and local laws.

10.1 U.S. ARMY CORPS OF ENGINEERS GUIDANCE DOCUMENTS

- EM 200-1-4. Environmental Quality – Risk Assessment Handbook, 1999.
- EM 1110-1-1002. Engineering and Design – Survey Markers and Monumentation, 1990.
- EM 200-1-15. Technical Guidance for Military Munitions Response Actions.
- EM-1110-1-100 Engineering and Design – Conceptual Site Models for Ordnance and Explosives (OE) and Hazardous, Toxic, and Radioactive Wastes (HTRW) Projects, 2003.
- EM 385-1-97 Explosives Safety and Health Requirements Manual
- EM 385-1-1. Safety and Health Requirements Manual, 2014.
- ER 200-3-1. Environmental Quality – Formerly Used Defense Sites (FUDS) Program Policy, 2004.
- ER 385-1-92. Safety - Safety and Occupational Health Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) Activities, 2007.
- ER 1110-1-12. Engineering and Design – Quality Management, 2006.
- EP 1110-1-18. Military Munitions Response Process, 2006.
- EP 1110-3-8. Engineering and Design – Public Participation in the Defense Environmental Restoration Program (DERP) for Formerly Used Defense Sites (FUDS), 2004.
- EP 1110-1-24. Establishing and Maintaining Institutional Controls for Ordnance and Explosives Projects, 2000.
- EP 75-1-2. Munitions and Explosives of Concern (MEC) Support During Hazardous, Toxic, and Radioactive Waste (HTRW) and Construction Activities
- EP 75-1-4. Recurring Reviews on Ordnance and Explosives (OE) Response Actions, 2003.
- Final Supplemental Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat with Draft Addendum 1, DERP-FUDS Property No. I02PR0068, Culebra, Puerto Rico (November 2014)

10.2 U.S. ARMY DOCUMENTS

- Army MMRP, Remedial Investigation / Feasibility Study Guidance, 2009.
- TM 60A 1-1-31, Explosive Ordnance Disposal Procedures, 1994.
- AR 385-64, Ammunition and Explosives Safety Standards, 1999.
- AR 190-11, Physical Security of Arms, Ammunition and Explosives, 2006.

10.3 DEPARTMENT OF DEFENSE DOCUMENTS

- DoD 6055.09-M, Department of Defense Ammunition and Explosives Safety Standards
- DoD 4145.26-M, Contractor's Safety Manual for Ammunition and Explosives
- DDESB TP 18, Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel

10.4 OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

- Occupational Safety and Health Administration (OSHA) 1994 *General Industry Standards*, 29 CFR 1910 and *Construction Industry Standards*, 29 CFR 1926; especially 1910.120/29CFR 1926.65-*Hazardous Waste Site Operations and Emergency Response*.

10.5 U.S. ENVIRONMENTAL PROTECTION AGENCY

- Draft Culebra Wastewater Facilities Plan, Environmental Impact Statement, 1985.
- Risk Assessment Guidance for Superfund (RAGS), 1989.

10.6 FEDERAL REGULATIONS

- Code of Federal Regulations (CFR)
 - 33 CFR 320 Wetlands Protection Act
 - 40 CFR 300.430 National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 1993.
 - 40 CFR Part 261.23 Resource Conservation and Recovery Act.
 - 49 CFR Parts 100-199 Transportation.
 - 62 Federal Register 6622, 1997 Military Munitions Rule.
- Fish and Wildlife Coordination Act 16 U.S.C. 661 et seq.
- Endangered Species Act 16 U.S.C. 1531-154.
- Migratory Bird Treaty Act 16 U.S.C. 703-712.
- National Historic Preservation Act 16 U.S.C. 1470.
- Clean Water Act 33 U.S.C. 1151 et seq., 1251 et seq., 40 U.S.C. 3906 et seq.
- Comprehensive Environmental Response, Compensation, and Liability Act 42 U.S.C. 9601-11050.
- National Wildlife Refuge System Improvement Act of 1997, U.S. Fish & Wildlife Service, Culebra National Wildlife Refuge.

10.7 COMMONWEALTH OF PUERTO RICO REGULATIONS

- Law 147 of 1999 (Act for the Protection, Conservation and Management of the Coral Reefs in Puerto Rico)
- Law 241 of 1999 (New Wildlife Law)
- Law 278 of 1998 (Puerto Rico Fisheries Law)
- Regulation 2577 (Regulation to Control the Extraction, Possession, Transportation and/or Sale of Live or Dead Coral)
- Forestry Law #133
- Sand, Gravel and Rock Law #132 of 25 June 1968
- Law of Docks and Ports of Puerto Rico of 1968 (Law 151)

10.8 OTHER DOCUMENTATION/SURVEYS AND STUDIES

- Environmental Science & Engineering, Inc. (ESE) 1997. Final Engineering Evaluation/Cost Analysis: Former Culebra Island Naval Facility, Culebra Island, Puerto Rico. DERP-FUDS Project Number I02PR006802. March.
- Explosive Ordnance Technologies, Inc. 2010. Final Site Specific Work Plan for Remedial Investigation / Feasibility Study at the Culebra Island Site, Puerto Rico. March 2010.

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- Parsons, 2007. Final Site Inspection Report, Culebra Island Site, Puerto Rico. September.
- Parsons, 2014. Final Environmental Baseline Survey Report, Underwater Portions of MRSs 07 and 02, Culebra, Puerto Rico. March.
- U.S. Army Corps of Engineers (USACE). 1991. DERP-FUDS Findings and Determination of Eligibility, Culebra Island NWR, P. R., Project No. I02PR006800. Prepared by USACE Jacksonville District.
- U.S. Army Corps of Engineers (USACE). 1995. Archives Search Report Findings for Culebra Island National Wildlife Refuge, Culebra, Puerto Rico. Project No. I02PR006802. Prepared by USACE Rock Island District. February.
- U.S. Army Corps of Engineers (USACE). 2004a. *ASR Supplement for the Culebra Island NWR*. Prepared by USACE Rock Island District. 26 November.
- U.S. Army Corps of Engineers (USACE). 2005b. *Supplemental Archives Search Report for Culebra, Puerto Rico*. Project No. I02PR0068. Prepared by USACE St. Louis District. September.

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