FINAL

Technical Information Paper

Phase II Seaside
Munitions Response Area
Outside Roadway Alignment and Utility Corridor
(Pollution Report and Removal Action Activity Report)

Former Fort Ord
Monterey County, California

March 25, 2011

Prepared for:

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Prepared Under:

Environmental Services Cooperative Agreement
No. W9128F-07-2-01621
and
FORA Remediation Services Agreement (3/30/07)

Document Control Number: 09595-10-087-010

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Monterey County, California

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ACRONYMS AND ABBREVIATIONS

μsec	microsecond
AOC	Administrative Order on Consent
AR	Army Regulation
Army	United States Department of the Army
ASR	Aquifer Storage and Recovery
ATF	Bureau of Alcohol, Tobacco, Firearms, and Explosives
BADT	best available (and appropriate) detection technology
BRAC	Base Realignment and Closure
BO	Biological Opinion
CCR	California Code of Regulations
CDR	Covenant Deferral Request
CEHNC	Corps of Engineers - Huntsville Center
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cm	centimeters
CTS	California tiger salamander
cy	cubic yards
DA PAM	Department of the Army Pamphlet
DGM	Digital Geophysical Mapping
DID	Data Item Description
DMM	discarded military munitions
DOD	U.S. Department of Defense
DQO	Data Quality Objective
DTSC	Department of Toxic Substances Control
EM	electromagnetic
EPA	U.S. Environmental Protection Agency
ESCA RP	Environmental Services Cooperative Agreement Remediation Program
FGCC	Federal Geodetic Control Committee
FORA	Fort Ord Reuse Authority
FVF	field variance form
GJMB	General Jim Moore Boulevard
GPS	Global Positioning System
HMP	Habitat Management Plan

Hz	readings per second
IDW	investigation-derived waste
km	kilometers
LBP	lead-based paint
lbs	pounds
LDSP	Land Disposal Site Plan
LFR	LFR Inc.
mag	magnetic
MC	munitions constituents
MD	munitions debris
MEC	munitions and explosives of concern
mm	millimeter
MPPEH	material potentially presenting an explosive hazard
MRA	Munitions Response Area
MRS	Munitions Response Site
MSD	minimum separation distance
mV	millivolt
NC	no contact
NPL	National Priorities List
NRMA	natural resources management area
NTCRA	Non-Time-Critical Removal Action
OE	Ordnance and Explosives
PDA	Personal Digital Assistant
PES	potential explosion site
QA	quality assurance
QC	quality control
RI/FS	Remedial Investigation/Feasibility Study
RTK	Real-Time Kinematic
SAA	small arms ammunition
SCA	Special Case Area
SOP	Standard Operating Procedure
SSWP	Site-Specific Work Plan
SUXOS	Senior UXO Supervisor
TCRA	Time-Critical Removal Action

TIP	Technical Information Paper
USACE	U.S. Army Corps of Engineers
USACE EM	U.S. Army Corps of Engineers Engineering Manual
USFWS	U.S. Fish and Wildlife Service
UXO	unexploded ordnance
UXOQCS	UXO Quality Control Specialist
WESTON	Weston Solutions, Inc.
yd^3	cubic yards

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GLOSSARY

Anomaly

Any item that is seen as a subsurface irregularity after geophysical investigation. This irregularity should deviate from the expected subsurface ferrous and nonferrous material at a site (i.e., pipes, power lines, etc.).

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980

CERCLA authorizes federal action to respond to the release or threatened release of hazardous substances into the environment or a release or threatened release of a pollutant or contaminant into the environment that may present an imminent or substantial danger to public health or welfare.

Construction Support

Assistance provided by United States Department of Defense (DOD) explosive ordnance disposal (EOD) or UXO-qualified personnel and/or by personnel trained and qualified for operations involving chemical agents (CA), regardless of configuration, during intrusive construction activities on property known or suspected to contain UXO, other munitions that may have experienced abnormal environments (e.g., DMM), munitions constituents in high enough concentrations to pose an explosive hazard, or CA, regardless of configuration, to ensure the safety of personnel or resources from any potential explosive or CA hazards.

Covenant Deferral Request

A letter along with a supporting information package known as a Covenant Deferral Request (CDR) is assembled by the Federal landholding to formally request deferral of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) covenant until all remediation has been accomplished prior to transfer. U.S. Environmental Protection Agency (EPA) requires that the information is: 1) of sufficient quality and quantity to support the request for deferral of the CERCLA Covenant; and 2) that it provides a basis for EPA to make its determination. This information is submitted to EPA in the form of a CDR.

Deferral period

The period of time that the CERCLA covenant warranting that all remedial action is complete before transfer, is deferred through the Early Transfer Authority.

Discarded Military Munitions (DMM)

Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include UXO, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations. (10 U.S.C. 2710(e)(2))

Early Transfers

The transfer by deed of federal property by U.S. Department of Defense (DOD) to a nonfederal entity before all remedial actions on the property have been taken. Section 120 (h)(3)(C) of the CERCLA allows Federal agencies to transfer property before all necessary cleanup actions have been taken. This provision, known as early transfer authority, authorizes the deferral of the CERCLA covenant when the findings required by the statute can be made and the response action assurances required by the statute are given. The Governor of the state where the property is located must concur with the deferral request for property not listed on the National Priorities List (NPL). For NPL property, the deferral must be provided by the EPA with the concurrence of the Governor. Upon approval to defer the covenant, DOD may proceed with the early transfer.

Exclusion Zone
A safety zone established around an MEC work area. Only essential project personnel and authorized, escorted visitors are allowed within the exclusion zone. Examples of exclusion zones are safety zones around MEC intrusive activities and safety zones where MEC is intentionally detonated.

ESCA RP Team
LFR Inc., Weston Solutions, Inc., and Westcliffe Engineers, Inc.

Geophysical Reacquisition
Geophysical Reacquisition involves utilizing a positioning method (i.e., differentially corrected Global Positioning System [GPS], ultrasonic [USRADS], or tape from corners) to accurately mark anomaly locations. The intended result of this method is to mark the targets (which could represent MEC) picked by the geophysicist during processing of digital geophysical data. The reacquisition team will place a flag at the coordinates where the intrusive teams will search within a 3 foot radius for the subsurface item causing the anomaly.

mag and dig
Utilizing hand held geophysical instruments to detect anomalies and immediately investigating the anomalies (without using collection of digital data and post processing to determine which anomalies to dig) by manual digging or with the assistance of heavy equipment

Material Potentially Presenting an Explosive Hazard (MPPEH)
Material that, prior to determination of its explosives safety status, potentially contains explosives or munitions (e.g., munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or disposal; and range-related debris); or material potentially containing a high enough concentration of explosives such that the material presents an explosive hazard (e.g., equipment, drainage systems, holding tanks, piping, or ventilation ducts that were associated munitions production, demilitarization or disposal operations). Excluded from MPPEH are munitions within DOD's established munitions management system and other hazardous items that may present explosion hazards (e.g., gasoline cans, compressed gas cylinders) that are not munitions and are not intended for use as munitions.

Military Munitions
All Ammunition products and components produced for or used by the armed forces for national defense and security, including ammunition products or components under the

control of the Department of Defense, the Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants, explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives, and chemical warfare agents, chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges, and devices and components thereof. The term does not include wholly inert items, improvised explosive devices, and nuclear weapons, nuclear devices, and nuclear components, other than non-nuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) have been completed. (10 U.S.C. 101(e)(4)(A through C)).

Military Munitions Response Program
Department of Defense-established program that manages the environmental, health, and safety issues presented by munitions and explosives of concern.

Minimum Separation Distance (MSD)
Minimum distance between a potential explosion site (PES) and personnel, assets, or structures, required to provide the appropriate level of protection from a detonation (either intentional or unintentional) at the PES.

Munition with the Greatest Fragmentation Distance (MGFD)
The munition with the greatest fragment distance that is reasonably expected (based on research or characterization) to be encountered in any particular area.

Munitions and Explosives of Concern (MEC)
This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks means: (A) UXO, as defined in 10 U.S.C. 101(e)(5)(A) through (C); (B) Discarded military munitions (DMM), as defined in 10 U.S.C. 2710(e)(2); or (C) Munitions constituents (e.g., TNT, RDX), as defined in 10 U.S.C. 2710(e)(3), present in high enough concentrations to pose an explosive hazard.

Munitions Constituents (MC)
Any materials originating from UXO, DMM, or other military munitions, including explosive and nonexplosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions (10 U.S.C. 2710)(e)(3).

Munitions Debris (MD)
Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.

Munitions Response Area (MRA)
Any area on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples include former ranges and munitions burial areas. A munitions response area is comprised of one or more munitions response sites.

Munitions Response Site (MRS)
A discrete location within an MRA that is known to require a munitions response.

Ordnance and Explosives (OE)
Ordnance and explosives (OE) is an obsolete term replaced by munitions and explosives of concern (MEC). See MEC in the glossary for further definition.

Quality Assurance (QA)
An integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed to meet project requirements.

Quality Control (QC)
The overall system of operational techniques and activities that measures the attributes and performance of a process, item, or service against defined standards that are used to fulfill requirements for quality.

Potential Explosion Site (PES)
The location of a quantity of ammunition and explosive that will create a blast, fragment, thermal, or debris hazard in the event of an accidental explosion of its contents.

Record of Decision (ROD)
A ROD is the document used to record the remedial action decision made at a National Priorities List property. The ROD will be maintained in the project Administrative Record and project file.

Response Action
Action taken instead of or in addition to a removal action to prevent or minimize the release of MEC so that it does not cause substantial danger to present or future public health or welfare or the environment.

Special Case Areas (SCAs)
SCAs were areas, identified by the Army, that were not cleared or surveyed previously for a variety of reasons, such as dense metallic clutter that prevented digital detection instruments or interference due to nearby metal structures or features. SCAs include historical and current fencing; asphalt/concrete range pads, roads, and walkways; areas under existing structures (i.e., field latrines and range-related structures); berms and culverts; and areas requiring excavation by heavy equipment (i.e., scrape areas).

Small Arms Ammunition (SAA)
Ammunition, without projectiles that contain explosives (other than tracers), that is .50 caliber or smaller, or for shotguns.

Unexploded Ordnance (UXO)
Military munitions that (A) have been primed, fuzed, armed, or otherwise prepared for action; (B) have been fired, dropped, launched, projected, or placed in such a manner as to constitute

a hazard to operations, installation, personnel, or material; and (C) remain unexploded either by malfunction, design, or any other cause. (10 U.S.C. 101(e)(5)(A) through (C))

UXO-Qualified Personnel
Personnel who have performed successfully in military EOD positions, or are qualified to perform in the following Department of Labor, Service Contract Act, Directory of Occupations, contractor positions: UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist, or Senior UXO Supervisor.

UXO Technicians
Personnel who are qualified for and filling Department of Labor, Service Contract Act, Directory of Occupations, contractor positions of UXO Technician I, UXO Technician II, and UXO Technician III.

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EXECUTIVE SUMMARY

This Technical Information Paper (TIP) describes the field activities, operations, and results of activities conducted to complete a portion of the munitions and explosives of concern (MEC) removal activities associated with the United States Department of the Army's (Army's) munitions response actions within the Seaside Munitions Response Area (MRA) at the former Fort Ord in Monterey County, California. A site vicinity map is provided on Figure 1-1. This report has been prepared in accordance with the Administrative Order on Consent (AOC) Task 10. The field activities, operations, and results described in this report are limited to work conducted within the Seaside MRA but outside of the roadway alignment and utility corridor areas at the Seaside MRA unless otherwise stated. The MEC investigation and removal activities conducted in the roadway alignment and utility corridor areas were documented in the Final TIP, Phase II Seaside Munitions Response Area Roadway Alignment and Utility Corridor ("Roadway and Utility Corridor TIP"; ESCA RP Team 2008h). The areas discussed in this TIP and the Roadway and Utility Corridor TIP are shown on Figure 1-2.

The MEC investigation and removal activities discussed in this report began in December 2007 and were completed in October 2008 with the exception of additional soil sifting activities, which were conducted from April 2009 to August 2009. This TIP will be used to support the Group 1 Remedial Investigation Feasibility Study (RI/FS).

As contractors to Fort Ord Reuse Authority (FORA) under the Environmental Services Cooperative Agreement Remediation Program (ESCA RP), the work described in this report was performed by LFR Inc., Weston Solutions, Inc., Westcliffe Engineers, Inc. (collectively, "the ESCA RP Team"), and their subcontractors. The scope of work covered under this TIP included:

- Scraping and sifting of surface soils and/or excavating soils within the areas previously identified as Special Case Areas (SCAs) by the Army where MEC removal actions could not be completed. A minimum of the top 6 inches of surface soils were scraped within the majority of the SCAs located outside the roadway alignment and utility corridor. SCAs that were not scraped are discussed in later sections of this report.
- Conducting a geophysical survey and investigating targets that potentially represented MEC from SCAs within the Seaside MRA but outside of the roadway alignment and utility corridor.
- Conducting analog surveys, investigating targets, and removing anomalies that potentially represented MEC in SCAs where geophysical surveys could not be completed.

The Army previously defined the SCAs. The SCAs were defined by the Army as either discrete points requiring further investigation (referred to as SCA points) or larger areas requiring further investigation (referred to as SCA polygons). In total, 423 SCA points and 4,962 identified digital geophysical mapping (DGM) targets located in 129 SCA polygons were investigated during investigation and removal activities. In total, 16 MEC items, 247 pounds (lbs) of munitions debris (MD), and more than 21,700 lbs of cultural debris were

removed as part of the investigation and removal action activities conducted in portions of the Seaside MRA located outside the roadway alignment and utility corridor. The 16 MEC items were recovered during site preparation activities. In addition, approximately 89,300 cubic yards (cy) of material scraped from SCA polygons was sifted, resulting in 6,944 cy of oversized material (larger than a 37 millimeter [mm] projectile) that was sorted and processed for reuse or disposal.

The FORA ESCA RP Team has successfully completed the Seaside MRA Phase II Removal Action for the SCAs. The anomalies that represented potential MEC were intrusively investigated and removed, except in a few areas where anomalies were left in place. These anomaly locations were defined as "left in place" because the areas could not be adequately investigated using the best available (and appropriate) detection technology (BADT) due to cultural interference. As discussed below, active unexploded ordnance (UXO) construction support will be utilized for construction or any other intrusive activities within the left-in-place anomaly locations.

During the investigation and removal actions, the required quality control (QC) and quality assurance (QA) inspections were successfully completed. The QC and QA approach resulted in a quality level that is greater than or equivalent to that performed by the Army during previous removal actions. No MEC was encountered during the QC and QA checks of the investigated anomaly locations.

Based upon the results of the removal action, the potential for residual MEC risks to remain within the Seaside MRA has been significantly reduced; however, due to the inherent uncertainty in the BADT used for MEC removal actions, some level of residual risk will always remain. To manage any remaining risks related to the potential presence of MEC, UXO construction support will be utilized during intrusive construction activities. Active UXO construction support will be utilized for construction or any other intrusive activities at the left-in-place anomaly locations. In addition, construction personnel will be required to complete UXO recognition and avoidance training.

The information provided in this TIP will be incorporated into the Group 1 RI/FS to support a final remedial decision.

1.0 INTRODUCTION

This Technical Information Paper (TIP) describes the field activities, operations, and results of activities conducted to complete a portion of the munitions and explosives of concern (MEC) removal activities associated with the United States Department of the Army's (Army's) munitions response actions within the Seaside Munitions Response Area (MRA) at the former Fort Ord in Monterey County, California. A site vicinity map is provided on Figure 1-1. This report has been prepared in accordance with the Administrative Order on Consent (AOC) Task 10. The field activities, operations, and results described in this report are limited to work conducted within the Seaside MRA but outside of the roadway alignment and utility corridor areas at the Seaside MRA. The MEC investigation and removal activities conducted in the roadway alignment and utility corridor areas were documented in the Final TIP, Phase II Seaside Munitions Response Area Roadway Alignment and Utility Corridor ("Roadway and Utility Corridor TIP"; ESCA RP Team 2008h). The Seaside MRA is shown on Figure 1-2.

The MEC investigation and removal activities discussed in this report began in December 2007 and were completed in October 2008 with the exception of additional soil sifting activities, which were conducted from April 2009 to August 2009. This TIP will be used to support the Group 1 Remedial Investigation/ Feasibility Study (RI/FS).

As contractors to the Fort Ord Reuse Authority (FORA) under the Environmental Services Cooperative Agreement Remediation Program (ESCA RP), the work described in this report was performed by LFR Inc. (LFR), Weston Solutions, Inc. (WESTON), Westcliffe Engineers, Inc. (collectively, "the ESCA RP Team"), and their subcontractors. Activities described in this TIP were conducted in accordance with the following project documents:

- Final Addendum to Final OE-15SEA.1-4 Site-Specific Work Plan, Phase II Seaside Munitions Response Area (MRA) Removal Action ("the Seaside Site-Specific Work Plan [SSWP] Addendum"; ESCA RP Team 2008b)
- 2nd Addendum to the 3rd Amendment to the 17 Feb 94 Land Disposal Site Plan (LDSP) for Base Realignment and Closure (BRAC) of Fort Ord, California (ESCA RP Team 2008a)
- Approved field variance forms associated with the SSWP Addendum as described in greater detail in Section 3.13 of this report
- Soil Management Plan, Seaside Munitions Response Area (ESCA RP Team 2008g)
- Final City of Seaside - Community Safety Plan (ESCA RP Team 2008c)
- Final Standard Operating Procedure for Mechanical Soil Sifting (ESCA RP Team 2008e)

1.1 Purpose and Scope

The purpose of this TIP is to document the activities conducted within the Seaside MRA outside of the roadway alignment and utility corridor to investigate and/or remove MEC, thereby reducing the threat to human health and providing an additional measure of safety for future subsurface activities conducted within the MRA.

The scope of work covered under this TIP included conducting geophysical surveys and investigating and removing MEC from Special Case Areas (SCAs) located outside the roadway alignment and utility corridor. The Army previously defined the SCAs. The SCAs were defined by the Army as either discrete points requiring further investigation (referred to as SCA points) or larger areas requiring further investigation (referred to as SCA polygons). This TIP presents only the investigation and removal activities conducted outside the roadway alignment and utility corridor within the Seaside MRA. The work conducted within the roadway alignment and utility corridor was presented in the Roadway and Utility Corridor TIP (ESCA RP Team 2008h) so that the land within the roadway alignment and utility corridor could be released to FORA for roadway and utility construction prior to release of the balance of land within the Seaside MRA.

The information presented in this TIP will be incorporated into the RI/FS for the Group 1 MRAs (Seaside MRA and Parker Flats MRA Phase II) to support a final remedial decision for the Seaside MRA.

1.2 Report Organization

This TIP is presented in numbered sections, tables, and figures and lettered appendices. Tables and figures are numbered to correspond with the section in which they are first referenced. Introductory information for the project is presented in Section 1.0. Background information for the Seaside MRA is presented in Section 2.0. Section 3.0 presents the technical approach employed to complete activities associated with the MEC investigation and removal action within the SCAs outside of the roadway alignment and utility corridor. Quality control (QC) and quality assurance (QA) activities were conducted throughout the course of the project and are described in Section 4.0. The results of the MEC investigation and removal action are discussed in Section 5.0. The conclusions and recommendations are presented in Section 6.0. References are provided in Section 7.0.

2.0 SITE DESCRIPTION AND BACKGROUND

The scope of this TIP is limited to the portions of the Seaside MRA located outside the roadway alignment and the utility corridor (Figure 1-2). The following sections discuss the background, history, and previous investigations conducted for the entire Seaside MRA.

2.1 Seaside MRA Location

The Seaside MRA is located in the southwestern portion of the former Fort Ord, bordered by the City of Seaside, the natural resources management area (NRMA) area to the east (the former impact area), Eucalyptus Road to the north, and additional former Fort Ord property to the south (Figures 1-1 and 1-2). General Jim Moore Boulevard (GJMB) crosses the western portion of the Seaside MRA in a north-south direction. The Seaside MRA is wholly contained within the jurisdictional boundaries of the City of Seaside.

The Seaside MRA encompasses approximately 419 acres, and includes the U.S. Army Corps of Engineers (USACE) reuse parcels E24, E34, E23.1, and E23.2, which are roughly coincident with (and include all of) MRS-15SEA.1 (183 acres), MRS-15SEA.2 (86 acres), MRS-15SEA.3 (50 acres), and MRS-15SEA.4 (79 acres), respectively. Not included within the boundaries of the Munitions Response Sites (MRSs), but located within the Seaside MRA is GJMB and the narrow area west of GJMB (21 acres). The MRS-15SEA.1–4 nomenclature will be used in this document to refer to the four MRSs within the Seaside MRA. The boundaries of the four MRSs and the MRA are shown on Figure 1-2.The locations and boundaries of the roadway alignment, utility corridor, and the hillside west of GJMB are described in greater detail in the following sections.

2.1.1 Roadway Alignment Location and Description

The roadway alignment is approximately 84 acres and extends a length of approximately 9,400 linear feet along GJMB on the western edge of the Seaside MRA, and a length of approximately 6,400 linear feet along Eucalyptus Road on the northern edge of the Seaside MRA. The roadway alignment work area is defined as the width of the actual roadway and center median (varies from 100 to 200 feet wide) plus a 50-foot-wide work area on both sides of the roadway for a total approximate width of 200 to 300 feet.

2.1.2 Utility Corridor Location and Description

The utility corridor is defined as a 50-foot-wide strip of land within the Seaside MRA that runs along the boundary with the adjacent NRMA located to the east and southeast. The utility corridor extends a length of approximately 8,650 linear feet along the eastern boundary of the Seaside MRA and then trends eastward for approximately 5,900 linear feet along the southeastern boundary of the Seaside MRA.

2.2 Seaside MRA Physical Description

The physical description provides information on topography, vegetation, surface water, and groundwater associated with the MRA.

2.2.1 Topography

The terrain of the Seaside MRA varies from flat to moderately rolling hills. The elevation ranges from approximately 210 to approximately 520 feet mean sea level with 2 to 15% slopes. Old dune deposits up to 250 feet thick cover most of the area. Surface soils at the MRA are predominantly weathered dune sand.

2.2.2 Vegetation

In general, the vegetation at the Seaside MRA consists primarily of maritime chaparral with patches of nonnative grassland and scattered stands of coastal and inland coast live oak woodlands. Poison oak is known to be found in many of the areas of the MRA. In the past, vegetation on the MRA has been cut in support of previous removal actions conducted within the Seaside MRA. In 2003, as part of the Army's Time-Critical Removal Action (TCRA) for MEC, 398 acres of the Seaside MRA vegetation were cut. The maritime chaparral was cut to a 6-inch height, and the oak trees were pruned up to shoulder height to allow access below the tree canopies. Additional vegetation removal occurred in support of the Army's Non-Time-Critical Removal Action (NTCRA). Much of the native vegetation had been reestablished by the time the work described in this report occurred.

2.2.3 Surface Water and Groundwater

The Seaside MRA overlies the Seaside Groundwater Basin, which is structurally complex and divided into several sub-basins. The uppermost aquifer ranges in thickness from 60 to 180 feet. Groundwater is generally encountered at a depth of approximately 100 feet below ground surface.

No significant surface-water features or delineated wetlands are reported to be present in the Seaside MRA; however, two aquatic features are known to exist to the south and southeast of the MRA.

2.2.4 Seaside MRA Ecological Profile

The Habitat Management Plan (HMP) identifies the Seaside MRA as a development parcel with a borderland development buffer area along the interface with the NRMA, which is designated as habitat reserve (USACE 1997). The NRMA interface separates the development category land within the Seaside MRA from the adjacent habitat reserve area of the former impact area. The NRMA and habitat reserve areas support plant and animal species that require implementing mitigation measures identified in the HMP to ensure compliance with the Endangered Species Act and to minimize impacts to listed species.

The U.S. Fish and Wildlife Service's 1993 Biological Opinion for the Cleanup and Reuse of the Former Fort Ord (USFWS BO) required that an HMP be developed and implemented to reduce the incidental take of listed species and loss of habitat that supports these species. The HMP for the former Fort Ord complies with the USFWS BO and establishes the mitigation measures for the conservation and management of wildlife and plant species and habitats that largely depend on former Fort Ord land for survival. The HMP incorporated conservation measures pursuant to the USFWS BO dated prior to issuance of the HMP in April 1997. Since April 1997, three additional BOs have been issued that are relevant to MEC removal activities (USFWS 1999, 2002, and 2005). Future MEC remediation is required to be consistent with the applicable conservation measures.

Plant species identified at the former Fort Ord that are either threatened or endangered include Contra Costa goldfields (Lasthenia conjugens; endangered), sand gilia (Gilia tenuiflora ssp. Arenaria; endangered), and Monterey spineflower (Chorizanthe pungens var. pungens; threatened).

In 2004, the California tiger salamander (CTS; Ambystoma californiense) was identified as a threatened species. CTS may be found as far as 2 kilometers (km) from aquatic breeding habitats. The CTS may be found in MRS-15SEA.1 and MRS-15SEA.2 as these two MRSs are within 2 km of aquatic features that may provide breeding habitat for the CTS.

2.3 Site History

Initial use of the Seaside MRA began in approximately 1917 when the U.S. Government purchased more than 15,000 acres of land and designated it as an artillery range. Although no training maps from this time period have been found, pre-World War II-era military munitions have been removed during previous Army response actions within the Seaside MRA. These munitions included Livens projector shells, Stokes Mortars, and 37 millimeter (mm) and 75mm projectiles. The Livens projector shells and Stokes Mortars previously found at the former Fort Ord have been high explosive, practice, or screening smoke. Cavalry and artillery troops stationed at the Presidio of Monterey, along with infantry troops stationed at the Presidio of San Francisco, reportedly conducted training activities in the vicinity of the Seaside MRA, although the precise location and extent of use are not known.

By 1945, the Army established 18 firing ranges and training sites within the boundaries of the 8,000-acre former impact area. The Seaside MRA lies on the westernmost part of the former impact area. The Seaside MRA contained the former training sites associated with the following military activities:

- Small arms ammunition (SAA) training - Ranges 18, 19, 20, 21, 22, 23, and 46 and Historical Area 59
- Non-firing target range training - Old Range 22 and Range 23M
- Mortar and antitank training - Range 48
- Booby trap training - Historical Area 50

According to the known configuration of the ranges, weapons were fired to the east and southeast from the SAA training Ranges 18, 19, 20, 21, 23, and 46 and Historical Area 59, and the mortar and antitank training Range 48 area, toward the center of the impact area. It is expected that munitions activity associated with these ranges would have occurred at, or in the general vicinity of, the firing points. To facilitate previous MEC investigations and removal activities, these locations were divided into four MRSs, MRS-15SEA.1 through MRS-15SEA.4. The boundaries of each of these MRSs are shown on Figure 1-2.

2.4 Previous Investigations

The following sections summarize the previous investigation and removal activities conducted at the Seaside MRA.

2.4.1 Army Investigation and Removal Activities

From 1997 to 2004, the Army performed sampling and removal investigations on the Seaside MRSs (MRS-15SEA.1–4). During these investigations, MEC items were removed from the MRSs including Stokes Mortars, 60mm mortars, 75mm projectiles, and hand grenade fuses.

The Army conducted the following munitions response actions on the Seaside MRA:

- Field Latrine Investigation from March to November 1997 (USA 2001a)
- MEC Sampling in Small Arms Ranges (OE-15A Grid Sampling) from October to November 1997 (USA 2000a)
- MEC Sampling (OE-15B Grid Sampling) from October 1997 to February 1998 (USA 2000b)
- Impact Area Grid Sampling from March to August 1999 (USA 2001d)
- MEC Removal-Impact Area Roads and Trails from March 1997 to March 1998 (USA 2001b)
- MEC Removal-Blue Line Fuel Break from May to June 1998 (USA 2001e)
- MEC Removal to Support Lead-Contaminated Soil Remediation at Ranges 19, 21, 22, and 23 from April 1997 to June 1999 (USA 2001c)
- MEC Removal to Support Lead-Contaminated Soil Remediation at Range 46 from April to August 1999 (USA 2001c)
- Impact Area Fuel Break Maintenance in 2001 (Parsons 2001b)
- TCRA – Vegetation and Surface MEC Removal from December 2001 to March 2002 (Parsons 2006)
- NTCRA and Phase I Geophysical Operations – 4-Foot Removal Action from March 2002 to March 2004 (Parsons 2006)

These actions are summarized in the Final Technical Information Paper MRS-15SEA.1-4 Time-Critical Removal Action and Phase I Geophysical Operations (Parsons 2006). These actions were completed on the Seaside MRA in 2004, with the exception of several areas that were scattered throughout the Seaside MRA. The areas in which the actions were not completed are referred to by the Army as SCAs. Together, the total area covered by the SCAs was approximately 35 acres. SCAs were identified by the Army for a variety of reasons, such as the presence of dense metallic clutter or interference due to nearby metal structures or features. SCAs included historical and current fencing; asphalt/concrete range pads, roads, and walkways; areas under existing structures (i.e., field latrines and range-related structures); berms and culverts; and areas requiring excavation by heavy equipment (i.e., scrape areas).

The NTCRA was performed pursuant to site-specific and programmatic work plans. The Programmatic Work Plan was prepared by Parsons in May 2001 with updates in May 2004 and describes the procedures, methods, and resources used while performing munitions response work at the former Fort Ord (Parsons 2004). In March 2002, Parsons prepared an SSWP for munitions response actions in MRS-15SEA.1-4. An addendum to the March 2002 SSWP was issued in December 2002, to include the previously excluded 25-acre eastern portion of MRS-15SEA.4. These documents are available on the Army's Administrative Record, which can be found at www.fortordcleanup.com, or at the Fort Ord BRAC office.

These actions resulted in complete removal of detected MEC to a depth of 4 feet, with the exception of the SCAs and the hillside west of GJMB. Because the Army's investigation activities did not include the hillside west of GJMB, the status of MEC in this area represented a data gap and further investigation was recommended in the Summary of Existing Data Report (ESCA RP Team 2008i). The hillside west of GJMB was discussed in the Roadway and Utility Corridor TIP (ESCA RP Team 2008h).

2.4.2 Seaside MRA Investigation and Removal Activities Inside Roadway Alignment and Utility Corridor

In order to allow FORA to begin roadway and utility construction prior to release of the balance of the land within the Seaside MRA, the ESCA RP Team submitted the Roadway and Utility Corridor TIP, which described the activities conducted within the roadway alignment and utility corridor. From December 2007 to July 2008, the FORA ESCA RP Team completed the Seaside MRA Phase II Removal Action within the roadway alignment and utility corridor and for the portion of the hillside west of GJMB that lies within the roadway alignment. The results of the MEC investigation and removal activities were documented in the Roadway and Utility Corridor TIP (ESCA RP Team 2008h). The scope of work covered under the Roadway and Utility Corridor TIP included:

- Clearing and grubbing of vegetated surface soils within areas that have had previous MEC removal actions completed by the Army.
- Scraping and sifting of surface soils within the areas previously identified as SCAs by the Army where MEC removal actions could not be completed (the soil scraped from the SCA polygons located within the roadway alignment and utility corridor was not segregated from the soil scraped from the SCA polygons that are the subject of this TIP).

- Conducting a geophysical survey and investigating and removing anomalies that potentially represented MEC from SCAs within the roadway alignment and utility corridor.
- Conducting a geophysical survey and investigating and removing anomalies that potentially represented MEC from the portion of the hillside west of GJMB within the roadway alignment.

In total, 111 SCA points and 78 SCA polygons or portions of polygons were investigated as part of the work conducted inside the roadway alignment and utility corridor. A total of 22 MEC items, 208 pounds (lbs) of munitions debris (MD), and more than 6,000 lbs of cultural debris were removed as part of the investigation and removal action activities. Of the 22 MEC items, six items were recovered during the roadway clearing and grubbing activities, 12 items were recovered during soil sifting operations (as stated above, the soil scraped from the SCA polygons located within the roadway and utility corridor was not segregated from the soil scraped from the SCA polygons that are the subject of this TIP), and four items were recovered during intrusive investigations of targets identified during digital geophysical mapping (DGM) surveys.

The anomalies that potentially represented MEC were intrusively investigated and removed, except in areas where anomalies were left in place. These anomaly locations were defined as “left in place” because the areas could not be adequately investigated using the best available (and appropriate) detection technology (BADT) due to cultural interference.

2.5 Historical MEC Sources and Types

Historical information summarized in this TIP is based on historical documents and previous MEC sampling and removal activities in the Seaside MRA. The Seaside MRA contains portions of ranges that were used for military training activities. The Final Technical Information Paper MRS-15SEA.1-4 prepared by Parsons summarized the previous MEC removal and sampling activities that were performed in the Seaside MRA (Parsons 2006). Table 2-1 lists the MEC that were encountered during the previous MEC removal and sampling activities. Figure 2-1 shows the locations where the MEC was encountered and removed during the previous MEC removal and sampling activities.

3.0 TECHNICAL OPERATIONS

The MEC investigation and removal activities began on the Seaside MRA in December 2007 and were mostly complete by October 2008. Additional activities related to processing oversized debris generated from the soil sifting activities were conducted from April 2009 to August 2009. Section 3.0 describes the technical approach employed to complete activities associated with the MEC investigation and removal actions in the Seaside MRA SCAs located outside of the roadway alignment and utility corridor. QC and QA activities were conducted throughout the course of the project and are described in Section 4.0. The results of the MEC investigation and removal actions are discussed in Section 5.0.

3.1 Extent of MEC Investigation and Removal Action Activities

As described in the SSWP Addendum, intrusive investigation and removal activities were planned for the SCAs throughout the Seaside MRA. The scope of this TIP is limited to the activities that occurred in the Seaside MRA areas located outside of the roadway alignment and the utility corridor (Figure 1-2).

3.2 Recategorization of the Special Case Areas

As described in Section 2.4, the Army previously completed MEC removal actions at the Seaside MRA except for areas that were identified as SCAs. Prior to beginning field operations, the ESCA RP Team prepared the SSWP Addendum, which separated the SCAs into types as originally defined by the Army. The SSWP Addendum described each type of SCA in detail and proposed investigation approaches for each SCA type. The Seaside MRA SCAs, as described in the SSWP Addendum by the Army, of which all or a portion fell outside the roadway alignment and utility corridor areas included:

- Existing Site Fence Area – A metallic barbed wire site fence is located along GJMB and Eucalyptus Road. Removal actions could not be completed because the barbed wire interfered with the geophysical instruments (portions of this SCA pass in and out of the roadway alignment area).
- Original Fence Line – The original fence line footprint is located 10 to 15 feet east of GJMB within MRS-15SEA.1-3 and removal actions could not be completed due to saturation of metallic debris in the soil along the former fence line location (portions of this SCA pass in and out of the roadway alignment area).
- Asphalt and Concrete – Asphalt paved roads extend from GJMB and Eucalyptus Road onto the Seaside MRA (many asphalt-paved roads cross the roadway alignment). Concrete pads were located beneath structures that had been demolished previously.
- Backhoe Excavations – Approximately 350 locations/areas were identified by the Army that required backhoe excavations. A total of 53 of these locations were within the roadway alignment or utility corridor. The remaining backhoe excavations were located outside the roadway alignment and utility corridor. These locations included areas where backhoe excavations were started by the Army but not completed due to budgetary

constraints and areas containing subsurface cable/wire, grounding rods, range markers, reinforced concrete, and wood.

- Heavy Equipment Excavations – Several Seaside MRA SCA locations were identified by the Army as requiring excavation with heavy equipment. Of these locations, 32 locations occurred outside the roadway alignment and utility corridor. These locations included concrete bunkers, fighting positions, flag poles, target boxes, tie-downs, utility poles, and wooden stairs.
- Berms/Retaining Walls – The metal connections on the wooden retaining walls of the berms located on the Seaside MRA prevented geophysical surveys from being successfully completed in the vicinity of the berms. A total of 31 points were identified as berms or retaining walls in the Army's dataset located outside of the roadway alignment and utility corridor, although in some cases the points were part of the same berm/retaining wall.
- Structures – Several structures and latrines were located at the Seaside MRA that required demolition in order to perform geophysical surveys. A total of 14 range structures and field latrines were identified outside the roadway alignment and utility corridor.
- Debris Piles – Numerous piles of debris were previously located throughout the Seaside MRA. Twenty-four debris piles were identified by the Army as occurring outside the roadway alignment and utility corridor. During a site reconnaissance, additional debris pile locations were found, although these areas were not originally identified as SCAs by the Army.

The SCA types described above were based upon information provided by the Army and were reviewed by the ESCA RP Team prior to a site reconnaissance. Upon mobilization in the field, it was determined that many of the SCA types identified above were co-located, improperly categorized, or were located so closely to each other that consolidating them into one larger area was appropriate. As a result, the ESCA RP Team recategorized the SCA types listed above into two types: SCA point locations and SCA polygons (Figure 3-1). The SCA point locations were identified as discrete Global Positioning System (GPS) coordinates provided by the Army and were renumbered 1 through 534 (423 of these locations were located outside the roadway alignment and the utility corridor). The SCA polygons were renumbered SCA_W000 through SCA_W166 and were further broken down into large or small polygons. Large polygons were those with a surface area greater than 1,000 square feet. Small polygons were those with a surface area less than or equal to 1,000 square feet. A total of 129 of the 167 SCA polygons were located either completely or partially outside the roadway alignment and/or utility corridor. In total, approximately 23 acres of SCA polygons were located either completely or partially outside the roadway alignment and utility corridor.

An overview of the SCAs located within the roadway alignment and utility corridor for each MRS is shown on Figures 3-1 through 3-4. More detailed maps showing the renumbered, recategorized SCA point locations and SCA polygons are provided in Appendix A and Appendix B, respectively. Table 3-1 summarizes the SCA points located outside the roadway alignment and utility corridor and includes the SCA type previously identified by the Army for each SCA point. Table 3-2 summarizes the SCA polygons either completely or partially located outside the roadway alignment and utility corridor and includes the SCA type(s) previously identified by the Army that were located in each SCA polygon. In accordance with the SSWP Addendum, SCA locations were investigated using BADT.

3.3 General Approach

This section describes the general approach that was implemented to complete the activities associated with the Seaside MRA MEC investigation and removal action outside the roadway alignment and utility corridor. Copies of contractor and subcontractor daily field reports from December 2007 to July 30, 2008 were provided in the Roadway and Utility Corridor TIP (ESCA RP Team 2008h). Contractor and subcontractor daily field reports for the period from July 30, 2008 to October 31, 2008 and from April 2009 to August 2009 are provided in Appendix C of this report. The general approach is described below.

- Site preparatory activities – the following activities were conducted to prepare the site for MEC investigation and removal activities:
  - Surveying – this task included marking the SCA polygons and SCA point locations in the field based on the coordinates as reported in the Army's Geographic Information System and associated databases
  - Vegetation cutting and removal – this task consisted of cutting vegetation and trees within the SCAs and removing it
  - Structure demolition and debris removal – this task consisted of demolishing existing structures such as latrines and removal of debris piles
  - Asphalt removal – this task consisted of removing asphalt roads that would impact upcoming geophysical investigations (asphalt does not influence the performance of the geophysical instruments but constrains follow-up digging activities)
- Investigation of SCA point locations outside of the roadway alignment and utility corridor using BADT
- Scraping 6 to 12 inches of surface soils and/or excavating soils within the SCA polygon boundaries and transporting scraped and/or excavated soil to the sifting plant location
- Sifting soil scraped and/or excavated from SCA polygons through the sifting plant
- Completing a geophysical investigation using BADT of SCA polygons, which included the following:
  - Processing geophysical investigation data and selecting targets that may represent MEC items
  - Investigating the targets for potential MEC and recording the results
  - Removing and disposing MEC or MD items encountered at the targets and recording the results

- Conducting QC and QA procedures for all aspects of the tasks, as defined by the SSWP Addendum and appropriate field variance forms (FVFs)

Table 3-1 lists the 423 SCA point locations located outside the roadway alignment and utility corridor. Table 3-2 lists the 129 SCA polygon locations located either entirely or partially outside the roadway alignment and utility corridor. In a few cases the approach was modified to suit the requirement for the specific area and these areas are identified in the notes column of Table 3-2. The following are the areas that were exceptions to the above approach:

- SCA_W003, SCA_W035, SCA_W046, SCA_W123, SCA_W124, SCA_W125, SCA_W126, SCA_W127, SCA_W128, and SCA_W129 (Transmission Towers): There are 10 high-voltage electrical transmission towers identified within SCA polygons that completely or partially lie outside of the roadway alignment. The locations of these SCA polygons are shown on Maps B-1 through B-4 in Appendix B. DGM surveys are ineffective within 10 feet of the base of the towers. DGM surveys were performed as close as possible to the base of each tower; however, the area directly under the tower could not be surveyed using DGM.
- SCA_W140 (previously referred to as the existing fence line): MRS-15SEA.1-4 were fenced on the northern and western boundaries by a four-strand barbed wire fence, backed with concertina wire. The location of this SCA is shown on Maps B-1 through B-8 in Appendix B. The fence was installed in 1996 with unexploded ordnance (UXO) construction support. Due to site security issues and the presence of fence posts embedded in the asphalt and road base next to the edge of the existing GJMB roadway, the fence adjacent to GJMB was not removed. Instead, the concertina wire was removed and an analog survey was conducted over a majority of SCA_W140 that was outside the roadway alignment and adjacent to the existing GJMB. A small portion of SCA_W140 adjacent to GJMB, near the corner of Eucalyptus Road, underwent a DGM survey. Analog surveys were also conducted in this area as terrain-related data gaps were found in the DGM survey data.
- SCA_W048, SCA_W055, SCA_W140, and SCA_W162 (Wooden communication poles): Seven wooden communication poles lie outside the roadway alignment and utility corridor and were identified as SCAs by the Army. These utility poles are located within larger SCA polygons. The locations of these SCA polygons are shown in Appendix B. The wooden communication poles support active overhead communication lines and are held in place by guy wires anchored into the ground. In order to perform a removal action around the base of the poles the guy wires would need to be removed. With the guy wires removed a vehicle would be needed to support the poles. Since the vehicle would cause more interference than the guy wire, this option was not feasible. On April 10, 2008, WESTON personnel showed these SCA polygons to Department of Toxic Substances Control (DTSC) personnel to discuss this approach. DTSC personnel concurred with the approach of leaving the guy wires in place with active UXO construction support during removal for the roadway work.
- SCA_W009, SCA_W011, SCA_W0021, SCA_W022, SCA_W026, SCA_W027, SCA_W028, SCA_W032, SCA_W061, SCA_W063, SCA_W136, and SCA_W148: These SCA polygons presented a variety of terrain, steep slopes, proximity to existing

fences, gates, and other challenges that prevented scraping the SCA polygon or a portion of the SCA polygon prior to collection of DGM data.

- SCA_W005, SCA_W014, SCA_W015, SCA_W020, SCA_W022, SCA_W030, SCA_W035, SCA_W037, SCA_W040, SCA_W041, SCA_W048, SCA_W055, SCA_W062, SCA_W066, SCA_W070, SCA_W074, SCA_W087, SCA_W109, SCA_W111, SCA_W113, SCA_W118, SCA_W119, SCA_W123, SCA_W124, SCA_W125, SCA_W129, SCA_W130, SCA_W134, SCA_W138, SCA_W140, SCA_W141, SCA_W146, SCA_W149, SCA_W155, W160, SCA_W161, and SCA_W162: These SCA polygons presented a variety of terrain, steep slopes, proximity to existing fences, gates, and other challenges that prevented the collection of DGM data in portions of the SCAs using geophysical equipment. Analog surveys were completed in a portion of the polygon or the entire polygon.
- SCA_W130, SCA_W137, and SCA_W165: These SCAs contained asphalt that was left in place because the asphalt was part of an apron left at gated site entrances. The aprons were kept in place to provide stabilized construction site entrances to minimize erosion and dirt track-out onto the streets. As a result, DGM surveys were not performed in portions of these SCAs. These SCAs are discussed in Section 5.6.
- SCA_W002 and SCA_W010: These SCAs make up the aquifer storage and recovery (ASR) project area. Work in this area was conducted by Monterey Peninsula Engineering from January to February 2008 with construction support provided by the Army (USACE 2008). No further investigation was conducted by the ESCA RP Team.

3.4 Geophysical Detection Equipment

The MEC investigation and removal action activities outside the roadway and utility corridor were conducted using three geophysical instruments (one digital and two analog), which employ two different geophysical methods (time-domain electromagnetic and magnetometry). The digital geophysical instrument was used during the DGM survey (described in greater detail in Section 3.10). The analog instruments were used for the following activities: supporting intrusive investigations of target anomaly excavations (described in Section 3.10.5); performing analog surveys in areas where digital instruments could not be effective due to electromagnetic interference from metallic site features or terrain related access issues (described in Section 3.10.6); and performing UXO construction support. The instruments are described in greater detail below.

3.4.1 Digital Detection Equipment

The digital geophysical instrument used was the Geonics Limited, EM61-MK2 (0.5-meter by 1-meter coils) time-domain electromagnetic metal detector. The EM61-MK2 is a high-sensitivity ferrous and nonferrous metal detector. The EM61-MK2 is battery-powered, operates at a maximum output of 10,000 millivolts, and digitally records survey data.

Electromagnetic surveys were performed using a manually towed single-array system (shown in Photograph 3-1), or a vehicle-towed multi-array system, based on site conditions and survey area (shown in Photographs 3-2 and 3-3) as described in the following subsections.

The objective for mean speed of operation of the EM61-MK2 is less than 3 miles per hour. The metric for along-track spacing is less than 0.5 foot. The metric for cross-track spacing is 2.5 feet, excluding gaps due to surface obstructions. The metric for the smallest detection of MEC is a 37mm projectile buried 16 inches below ground surface. The effective detection depth for the EM61-MK2 is a function of target characteristics (i.e., composition, size, mass, and orientation) and geological noise.

Prior to the start of each survey, QC function checks were performed following the instrument operating manual and standard industry practices (discussed in Section 4.3).

3.4.1.1 Single-Array EM61-MK2

The manually towed single-array system consists of two 1 by 0.5 meter air-cored coils with the top coil 28 centimeters (cm) above the bottom coil. The transmitter generates a pulsed magnetic field that induces eddy currents in conductive objects within the subsurface. These currents are proportional to the conductive nature of the material below the instrument. When conductive objects are present below the instrument, the amplitude and decay time of the induced eddy currents vary in response to the size, mass, and orientation of the objects. The bottom receiver coil measures the amplitude of these eddy currents at 216-, 366-, 660-, and 1,266-microsecond (µsec) intervals (time gates) during the decay period. The top coil measures the response at the same 660-µsec time gate as the bottom coil. Data were collected from the bottom coil in the standard four-time-gate mode.

The manually towed cart single-array instrument was set to digitally record and store data at 10 readings per second (Hz) in an Allegro data logger. The readings were adjusted (nulled) to a common zero background at a low background area to level datasets according to site-specific conditions. The operating height of the manually towed single-array EM61-MK2 was 16 inches above ground surface.

Photograph 3-1 - EM61-MK2 manually towed single-array system

3.4.1.2 Multi-Array EM61-MK2

The vehicle-towed system was comprised of an array of three EM61-MK2 coils mounted on a fiberglass frame, interfaced with a survey-grade GPS that provided precise navigation and geographical positioning of detected anomalies. A multi-port hub, which provided a direct interface between the GPS and the geophysical sensors, streamed both positional and sensor information directly into a ruggedized field laptop computer. The data were logged into the field laptop computer using specialized software. The array was a fabrication of nonmetallic composite fiberglass frame and axles and Kevlar wheel bearing to virtually eliminate metal-induced noise. The operating height of the vehicle-towed-array EM61-MK2 was 10 inches above the ground surface. The complete array was towed by a (diesel) all-terrain vehicle (shown in Photographs 3-2 and 3-3). This configuration provided real-time monitoring of navigational tracking, sensor status, and anomaly responses to the field crew.

The vehicle-towed-array was also set to record and store data at 10 Hz, in a field laptop computer. Data corrections for the towed-array were made during the post-processing stage.

Photograph 3-2 - EM61-MK2 vehicle-towed multi-array system

Photograph 3-3 - EM61-MK2 vehicle-towed multi-array system

3.4.1.3 *Navigation Interface*

A Trimble Real-Time Kinematic (RTK) GPS was utilized to position data collected during the EM61-MK2 surveys to cm accuracy. The GPS antenna was mounted over the center of the top EM61-MK2 coil and connected to the data logging device. This receiver captures real-time differential corrections from a fixed local base station and outputs a National Marine Electronics Association GPS Fixed Data message directly into the data logger at 1-second intervals. Direct interfacing between the GPS and instruments utilizes a single clock and streams position information directly into the raw data files.

3.4.2 Analog Detection Equipment

The analog instruments that were used included the Schonstedt® GA-52/Cx handheld magnetometer and the Whites XLT® E Series handheld all-metals detector. Prior to operating an analog instrument (i.e., Schonstedt® or Whites XLT® E Series), the analog operator conducted and documented the analog checkout procedure.

3.4.2.1 *Schonstedt® GA-52/Cx*

The Schonstedt® GA-52/Cx handheld magnetometer has been approved for use at the former Fort Ord as documented in the Ordnance Detection and Discrimination Study (Parsons 2001a). Schonstedt magnetometers are typically used to locate ferrous anomalies, and were used in conjunction with the Whites XLT® E Series all-metals detector.

Ferrous metal (iron) objects cause local variations in the earth's magnetic field, which can be detected by a magnetometer. The magnetometer is comprised of two fluxgate magnetometer sensors that measure the local magnetic field. The magnetometer sensors are aligned opposing so that the magnetic field measured by one sensor is the negative of the magnetic field measured by the other. The locator then sums the output of the two sensors. By summing the two output signals, the detector cancels any field common to both sensors, such as the earth's magnetic field, and shows only the local variations in the magnetic field caused by a ferrous object.

Schonstedt magnetometer sweeps (i.e., "mag and dig") are particularly effective in areas where vegetation and terrain limit the use of larger digital systems. Analog survey approaches are discussed in Section 3.10.6.

3.4.2.2 *Whites XLT® E Series*

The Whites XLT® E Series handheld all-metals detector is also commonly used for geophysical investigations. Whites all-metals detectors are typically used to locate anomalies associated with buried objects composed of various types of metal, and were used in conjunction with the Schonstedt® GA-52/Cx handheld magnetometer.

The Whites all-metals detector is comprised of transmitting and receiving coils. Current moving through the transmitter coil creates an electromagnetic field that is transmitted into the ground. As the magnetic field pulses back and forth into the ground, it interacts with any conductive objects (e.g., metal) it encounters, causing the objects to generate weak magnetic fields of their own.

The receiver coil is completely shielded from the magnetic field generated by the transmitter coil. However, it is not shielded from magnetic fields coming from objects in the ground. When the receiver coil passes over a conductive object, it detects the magnetic field created by the object as a result of the signal from the transmitter coil. The receiving coil amplifies the field and sends it to sensors in the control box of the metal detector.

Whites XLT® E Series handheld all-metals detector sweeps (i.e., "mag and dig") are particularly effective in areas where vegetation and terrain limit the use of larger digital systems. Analog survey approaches are discussed in Section 3.10.6.

3.5 Site Preparation Activities

Site preparation activities continued concurrently with other activities, the majority of which were completed in March 2008. In June 2008, brush cutting crews remobilized to the site to cut brush along the existing fence line. All site preparation activities were conducted with the escort of a UXO Technician II to assist with MEC avoidance.

3.5.1 Surveying Activities

In December 2007, the ESCA RP Team mobilized subcontractor, Polaris Consulting of Carmel, California, a licensed land surveyor in the state of California, to begin surveying the SCA boundaries. The survey work on the MRA was based on established monuments and used the North American Datum 83 California State Plane Zone IV coordinate system for control points and other survey activities. All control points used for baselines met the standards established by the Federal Geodetic Control Committee (FGCC) for Third Order, Class 1 Survey as published in the "Classification, Standards of Accuracy and General

Specifications of Geodetic Control Surveys" (FGCC 1984) and "Specifications to Support Classification, Standards of Accuracy, and General Specifications of Geodetic Control Surveys" (FGCC 1980). All control points recovered and/or established at the site were plotted on planimetric drawings at the appropriate coordinate location and were identified by name or number. Surveying activities continued concurrently with other activities and were completed for the activities described in this report in March 2008. All surveying activities were conducted with the escort of a UXO Technician II to assist with MEC avoidance.

3.5.2 Vegetation Cutting and Removal Activities

To make the surface safe and accessible for geophysical investigation and UXO personnel, vegetation within the work areas at the Seaside MRA was cut to a height of approximately 6 inches above ground surface. Vegetation cutting and removal activities were performed by the ESCA RP Team's subcontractor, Ahtna Government Services Corporation of Oakland, California ("Ahtna"), in coordination with FORA's environmental consultant.

Prior to brush cutting, a UXO Technician II used a magnetometer to aid in searching the vegetation for surface MEC. Brush cutting and vegetation removal activities within the SCA boundaries began in December 2007.

The majority of brush cutting activities were completed in January 2008. In June 2008, Ahtna remobilized to the site to cut remaining brush along the existing fence line to prepare for DGM activities in this area.

3.5.3 Berm Removal

Several SCA points were identified as berms/retaining walls in the Seaside MRA outside the roadway alignment and utility corridor. During previous Army removal actions, the metal connectors of the retaining walls prevented geophysical surveys from being conducted near the berms and the material in the berms was too thick to effectively detect MEC at or below the original ground surface. As part of the ESCA RP Team activities, the retaining walls were removed and the berms were deconstructed. Construction support was provided and excavators were used to remove the soil from the berm until the field crews were able to determine that the level of the berm matched the existing terrain or that the native soil levels had been reached. The excavated surface was cleared to depth using BADT and the soil from the berm was sifted and stockpiled on site as described in Section 3.8 of this report.

3.5.4 Structure Demolition and Debris Removal Activities

Fourteen structures were present outside the roadway alignment and/or utility corridor. These structures had previously been identified as buildings 9210, 9220, 9221, 9230, 9190, 9181, 8302, 8301A, 9482, 9481, 3940, 3939, 9460 and 9463. These structures were demolished and removed in order for DGM survey to be completed in the areas beneath the structures. In addition, numerous debris piles were located throughout the Seaside MRA; 24 of these piles were located outside the roadway alignment and/or utility corridor, which needed to be moved in order to complete the DGM survey, identified as Pile No. 1, 2, 3, 11, 12, 14, 16, 17, 31, 5A-5D, 19, 20, 7, 8, 21, 23, 24, 25, 28, 29 and 30 (Figures 3-5 through 3-8).

Prior to demolishing of existing structures, asbestos abatement and lead-based paint (LBP) stabilization was conducted. Asbestos abatement and LBP stabilization activities for the existing structures began in December 2007 and were performed by the subcontractor Performance Abatement Services of Richmond, California under the oversight of a California-Certified Asbestos Consultant and California Department of Public Health-Certified Lead Inspector/Assessor and Project Monitor. Following the asbestos abatement and LBP stabilization, the structures were demolished. Demolition activities were completed by the subcontractor Soil Enterprises Inc. of Brentwood, California. Asbestos abatement, LBP stabilization, and demolition activities were complete in January 2008.

The debris piles from the entire MRA were inspected by UXO Technicians to ensure no MEC hazards were present. The piles were then consolidated into one central area and were segregated according to waste stream and transported off site to appropriate receiving facilities. A complete summary of demolition and debris pile removal activities for the entire Seaside MRA, including waste manifests and detailed disposal information, will be included in the RI/FS report.

3.5.5 Asphalt Removal Activities

Asphalt range roads extended from GJMB and Eucalyptus Road into the Seaside MRA. Additional asphalt-covered areas, including parking and staging areas, were present on the MRA. The asphalt roads, including road base material and pads, were removed by subcontractor Ahtna with the construction support of UXO personnel. The locations of the asphalt that was removed is shown on Figures 3-5 through 3-8. The removed asphalt was transported to the sifting plant and sifted to remove material greater than 3/4 inch, which could represent potential MEC items.

3.6 MEC Removal Action for SCA Point Locations Outside the Roadway Alignment and Utility Corridor

A total of 534 SCAs were previously identified as discrete point locations by the Army and, for a variety of reasons, were not previously investigated in the Seaside MRA. These discrete SCAs were identified by the ESCA RP Team as SCA point locations, as discussed in Section 3.2. Of these 534 point SCAs, 423 were located outside the roadway alignment and the utility corridor (Table 3-1). The locations of the SCA points located outside of the roadway alignment and utility corridor are shown on Figures 3-1 through 3-4. More detailed maps showing the SCA points and corresponding identification numbers are provided in Appendix A. The following sections describe MEC removal activities for SCA point locations and SCA points located within SCA polygons.

3.6.1 SCA Point Locations

SCA point locations were staked by a licensed surveyor as previously described in Section 3.5.1. UXO Technicians investigated a 3-foot-radius area around each staked SCA point location using handheld magnetometers and all-metals detectors to locate the anomaly response. Once the anomaly response was located, the UXO Technician began excavation of the location using either shovels and/or an excavator depending on the depth of the anomaly. Once the anomaly source was found and recovered, the UXO Technician rechecked the 3-foot-radius area around the location to determine if other items remained in the subsurface. Item(s) recovered were logged into a Personal Digital Assistant (PDA) or Juniper Systems Archer Ultra-Rugged Field Personal Computer. At the end of each day, the data were uploaded to an Access database. If no anomaly source was detected, the negative result was noted as no contact (NC).

The SCA points were investigated and anomalies were removed to the extent possible. If the anomaly source could not be physically removed due to the presence of remaining power poles or other features, the locations were not excavated. Each SCA point excavation was inspected using the QC-1 procedure described in Sections 4.2 and 4.3.6.1 by the UXO Quality Control Specialist (UXOQCS). Section 5.0 summarizes the findings of the SCA point investigations.

3.6.2 SCA Points within SCA Polygons

There were a total of 86 SCA points outside the roadway alignment and utility corridor that were located within the footprint of SCA polygons. These SCA points and the polygons in which they were located are identified in Table 3-1. The locations of these SCA points and identification numbers are shown on detailed maps provided in Appendix A. These SCA points were investigated after the polygons were scraped using the procedures described in Section 3.7. In addition, these SCA points underwent a DGM survey or an analog survey as part of the associated SCA polygon (the type of survey depended upon the polygon). As described in Section 3.7, the SCA polygons, including any SCA point locations, were scraped to remove metallic clutter and other debris, and the scraped soil was sifted as described in Section 3.8. The majority of the polygons were surveyed using DGM instruments followed by investigation of detected anomalies (Section 3.10). In some circumstances, the polygons were investigated using analog instruments. The SCA polygons went through the appropriate QC and QA processes depending on the type of survey that was conducted (DGM or analog), as discussed in Section 4.0.

3.7 SCA Polygon Scraping Operations Outside the Roadway Alignment and Utility Corridor

As opposed to the SCA point locations, SCA polygons were defined as areas that could not be cleared due either to physical obstructions or to dense metallic clutter, which caused interference and prevented a DGM survey from being completed in the area. Prior to DGM surveys, the soil within the SCA polygons was scraped and sifted to remove metallic clutter and other debris. A total of 129 SCA polygons located either partially or completely outside the roadway alignment and utility corridor were proposed for scraping and sifting prior to performing the DGM survey (Table 3-2). The locations of the SCA polygons outside the roadway alignment and utility corridor are shown on Figures 3-1 through 3-4. More detailed maps showing the SCA polygons and corresponding identification numbers are provided in Appendix B. In 29 of these polygons, scraping did not occur in portions of the polygon or occurred only after the DGM survey was complete. The SCA polygons that were not scraped are identified as:

- SCA-W111 (investigated as discrete anomaly excavations under approved field variance form FVF SEAMRA-003)
- SCA_W002 and SCA_W010 (ASR)
- SCA_W140 (existing fence line SCA)
- SCA_W003, SCA_W035, SCA_W046, SCA_W123, SCA_W124, SCA_W125, SCA_W126, SCA_W127, SCA_W128, and SCA_W129 (Transmission Towers)
- SCA_W009, SCA_W011, SCA_W0021, SCA_W022, SCA_W026, SCA_W027, SCA_W028, SCA_W032, SCA_W061, SCA_W063, SCA_W136, and SCA_W148 (terrain)
- SCA_W130, SCA_W137, and SCA_W165 (access gate entrances maintained to prevent erosion issues)

Figures 3-9 through 3-12 show the locations of the SCA polygons that were scraped outside the roadway alignment and utility corridor.

On February 4, 2008, ESCA RP Team personnel began scraping the soil within the SCA polygons located both inside and outside the roadway alignment and utility corridor. Soil scraping continued until August 2008. The SCA boundaries were previously staked by a licensed surveyor as indicated in Section 3.5.1. SCA scraping activities were conducted with UXO construction support. Prior to initiating scraping activities, the surface of the area to be scraped was visually inspected by UXO Technicians for the presence of MEC or MD items. Once the areas were visually inspected, scraping activities were conducted. UXO Technicians were present to observe and inspect scraping, loading, and transport activities in the event that potential MEC items were uncovered.

The depths to which the SCA polygons were scraped were based on the response from the handheld magnetometer and/or the all-metals detectors used by the UXO Technicians during their oversight. Scraping was conducted to the required depth until minimal anomaly responses were detected by the handheld instruments. The scraping of SCA polygons is shown in Photographs 3-12 and 3-13. Typically, the depth of scraping was approximately 6 inches; however, in some areas scraping extended deeper. In the case of SCA_W160, scraping extended to an approximate depth of 10 feet in some areas of the SCA due to the presence of significant asphalt debris.

Scraped soil was loaded onto haul trucks and transported to a soil stockpile staging area in Seaside MRS-15SEA.1. The locations of the sifting plant and soil stockpile staging area are shown on Figure 3-13. The soil was staged in discrete stockpiles by MRS (MRS-15SEA.1 through MRS-15SEA.4).

Photograph 3-12 – SCA polygon scraping activities

Photograph 3-13 – SCA polygon scraping and dust control activities

3.8 Sifting Operations of SCA Scraped Material

Soil and material scraped from the SCA polygons was transported and stockpiled for further processing by the sift plant. The sifting plant and stockpile staging areas were located on the eastern side of Seaside MRS-15.SEA.1 (Figure 3-13). The soil and material scraped from the SCA polygons were processed through the sift plant in accordance with the Standard Operating Procedure (SOP) for Mechanical Soil Sifting (ESCA RP Team 2008e) and field variance forms FVF SEAMRA-002 and FVF SEAMRA-007. A schematic of the sift plant is shown in Figure 3-14. The soil sifting operations took place from April 9, 2008 to July 23, 2008 and from August 15, 2008 to August 28, 2008. The material sifted from April 9, 2008 to July 23, 2008 included soil scraped from SCA polygons located both inside and outside the roadway alignment and utility corridor because the soils were not segregated by SCA, only by MRS. The details of the sift plant operations that occurred from April 9, 2008 to July 23, 2008 (excluding the oversized, rejected material) were presented in the Roadway and Utility Corridor TIP (ESCA RP Team 2008h) and the results are not included in this report. Sifting operations were resumed on August 15, 2008 to sift a small amount of soil that remained from scraped SCA polygons located outside the roadway alignment and utility corridor (primarily soil from SCA_W074 outside the roadway alignment) and were complete on August 28, 2008. The results of the sifting operations that occurred from August 15, 2008 to August 28, 2008 are presented in Section 5.2 of this report.

The oversized, rejected material generated during the sifting operations is discussed in the next section.

3.9 Oversized Material

Material scraped from SCA polygons that did not pass through the 6-inch, 2-inch, or 3/8-inch screens of the sift plant was separated by the sift plant as oversized, reject material. The Army requested use of some of the oversized material deemed suitable for use as road base for repairs to the fire break roads within the Inland Ranges portion of former Fort Ord. The oversized material was sorted and inspected in accordance with Section 9.1 of the SOP for Mechanical Soil Sifting. Initially, the inspection included 100% visual inspection by trained UXO personnel assisted by magnetometer and all-metals detector instruments.

Material not suitable for use by the Army, such as large pieces of metal scrap, wood, and plant debris, was segregated and stockpiled within the Seaside MRA for further processing (described below).

From August 7, 2008 until August 11, 2008, the Army transported the processed oversized material suitable for fire road repairs by truck from the Seaside MRA to the Inland Ranges. The processed material was deposited in approximately 3-inch lifts where it was inspected by UXO Technicians before a subsequent lift was placed. On August 11, 2008, a non-ferrous 40mm M407 A1 practice projectile with an aluminum cover was found during spreading of the material by the Army. In response to this event, FVF SEAMRA-007 was prepared to modify the sorting and inspection process to use an armored rock crusher to process the oversized material (Appendix I). The Roadway and Utility Corridor TIP presented the 40mm M407 and FVF SEAMRA-007.

As approved in FVF SEAMRA-007, a rock crusher was mobilized to the Seaside MRA in August 2008. The screen rejected material (greater than 3/8 inch) was loaded by armored excavator or front end loader into a hammermill rock crusher with hammers set with 1-inch separation. Material smaller than one inch in diameter exited the rock crusher and was passed 8 inches below a 574 gauss magnet. Reject material (larger than 1 inch in diameter) was reloaded into the crusher until all material was less than 1 inch in diameter. Metal material collected by the magnet was inspected by a UXO Technician to determine it was free from explosives and sent off site for recycling. These rock crushing activities were complete on September 24, 2008.

After the sifting and rock crushing operations were complete, approximately 2,000 cubic yards (yd^3) of mixed oversized reject debris deemed unsuitable for use by the Army as road base remained on the Seaside MRA near the former sift plant location. During the rock crusher operations that took place in August and September 2008, the material was deemed incompatible with the equipment used at that time due to high vegetative matter content and was not processed. As a result, SEI was retained to sort, crush, and dispose of this oversized reject debris. Processing of this reject debris began in April 2009 with segregation by material type (concrete, wood, metal, vegetation, etc.) and continued through May 2009. SEI began processing the segregated piles through their rock crusher on July 6, 2009 and completed the processing activities on August 12, 2009. The processing of the reject debris was conducted in accordance with FVF SEAMRA-007.

3.10 MEC Removal Actions - SCA Polygons

Following the site preparatory activities and the soil scraping of SCA polygons to remove the debris that would prevent effective geophysical surveys, a DGM survey was performed within the SCA polygons to establish and record the locations (i.e., targets) of geophysical anomalies that potentially represented subsurface MEC. The BADT was utilized as appropriate for each area and physical investigation. The performance goal for the geophysical survey was to locate all items in the subsurface that could be detected given the particular instrument and the site-specific conditions (i.e., terrain, vegetation, cultural, etc.). Items identified as potential MEC were intrusively investigated. Terrain and physical constraints prevented DGM surveys from being completed in certain areas of several SCAs as described in Section 3.10.6.3. Instead, an analog survey and removal action was completed in these areas.

3.10.1 Geophysical Test Plot and Report

Prior to initiating the full-scale geophysical mapping within the SCAs, instrumentation was tested at the established geophysical test plots. The geophysical test plot survey was conducted in accordance with the SSWP Addendum and the “Final Geophysical Test Plot Plan, Seaside Munitions Response Area (MRA),” dated March 7, 2008 (ESCA RP Team 2008d). As part of the geophysical test plot survey, two geophysical test plot grids (referred to as Test Plot 1 and Test Plot 2) were established and geophysically mapped at the Seaside MRA. The second test plot was established to evaluate the potential effects of a power line that crosses part of the survey area. The primary objectives of the test plot surveys were to 1) provide information that was used to validate proposed geophysical sensor and navigation instrumentation and personnel protocols, and 2) confirm that the project scope and other proposed metrics for Data Quality Objectives (DQOs) were attainable and sufficient to meet the intended project goals. The intended project goals were to accurately map and locate MEC within the Seaside MRA. A summary of the results of the geophysical test plot are provided below. Additional details of the geophysical test plot survey are included in the Geophysical Test Plot Report (ESCA RP Team 2008f).

The electromagnetic (EM) surveys were conducted using a Geonics Limited, EM61-MK2™ high-sensitivity ferrous and nonferrous metal detector described in Section 3.4.1. Surveys were performed using the single man-towed cart and towed multiple-array units mounted on a sled platform. An RTK GPS was utilized to position data collected during the EM61-MK2 single- and towed-array surveys to cm accuracy. Static background, static spike, and vibration/cable tests were performed daily before and after surveying and during power-on and power-off cycles to confirm the equipment was functioning properly throughout the survey period. The EM61-MK2 was tested at a designated QC area during the pre- and post-survey instrument function tests.

Based on the results of the geophysical test plot surveys presented in detail in the Final Geophysical Test Plot Report, the following recommendations were proposed and approved for the full-scale activities at the Seaside MRA:

- EM61-MK2 was selected as the primary instrument for DGM. Data were to be collected and processed using conventional processing techniques. The towed-array would be used in areas that were wide open and easily accessible. The single unit would be used to collect data at small, discrete locations or where the data from the towed-array could be compromised (excessive topography and rough terrain).
- Target selection thresholds would initially be based on analysis of a portion of background data in each dataset. This background data would be examined to calculate a threshold of three times the standard deviation of the background signal. It was also recommended that low threshold values be ground-truthed against a representative sample of these low threshold geophysical targets in the initial stages of the full-scale surveys. After several datasets had been investigated (reacquired and logged), an analysis was to be performed of these targets and their resulting dig information to determine if an increase in the target selection threshold was warranted. During the DGM survey activities conducted at the Seaside MRA, no increase in the target selection threshold was warranted.

3.10.2 Digital Geophysical Data Mapping Surveys

DGM surveys were completed in wide open areas where terrain permitted. As determined by the geophysical test plot survey, EM61-MK2 was the primary instrument used for DGM.

Some areas were not accessible for DGM surveying. These areas included the electrical transmission towers, communication poles with guy wires and anchors, steep slopes, and the area of existing fence immediately adjacent to the existing GJMB. To maintain service of these utilities, the DGM survey was conducted as close to these locations as possible. Active UXO construction support will be required to be on site during the subsequent removal of these towers and communication poles.

The full-scale and QC-2 DGM of the SCA polygons within MRS-15SEA.1-4 were performed using the EM61-MK2 as the primary instrument. Data were collected and processed using methodologies consistent with the USACE Data Item Description (DID) MR005.05A and industry standards. The towed multiple-array was used to acquire data in SCA polygons of larger areas and suitable terrain. The single-array EM61-MK2, on a wheel-mounted cart, was used to acquire data at smaller SCAs, discrete locations, and data gaps in the towed-array data resulting from excessive topography or rough terrain. Both instruments were interfaced with the Trimble RTK GPS to provide navigation to cm accuracy. Prior to conducting each survey, QC function tests were performed following the instrument operating manual and USACE guidelines. The instrument QC readings were digitally recorded and stored in memory in an Allegro data logger. The locations where the EM61-MK2 surveys were conducted are shown on Figures 3-15 through 3-18.

3.10.3 Digital Geophysical Data Processing and Target Anomaly Selection

The data collected from the digital detection instruments were processed using the techniques described in the following subsections.

3.10.3.1 Preprocessing of Raw Data

The raw EM61-MK2 single unit field data was processed using DAT61 MK2 software. The EM61-MK2 towed-array data were collected using MagLog software and preprocessed using MagMap 2000 software. Data were then exported in Geosoft XYZ file format for post-processing.

3.10.3.2 Geophysical Processing

Raw Geosoft XYZ files were imported into Geosoft Oasis Montaj™ processing software. Data were checked for navigational accuracy, line distribution, and coverage. Latency values obtained during the pre- and post-survey QC tests were applied to the data, correcting for any temporal lags seen in the data. A Geosoft script was run to automatically progress through the processing steps for each of the four individual data channels. The script was used to drift-correct the data using a common filtering technique. A nonlinear drift correction filter was used to remove any drift associated with each data channel occurring throughout the survey period. Velocity and sample separation were calculated for each dataset (recorded in Processing Notes, presented in Appendix D). After each of the four time-gate data channels was processed and evaluated, the channels were summed into a single “stack” channel.

Background noise was evaluated for each dataset by windowing a section of the data and generating statistics using the UX-Process QC module. Background noise was variable across the site. The lowest noise values averaged between 4 and 5 millivolts (mV) and an average standard deviation of 2.4 . The highest levels of between 7 and 10 mV were observed in SCA_W048 (original fence line SCA) in MRS-15SEA.2

Grid images for the EM61-MK2 (stacked channels 1 through 4) were then generated using Oasis Montaj contour plotting software. Contour plots were generated by gridding the stack data channel using a grid cell size of 0.25 foot, a search radius of 2 feet, and blanking distance of 1.8 feet (for the 4-coil configuration). The grid images for the EM61-MK2 surveys are shown in Figures 3-15 through 3-18. More detailed maps of the contour color plots are provided in Appendix E.

The EM61-MK2 plots were used to identify targets and locate anomalies requiring further investigation. The targets were selected for the gridded data by running the Blakely Peak algorithm in Geosoft. The background mean and standard deviation were calculated from the dataset. Target selection threshold was chosen based on 3 times the mean that was calculated in the background data analysis. In areas exhibiting low noise levels a grid threshold value of 5 to 7 mV was used to select the initial target list. In areas exhibiting slightly higher ambient noise, a nonlinear filter was applied to remove a portion of the background noise and a grid threshold of 8 to 10 mV was used for the target selection. These values were based upon a review of the background signal. Background was calculated by windowing a polygon of data typical of a quiet area. Target review consisted of manually evaluating selected targets, and removing or merging multiple targets associated with large anomalies. Targets were also moved (where necessary) to the location of the peak response associated with a given anomaly. A target decay analysis was also run to remove targets that had an atypical decay between their four time-gate channels. An atypical decay occurs when an anomaly undergoes a decay that does not decrease through time, but instead shows an increase in any of the subsequent time-gate channels. Atypical decay represents nonmetallic anomalies generated by ambient forces such as terrain induced noise, hot rocks, and electrical interference.

The data processing procedures were used to generate a target anomaly database. Coordinate positions for each of the targets identified in the DGM were compiled by SCA into a dig list, which was then provided to the UXO Teams for reacquisition and excavation. The composite dig list (also known as “dig sheets”), including the unique ID, position, and anomaly characteristics and dig information for each investigated target selected using the DGM, is presented in Appendix F. A total of 4,962 target anomaly locations were identified as requiring further investigation. Navigation and target picking accuracy were checked by selecting a target over a known QC seed survey control and calculating the offset distance between the two; these values were recorded and are documented in the Processing Notes (Appendix D). Table 3-3 summarizes the details of the EM61-MK2 data processing parameters utilizing Geosoft.

3.10.4 Anomaly Reacquisition Procedures

Field reacquisition teams reacquired the targets based upon information provided on the dig sheets. Target anomaly reacquisition was performed utilizing the Trimble RTK GPS for navigation to the precise coordinate location for each target anomaly and the location was flagged with a nonmetallic pin flag bearing the unique target identifier. The DGM target anomaly locations found were investigated within a 3-foot radius around the flagged location. The UXO Dig Team used the Whites all-metals detector and the Schonstedt magnetometer. The UXO Dig Team noted any offset from the flag to the excavated anomaly source(s) and logged the information accordingly. If no anomaly source was detected, the reacquisition team noted the negative result as NC on the anomaly list and left the flag in the location. Anomalies were intrusively investigated using the procedures described in Section 3.10.5.

During the course of the project, it was concluded that the use of an EM61-MK2 was not necessary to peak the anomaly location due to the level of accuracy of the navigation equipment used (Trimble RTK GPS). Therefore, FVF SEAMRA-004 was prepared to document the removal of this step from anomaly reacquisition procedures. FVF SEAMRA-004 was reviewed and approved by the regulatory agencies prior to implementation in the field. Section 3.13 provides additional information on the FVFs.

3.10.5 Excavation of DGM Anomalies

During the DGM target anomaly removal actions, near-surface anomaly excavations were performed with hand tools such as shovels (near-surface anomalies are those subsurface anomalies that are within 6 inches of the surface). Photographs 3-19 and 3-20 show the hand excavation of near-surface anomalies. Those items considered too large or deep to be excavated by hand tools were investigated using heavy machinery such as a mini-excavator. UXO Dig Teams consisting of UXO Technicians performed excavations at the target anomaly locations identified in the DGM survey, identified the source of the anomaly, and utilized the PDA-based UXOFastSM data logging system to electronically log the target anomaly characteristics real-time in the field. Target anomaly characteristics logged included, but were not limited to: item type (e.g., MEC, cultural debris, QC item); item description (e.g., concrete, practice grenade); weight of item; depth; confirmation of hole cleared; etc. MEC items encountered were photographed for documentation purposes. The following nomenclature was used to categorize the items discovered by the dig teams:

- UXO (Unexploded Ordnance)—Military munitions that (A) have been primed, fuzed, armed, or otherwise prepared for action; (B) have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installation, personnel, or material; and (C) remain unexploded either by malfunction, design, or any other cause.
- DMM (Discarded Military Munitions)— Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include UXO, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations. (10 U.S.C. 2710(e)(2))
- MC (Munitions Constituents)—Any material originating from UXO, DMM, or other military munitions, including explosive and nonexplosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions present in high enough concentrations to pose an explosive hazard.
- MD (Munitions Debris)— Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.
- Cultural Debris (Non-MEC-related items)—A variety of materials not related to MEC. These include, but are not limited to, metal scrap, cultural materials, and construction debris.
- NC (No Contact)—Items that were not identified (no response) at the reacquired target location by using either a handheld magnetometer and/or an all-metals detector.

At the end of each day, the data were uploaded to an Access database. The results of the target anomaly excavations are provided in Section 5.4. The handheld Schonstedt magnetometer was utilized to “clear the hole” of ferrous material. The Whites all-metals detectors were used to further investigate locations for nonferrous objects. An EM61-MK2 was used to resolve any NCs that the detectors could not resolve.

Photograph 3-19 - View of Anomaly Investigation Activities

Photograph 3-20 – View of Anomaly Investigation Activities

3.10.6 Analog Surveys

Analog surveys were conducted in portions of several SCAs for a variety of reasons as described in the following subsections. The boundaries of the analog survey areas were drawn to overlap adjacent DGM survey areas in order to establish complete surveys of the accessible areas of the SCAs. The handheld Schonstedt magnetometer and the Whites all-metals detectors were used to locate anomaly responses in these areas. Once an anomaly response was located, the UXO Technician excavated the location using either shovels and/or an excavator depending on the depth of the anomaly. Once the anomaly source was found and removed, the UXO Technicians rechecked the 3-foot-radius area around the location to determine if other items remained in the subsurface. Analog investigations were logged on analog survey sheets. Copies of the analog survey sheets are included in Appendix G. The totals for cultural debris, MEC, or MD items were recorded for each area by SCA. Section 5.4.1.2 summarizes the findings of the analog investigations.

3.10.6.1 SCA_W140

As described in Section 3.3, DGM surveys could not be completed in certain portions of the SCA polygon SCA_W140 (existing fence line), where steep slopes prevented the use of the DGM survey equipment. DGM surveys could not be completed in another portion of SCA_W140. Removing the fence posts in this area would have caused damage to the asphalt and could have undermined the originally existing GJMB, which was still in use at the time the ESCA RP Team completed the removal activities in the Seaside MRA. As such, analog surveys and removal actions were completed (because analog instruments could be used closer to the fence posts than DGM instruments) in these areas of SCA_W140 using the procedures described above. Active construction support is required when earth moving activities occur near the fence posts left in place. The locations where the analog surveys were completed are shown on Figures 3-19 and 3-20 and on more detailed maps provided in Appendix E.

3.10.6.2 SCA_W048

DGM surveys could not be completed in certain portions of the SCA polygon SCA_W048 (original fence line), where steep slopes and terrain prevented the use of the DGM survey equipment. Analog surveys and removal actions were completed in these areas of SCA_W048. The locations where the analog surveys were completed are shown on Figures 3-19 and 3-20 and on more detailed maps provided in Appendix E.

3.10.6.3 Various SCAs

DGM surveys could not be completed in portions of 36 SCA polygons located outside the roadway and utility corridor, including SCA_W005, SCA_W014, SCA_W015, SCA_W020, SCA_W022, SCA_W030, SCA_W035, SCA_W037, SCA_W040, SCA_W041, SCA_W048, SCA_W055, SCA_W062, SCA_W066, SCA_W070, SCA_W074, SCA_W087, SCA_W109, SCA_W111, SCA_W113, SCA_W118, SCA_W119, SCA_W123, SCA_W124, SCA_W125, SCA_W129, SCA_W130, SCA_W134, SCA_W138, SCA_W140, SCA_W141, SCA_W146, SCA_W149, SCA_W155W160, SCA_W161, and SCA_W162. These SCA polygons presented a variety of terrain, steep slopes, proximity to existing fences, gates, and other challenges that were not conducive to a DGM survey.

UXO Technicians conducted analog surveys and removal actions as described above. The locations where the analog surveys were completed are shown on Figures 3-19 and 3-20 and on more detailed maps provided in Appendix E.

3.11 Demolition Operations

No in-place demolitions for UXO items that were determined to be unsafe for transport or storage were conducted during investigation and removal activities in the Seaside MRA outside the roadway alignment and utility corridor.

3.11.1 MD Recycling

Prior to site closure, MD will be disposed of permanently. MD will be disposed of at a foundry or recycler where it will be processed through a smelter, shredder, or furnace prior to resale or release. Disposal in a landfill or to a scrap dealer where it may sit in a scrap pile is not approved. All MD is secured in a lockable container after discovery. All containers remain locked until such time as they are delivered to, and signed for by, a foundry/recycler.

3.11.2 Explosive Storage

During the Phase II removal activities in the Seaside MRA, the ESCA RP Team used the government-supplied explosives storage facilities at the former Fort Ord in accordance with the approved LDSP and a Right of Entry agreement from the Army. The government-supplied explosives storage facilities are known as the Explosive Storage Location, which includes standard earth-covered and aboveground magazines for storage of explosives. The ESCA RP Team also uses a portable apparatus approved by the Bureau of Alcohol, Tobacco, Firearms, and Explosives for Type 2, outdoor storage, and box magazines for temporary holding of MEC items that are safe to move while awaiting demolition.

3.12 Other Related Activities

Additional activities that were conducted during the MEC investigation and removal activities included environmental monitoring, implementation of stormwater and erosion control measures, and dust monitoring to minimize fugitive dust from leaving the MRA during field activities.

3.12.1 Environmental Protection

Each MRS-15SEA.1-4 site is designated in the HMP for development. However, the sites fall within borderland development areas along the NRMA interface designated in the HMP. Therefore, measures to reduce impacts to natural resources were implemented. In addition, guidelines that minimize activities that could degrade lands through soil erosion or invasive weed problems were followed.

Within the SCAs, the biological monitoring activities were the responsibility of the ESCA RP Team qualified field biologist.

Though the fieldwork required vegetation removal and grubbing activities, efforts were made to the extent possible to preserve and protect environmental features within the Seaside MRA, including, but not limited to:

- Minimized vegetation removal and cutting where possible while ensuring that the required work could be completed to the extent feasible.
- ESCA RP Team qualified field biologists were on site during the rainy season to monitor SCA excavations within the limits of the areas identified as potential California tiger salamander breeding habitat (located on MRS-15SEA.1 and a small portion of MRS-15SEA.2) – refer to Photograph 3-21 for an example of an excavation protected with silt fencing to prevent entrance by the CTS.
- Awareness training for the CTS and other sensitive animal and plant species was provided for all field personnel by the ESCA RP qualified field biologists.
- Erosion control measures were installed within the Seaside MRA to reduce erosion.

Photograph 3-21 – SCA excavation with silt fencing for protection of CTS

3.12.2 Dust Control Measures and Monitoring

This section presents the dust minimization, controls, and monitoring activities that were implemented during the project activities. The ESCA RP Team implemented dust controls during site operations consisting of spraying water along the haul routes, work areas, and stockpiled soil introduced to the sifting plant, as needed to minimize fugitive dust. In addition, heavy equipment speeds were monitored to minimize dust emissions. Photograph 3-23 shows the water spraying activities employed to minimize fugitive dust.

Photograph 3-23 – Water spraying activities to minimize fugitive dust

Two stationary dust monitoring stations were active during working hours. During sifting operations, three stationary dust monitoring stations were active. One dust monitor was set up in the work area to monitor dust levels for worker safety. A second monitor was set up near the downwind perimeter of the work area along GJMB to monitor dust levels leaving the site. A third dust monitor was set up along the haul route to monitor dust levels from running haul trucks. Wind direction was observed in the field and noted on the contractor daily field reports (included in Appendix C). The dust monitor locations are shown on Figure 3-13.

The dust monitors continuously monitored the dust concentrations and recorded the dust concentrations every minute. The data were downloaded each day and maintained in the project files for documentation purposes. Site management personnel periodically inspected the dust monitors to evaluate if dust control measures needed to be increased and/or site operations needed to be modified. Site management also visually monitored the site for "visible" dust and made necessary corrective actions, if warranted. The Monterey Bay Unified Air Pollution Control District 24-hour ambient air-quality standard is 50 micrograms per cubic meter. Every effort was made to ensure the site activities and dust controls were implemented such that the dust emissions were minimized and the ambient air-quality standard was achieved.

3.13 Project Field Variances

During the course of the field activities, the project field team encountered situations where field activities required deviations from procedures described in the original work plan. To address these issues, the project team prepared a number of FVFs to document each issue and how the work deviated from the work plan. Most of the FVFs applicable to the field operations were discussed briefly in the previous sections of this report. The following sections provide additional details regarding the FVFs submitted during the SSWP Addendum field operations.

3.13.1 Field Variance Form No. 1

Field Variance Form No. 1 (Appendix I, FVF SEAMRA-001) was prepared to provide additional details regarding the procedures, quality control activities, and safety and health requirements applicable to the conduct of mechanical soil sifting operations in the Seaside MRA. The SSWP Addendum did not provide sufficient details to describe the work that would be conducted. FVF No. 1 was reviewed and approved by the regulatory agencies.

3.13.2 Field Variance Form No. 2

Field Variance Form No. 2 (Appendix I, FVF SEAMRA-002) was prepared to document the replacement of the 3/4-inch screen installed in the sifting plant to a different design, 3/8-inch (8mm) spaced Speedharp-type screen. The reason for the screen type variance was due to clogging of the screen that restricted the throughput of the original 3/4 by 3/4 inch mesh screen design. The stockpiled soil (sand) from the SCA polygons had been wetted during scraping and transport activities to minimize dust emissions. Based on input by the sifting plant vendor (Powerscreen), the replacement of a 3/4-inch square mesh screen deck with a 3/8-inch (8mm) spaced harp-screen deck would provide a better design to handle wet sand with less clogging. Once the FVF was implemented, the throughput of the soil sifting increased significantly while still passing all of the daily QC inspections. The FVF was reviewed and approved by the regulatory agencies.

3.13.3 Field Variance Form No. 3

Field Variance No. 3 (Appendix I, FVF No. SEAMRA-003) was prepared to document the rationale for using an alternate approach to removing anomalies within a SCA polygon (SCA_W111) located in the roadway alignment in MRS-15SEA.4. The original approach to removing anomalies in this SCA was to scrape the top 6 inches of soil in order to remove debris from the area followed by DGM surveying and removal of any remaining anomalies that could be MEC. The minimum separation distance (MSD) for scraping in this area would be 1,073 feet. This approach would require evacuation of approximately eight homes during scraping operations. The Army requested that FORA identify alternate solutions as the evacuation of homes was not a desired approach.

The ESCA RP Team reviewed the digital geophysical data previously collected and processed by Parsons, an Army contractor conducting removal actions. A linear feature appeared to be present within this SCA. The feature was broken at regular intervals and was interpreted to be the remnants of a fence line. The ESCA RP Team proposed to investigate approximately 100 points along this linear feature to verify the hypothesis that the anomalies were related to a former fence line. This was accomplished by identifying the approximately 100 targets as SCA point locations within the SCA polygon. The targets were investigated using the SCA point anomaly procedures specified in the SSWP Addendum and discussed in this report. The objective was to investigate the approximate 100 SCA point locations within the polygon prior to conducting DGM and remove the material causing the anomalies, thus allowing the SCA polygon to undergo effective DGM surveying and completion of the removal action. The anomalies were caused by the subsurface base of fence posts that had been cut at the ground surface. Clearing and grubbing of this area in preparation for the roadway alignment occurred following DGM and anomaly removal operations.

Since the excavations were conducted as point targets, the MSD for investigation of the points was the hazardous fragment distance for the 57mm projectile M306. The MSD for this operation was therefore reduced to 167 feet and did not require the evacuation of homes.

3.13.4 Field Variance Form No. 4

Field Variance No. 4 (Appendix I, FVF No. SEAMRA-004) was prepared to document the rationale for using a simplified approach for reacquisition and excavation of anomalies. The original approach indicated that after the DGM surveys, the locations of anomalies selected for investigation were to be flagged using RTK GPS. After flagging the anomaly location, the anomaly location was to be refined using the same instrument used to conduct the digital geophysical survey. This refinement required the movement of the flag or the placement of a secondary flag to indicate the offset of the real-time peak response from the original DGM survey flag. The original approach of refining the anomaly location with an EM61-MK2 was related to controlling navigation errors more typically associated with less accurate forms of navigation, such as line and fiducial navigation or “dead reckoning.” Due to the high accuracy of target positioning using RTK GPS on this project, refinement of anomaly locations was not necessary.

Therefore, for the secondary step of refining the anomaly selected for excavation, all detected anomalies were investigated within the area 3 feet around the DGM anomaly location flagged with RTK GPS. The UXO Dig Team used handheld instruments, appropriate to the type of instrument used for the DGM survey (Whites all-metals detectors for EM61-MK2 data. The UXO Dig Team noted any offset from the flag to the excavated anomaly or anomalies and logged the information accordingly.

The QC-1 process remained intact and required checking 100% of the anomaly excavations with the same digital instrument (i.e., EM61-MK2) used in the original DGM survey. The FVF was reviewed and approved by the regulatory agencies.

3.13.5 Field Variance Form No. 5

Field Variance No. 5 (Appendix I, FVF No. SEAMRA-005) was prepared to provide clarification regarding access for regulatory representatives to inspect the site unescorted. The original statement regarding regulatory representative site access stated that representatives from regulatory agencies were “permitted to enter the site at any time during business hours or any other reasonable time with an escort.” Confusion existed regarding whether this statement meant that an escort was required at all times for regulatory agency representatives or whether the regulatory agency representatives could be on site without an escort during normal business hours, but required an escort outside of normal business hours. The FVF clarified that regulatory agency representatives could be on site during normal business hours without an escort, but an escort was required outside of normal business hours. In addition, regulatory agency representatives were required to sign in and out at the job site trailer. The FVF also clarified that any violations or concerns identified by the regulatory agency representatives while on site would be brought to the immediate attention of the Senior UXO Supervisor on site and communicated in writing to FORA.

3.13.6 Field Variance Form No. 6

Field Variance No. 6 (Appendix I, FVF SEAMRA-006) was prepared to document a revised approach for the quality control process referred to as QC-2. The revised QC-2 approach considers the fact that only SCAs are addressed as part of the Seaside removal action and not entire grids. The revised approach for QC-2 also considered that the majority of QC-2 had been completed during previous removal actions conducted by the Army. The field variance in Appendix I provides the flow of logic used to revise the QC-2 process.

The QC-2 processes approved through the field variance were as follows:

- 10% DGM resurvey for all SCAs with areas greater than 1,000 square feet as shown on the FVF SEA-006 Maps 7-8 (Appendix I).
- 100% DGM resurvey for 30% of the 103 SCAs (a minimum of 31 SCAs) with areas less than or equal to 1,000 square feet as shown on the FVF SEA-006 Maps 7-8 (Appendix I).

The modified approach would result in a level of QC-2 that was greater than or equivalent to the approximately 16% QC-2 performed by Parsons during previous removal actions at Fort Ord.

A failure was constituted by the discovery of a UXO or UXO-like item, or five re-acquirable anomalies as a result of the QC survey, sufficient in size to represent a 37mm projectile or larger, or the discovery during the QC process of five nonselected anomalies that should have been selected during the initial survey. The following were the prescribed corrective actions for a QC-2 failure:

- Small SCAs: If failure occurred during QC-2, 100% of the area was resurveyed and an additional small SCA, similar in size, underwent QC-2 10% resurvey
- Large SCAs: If a failure occurred during QC-2, the area or grid (equivalent to 1/4 acre or 100 by 100 feet) surrounding the failure within the boundaries of the SCA was 100% resurveyed

A root cause analysis was to be performed to determine an appropriate corrective action to be implemented if a QC failure occurred.

3.13.7 Field Variance Form No. 7

Field Variance No. 7 (Appendix I, FVF SEAMRA-007) was prepared to document a revised approach to inspecting the oversize reject materials (materials rejected by the 6-inch, 2-inch, or 3/8-inch sifting screen) generated by sifting operations. The Army requested use of the oversize reject materials for use in fuel break repair projects on the inland ranges of the former Fort Ord.

On Monday, August 11, 2008, the Army notified the ESCA RP Team that work operations were stopped when a 40mm projectile was found in the oversize reject material being used for fuel break repairs during spreading operations. The WESTON Senior UXO Supervisor (SUXOS) immediately notified the WESTON Remediation Project Manager of this occurrence. The WESTON SUXOS then proceeded to inspect the item. The item was determined to be a 40mm M407 A1 practice projectile. Based on the encounter of the 40mm M407 A1 practice projectile in the oversize material taken by the Army, it was apparent that the instrument-aided visual inspection technique was not sufficient for inspecting the relatively large volume of reject oversized material, comprised primarily of aggregate rock with lesser amounts of asphalt, concrete, nonferrous metal (soda cans), and wood debris.

FVF-07 was prepared and described how the oversize reject material would be processed through a rock crusher to reduce the size of this stream to approximately 1.0 inch or smaller and a quality control check of a portion of the reprocessed reject material would be performed in a similar manner as prescribed for the sifted soil in the April 22, 2008 SOP for Mechanical Soil Sifting, Seaside MRA (ESCA RP 2008e). The amended SOP for Mechanical Soil Sifting, Seaside MRA (included with FVF SEAMRA-007 in Appendix I) was revised to incorporate this change.

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4.0 QUALITY CONTROL AND QUALITY ASSURANCE

QA/QC activities, including QC and FORA independent QA were conducted throughout the project. QC activities were conducted by the UXOQCS. FORA independent QA was conducted by FORA's subcontractors, ERRG and InDepth Corporation. The QC activities and their results are discussed in detail in the following sections. FORA contractor's independent QA report is included in Appendix K.

4.1 Sifting Quality Control Activities

A total of three seeded QC items were introduced to the sifting plant twice daily when material was being sifted, typically in the morning and afternoon to check for proper operation of the sifting plant. The three simulant seeds consisted of the following: 1) a piece of rebar that was 1/2 inch in diameter and 12 inches long; 2) an inert 57mm projectile; and 3) a pipe that was 2 inches in diameter and 5 inches long. The seeds were introduced by the excavator into the sifting plant grizzly. The sifting plant was turned on for operation, and then inspected for recovery of the seeds. Photographs 4-1 and 4-2 show a UXO Technician placing the seeds into the excavator bucket and the recovery of the seeds in the magnet recovery bin. All three QC seeds were successfully recovered twice daily by the sifting plant throughout the course of sifting operations. QC seed tests were recorded for documentation purposes. QC inspections were documented in a Daily Quality Control Inspection Report – Soil Sifting Operations. Copies of these daily inspection reports are included in Appendix J.

Photograph 4-1 – Placement of QC seeds into excavator bucket for feeding into sifting plant

Photograph 4-2 – View of two QC seeds recovered from the first magnet

4.2 Quality Control of SCA Point Anomaly Excavations

Following the excavation of the SCA point anomalies by the intrusive team, the QC team checked each of the SCA point anomaly excavations to ensure that the sources of the anomalies were satisfactorily removed. The area within at least a 3-foot radius of each excavated anomaly was inspected with the same analog instrument type used for the initial survey. If it was determined that the source of the anomaly had not been removed, the intrusive operation at that location was considered as "failed," and the location was reinvestigated by the intrusive team. The discovery of any UXO or UXO-like item sufficient in size to represent a 37mm projectile or larger constituted a failure of the SCA being investigated.

Following the initial excavation, the QC check of each of the 423 SCA points located outside the roadway alignment and utility corridor resulted in no SCA points requiring re-excavation.

4.3 Quality Control Digital Geophysical Mapping

QC activities conducted during the DGM surveys included equipment function tests, QC seeding, and QC of anomaly excavations.

4.3.1 DGM Instrument Function Testing

QC function checks were performed following the instrument operating manual and standard industry practices. Static background, static spike, and vibration/cable connection tests were performed daily before and after surveying in accordance with the USACE DID FPRI 005-05A, Geophysical Prove-Out Plan and Report to determine whether the equipment was functioning properly throughout the day. The EM61-MK2 was tested at a designated quality control area. The results for all function tests performed during the DGM surveys are provided in Appendix D.

4.3.1.1 Static Background

The static background tests consisted of collecting EM data at a “quiet” area for a period of 3 minutes. The static test enabled the operator(s) to see if any fluctuations in the data were occurring in real-time.

4.3.1.2 Static Spike

Static spike tests for the EM were performed with 6-inch rebar spikes set immediately beneath the center point of the coil. Data were collected for a period of 3 minutes, enabling the operator to monitor the instruments response to the spike object and any potential real-time fluctuations in the data.

4.3.1.3 Vibration/Cable Test

The vibration/cable test was performed to measure any effect of moving the cables during data collection. The cable test does not have a time limit associated with it, but allowed the operator to verify that all the connections were in good condition and were operating as designed.

4.3.1.4 Repeatability Lines

Repeatability lines were performed for the EM instrument to verify the repeatability of results. The repeat lines are displayed as graphical outputs of the sensor amplitude and navigational tracks. The acceptable limits for these tests were a repeatability of response amplitude +/-20% and a positional accuracy of 0.65 foot. Results for repeatability of response amplitude and positional accuracy were within these metrics. The results for these tests are presented in Appendix D.

4.3.1.5 Instrument Function Testing Results

Statistical evaluation of the static background, static spike, and cable connection tests indicated acceptable noise levels. Acceptable noise levels are defined as variability from the mean noise reading of less than 2 standard deviations in magnitude. EM61-MK2 instrument function tests all showed acceptable values with respect to established metrics. The EM61-MK2 instrumentation also showed good agreement throughout the life of the project.

4.3.2 Instrument Latency

To determine temporal lags inherent to the EM61-MK2 towed-array, a bidirectional navigation test was performed during the instrument function testing. The test was set up at a consistent latency QC station and consisted of traversing a known cloverleaf test lane with a fixed piece of rebar at the cross point. These tests allowed the processing geophysicist to determine the appropriate time corrections needed to accurately position the collected data. In addition to identifying instrument latency effects, the cross-point test quantified navigational accuracy based on operator ability and geophysical data results. Latency results can be found on the processing notes, and maps are provided in Appendix D.

4.3.3 Navigational Accuracy

The RTK GPS base station was set up over a previously established control point with the supplied X and Y coordinates to third-order accuracy. The base station then provided corrected data to the rover unit mounted above each geophysical sensor or array with centimeter accuracy. Geophysical data were collected over known locations (rebar/grid corners) at the latency QC station during the surveys (pre- and post-daily) to validate navigational precision and target selection. The navigational DQO for the project (1 foot) was achieved, and documented examples are shown in the processing notes in Appendix D (this navigational DQO is different from the Reacquisition DQO offset of 2 feet). The 1-foot DQO relates strictly to the navigational system itself. It is independent of additional/cumulative “offsets” that may propagate when the geophysical sensors and the processing/target picking are considered.

4.3.4 QC Seeding for Geophysical Operations

QC seed items were used in the field during geophysical operations. Known QC seed items were used to quantify the positional accuracy of each dataset. The geophysicists were aware of the location of the known QC seed items throughout the DGM survey and data processing activities. In addition, blind QC items were placed in various locations throughout the MRA where geophysical operations occurred. The locations of the blind seed items were not known to the geophysicists or UXO Technicians during the DGM survey or data processing activities. Figures 4-1 through 4-4 show the locations of blind seed items.

4.3.4.1 Known Seed Items

Known QC seed items were used in the field during the geophysical data collection to quantify positional accuracy of each dataset. The QC seed items consisted of 6-inch rebar spikes or equivalent inserted vertically at a surveyed location within each SCA polygon where DGM surveys were conducted.

The digital anomaly response from the QC item was identified during data processing and analysis. Each seed item was reviewed to quantify positional accuracy by measuring the distance from the anomaly target location to the actual geo-referenced location of the rebar spike recorded during the survey. The measured offset was logged for each dataset in the geophysical processing form spreadsheet.

A total of 89 known QC seed items were placed within the SCAs located outside the roadway alignment and utility corridor. The 89 known QC seed items were recovered during the DGM survey and excavated within the DQO metrics (2 feet from their original surveyed location). Detection results of each QC seed item are detailed in Table 4-1. The minimum offset was 0.00 foot and the maximum was 2.00 feet. The average offset for the group was 0.23 foot.

These values reflect the high level of accuracy achieved for the navigation, detection, and anomaly selection processes over the duration of the field effort.

4.3.4.2 Blind Seed Items

Blind seed items were placed in SCAs throughout MRS-15SEA.1-4. A total of 19 blind seeds were placed in SCAs outside the roadway alignment and utility corridor. The UXOQCS in consultation with the Remediation Project Manager and Project QA Representative determined the locations of the blind seed items.

The seeds were placed using a survey-grade GPS. The blind seeds consisted of a 1 1/2-inch by 5-inch pipe, to simulate a 37mm projectile. Each seed was painted and a laminated UXOQCS business card including a control number (e.g., ESCA-SEA-019) was zip tied to the pipe for identification. UXO Technicians were shown the blind seed items so they could positively identify a seed, if excavated. Photograph 4-3 shows a recovered blind QC seed item.

The seeds were buried at a depth interval between 6 and 12 inches, which is within the geophysical limits of 100% probability of detection of 16.06 inches for a 37mm projectile. The location of the seed items was not known to the on-site project personnel. QC and QA personnel reviewed the DGM data against the seed locations. The blind seeds placed in SCAs outside the roadway alignment and utility corridor were detected within the reacquisition metric identified in the Geophysical Test Plot Report. Detection results of each QC seed item are detailed in Table 4-1. The minimum offset was 0.00 foot and the maximum was 1.00 foot. The average offset for the group was 0.32 foot. These values were consistent with the known seed results and reflect the high level of accuracy achieved for the navigation, detection, and anomaly selection processes over the duration of the field effort.

Photograph 4-3 – View of recovered blind QC seed item in a DGM anomaly location

4.3.5 QC Review of DGM Data and Deliverables

QC review of geophysical data and data deliverables was performed by WESTON and included checks and reviews of the field forms and digital data.

4.3.6 Geophysical QC Surveys

After completion of the initial geophysical survey, reacquisition, and excavation of anomalies, geophysical QC surveys were conducted in the SCAs where digital geophysical data were collected. These surveys consisted of:

QC-1: Verify anomaly removal at each anomaly selected for excavation

QC-2: Resurvey a percentage of each SCA and excavate selected anomalies

QC-3: Conduct analog survey of at least 10% of the SCAs

4.3.6.1 QC-1

Following the excavation of the anomalies by the intrusive team, the geophysical QC team checked each of the excavations to ensure that the source(s) of the anomalies was satisfactorily removed. The area within at least a 3-foot radius of each excavated anomaly was inspected with the same instrument type used for the initial survey, and the maximum amplitude response in the area was recorded and checked against the original anomaly amplitude. If it was determined that the source of the digital anomaly had not been removed, the intrusive operation at that location would have been considered as “failed” and the location would be reinvestigated by the intrusive team.

Following the initial excavation, the QC-1 check of each of the 4,962 targets resulted in zero targets requiring re-excavation. This is attributed to the following actions:

- UXO Dig Teams had access to geophysical instruments to verify completion of excavations prior to the QC-1 check.
- UXO Dig Teams were diligent to verify “no contacts” prior to the QC-1 check.
- Scraping the surface of the SCA polygons prior to DGM surveys reduced the clutter that could have masked anomalies.
- Maintaining a very low target selection threshold resulted in a greater number of anomalies excavated than if the threshold had been higher.

4.3.6.2 QC-2

The QC-2 process provided in the SSWP Addendum was revised through a field variance dated July 28, 2008, and approved on July 30, 2008 (Appendix I, FVFSEA-006). QC-2 resurvey requirements for small and large SCAs are defined in Section 3.13.6 of this TIP. In total, 103 small SCA polygons (defined as being less than or equal to 1,000 square feet in size) were identified on the Seaside MRA (both inside and outside the roadway alignment and utility corridor) and a total of 33 of these small SCA polygons received a DGM QC-2 resurvey equivalent to 32% of the number of small SCAs. Of the 103 small SCA polygons, 70 were identified as being completely or partially outside the roadway alignment and utility corridor. Of the 70 small SCA polygons identified as being completely or partially outside the roadway alignment and utility corridor, DGM surveys were completed over 69 of them for a total area of 0.57 acre. Of the 69 small SCA polygons, 18 received a DGM QC-2 resurvey for a total area of 0.17 acre, equivalent to 30% of the total area of small SCA polygons located completely or partially outside the roadway alignment and utility corridor (for the small SCA polygons that were located partially outside the roadway alignment and utility corridor, some of the QC-2 DGM resurvey was conducted within the portion of the SCA located inside the roadway alignment or utility corridor; therefore, Table 4-2 shows the acreage of DGM QC-2 survey conducted both inside and outside the roadway alignment or utility corridor). A total of 59 large SCA polygons (defined as being greater than 1,000 square feet) were identified as being either partially or completely outside the roadway alignment and utility corridor for a total area of approximately 21.9 acres. For the 59 large SCA polygons, at least 10% of the surface area of the large SCA polygons received a QC-2 DGM resurvey. In many cases, the large SCA polygons received a DGM resurvey over greater than 10% of the surface area. A total of 4.6 acres of the large SCA polygons located outside of the roadway alignment and utility corridor received a DGM resurvey, equivalent to 21% of the total large polygon SCA acreage. Table 4-2 summarizes the QC-2 results for the SCAs located completely or partially outside the roadway alignment and utility corridor. Appendix J includes a table that provides the QC-2 results for all SCA polygons located in the Seaside MRA. Figures 4-5 through 4-8 show the QC-2 DGM areas located outside the roadway alignment and utility corridor.

Of the 75 total SCA polygons surveyed for QC-2, 27 had no targets identified, 30 had five or less targets identified. Eighteen SCA polygons yielded more than five targets with the highest numbers observed in SCA_W048 (98) and SCA_W140 (224). The targets were reinvestigated and identified as small cultural debris items or cultural noise associated with a surface feature. Of the 224 QC-2 targets investigated in SCA_W140, 186 were small cultural debris, much of it associated with pieces of barbed wire, and 38 were no contact or magnetic soils. QC-2 failure criteria for small and large SCAs are defined in Section 3.13.6 of this TIP. There were no MEC detected during the investigation of QC-2 targets in the SCA polygons or portions of polygons located outside the roadway alignment and utility corridor. Table 4-2 shows the SCA polygons, overall acreage, % QC-2 survey, and the number of targets re-investigated located outside of the roadway and utility corridor. Of the QC-2 targets investigated in SCA_W048, five were small MD, 29 were small cultural debris, much of it associated with pieces of scrap metal, and 64 were no contact or magnetic soils. Of the five MD items, four were inert empty casings and one was an inert small projectile, all significantly smaller in size than the 37mm projectile.

During the investigation of QC-2 targets in SCA polygon SCA_W085 located outside of the roadway alignment, two 81mm training mortars (classified as (MD) were recovered constituting a failure based on the QC failure criteria of any item found that is greater than or equal to a 37mm projectile. A root cause analysis of the failure was conducted and it was determined that the failure was the result of the QC-1 operator not following the QC-1 operating procedures. The appropriate corrective actions implemented included reinvestigation of previously identified targets to verify the scenario did not occur during other DGM activities at the Seaside MRA; training of the QC-1 operators to recognize deeper objects using the manual search mode of the EM61-MK2; implementation of QC-1 procedures over the entire excavation footprint following the excavation of a high-density anomaly; providing DGM grid images to the dig teams; and including high-density anomalies or anomalous areas in the QC-2 area selections. These corrective actions were implemented at SCA polygons located both inside and outside of the roadway alignment and utility corridor. The corrective actions conducted inside the roadway alignment and utility corridor were summarized in Corrective Action Report No. SEAMRA-001, which was provided in the Roadway and Utility Corridor TIP. The corrective actions conducted outside the roadway alignment and utility corridor are summarized in Corrective Action Report No. SEAMRA-002 provided in Appendix J of this report.

During investigation of QC-2 targets in SCA polygon SCA_W138 located outside of the roadway alignment, an approximately 50-lb compact ball of wire was recovered constituting a failure based on the QC failure criteria of any item found that is greater than or equal to a 37mm projectile in size. A root cause analysis of the failure was conducted and it was determined that the failure was the result of not collecting all of the metal debris during the soil movement process. The appropriate corrective actions implemented included rechecking 11 locations where debris or soil stockpiles were staged that were later transported to the sift plant location, and implementing procedures to allow a UXO Team to search the footprint of a soil stockpile area following removal of the stockpile. The corrective actions were summarized in Corrective Action Report No. SEAMRA-003 provided in Appendix J of this report.

4.3.6.3 QC-3

To complete the Army's previous investigations, a 10% QC-3 inspection was performed using a Schonstedt magnetometer for all grids (previously defined by the Army) that contained SCA points and all or portions of SCA polygons. In addition, a 10% QC-3 inspection was performed for grids outside the roadway alignment and utility corridor even if the grid did not contain previously identified SCA polygons or points. The discovery of any UXO or UXO-like item sufficient in size to represent a 37mm projectile or larger would have constituted a failure of the SCA being investigated. No MEC, MD, or cultural debris sufficient in size to represent a 37mm projectile was found during the QC-3 survey.

4.3.6.4 Back Check of Anomaly Database

To verify the target response and the database entries, a QC back check of the database was conducted by reinvestigating certain targets. Targets were selected for reinvestigation if their geophysical signatures identified during the DGM data analysis were deemed moderate or large and the target anomaly excavation result was listed in the database as either NC or very small metal items that did not appear to match the signal. A total of 48 targets were selected for reinvestigation and confirmation sampling. No metal debris was found in any of the 48 targets reinvestigated. It was determined that the anomalies were due to magnetic soil and rocks or the proximity of cultural features.

4.4 Quality Control Analog Survey and Excavations

Once the source of the analog anomaly was found and removed, the UXO Technicians rechecked a 3-foot-radius area around the location to determine if other items remained in the subsurface. No MEC, MD, or cultural debris sufficient in size to represent a 37mm projectile was found during the analog QC surveys.

4.5 FORA Independent Quality Assurance

Independent quality assurance was conducted by FORA. FORA used third-party contractors to conduct independent Quality Assurance reviews of the ESCA RP. FORA contractors provided an independent QA report, which is included in Appendix K.

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5.0 REMOVAL ACTION RESULTS

Activities associated with MEC and MD removal outside of the roadway alignment and utility corridor at the Seaside MRA included:

- Site preparation, including brush clearing and asphalt removal
- Sifting approximately 4,500 yd^3 of material generated from SCA soil scraping activities
- Processing of approximately 7,000 yd^3 of oversized material generated from soil sifting operations
- Investigation and removal at SCA point locations
- Investigation and removal at SCA polygon locations

As part of this work, 423 SCA points and 4,962 identified DGM targets located in 129 SCA polygons were investigated during investigation and removal activities.

In total, 16 MEC items, 247 lbs of MD, and more than 21,700 lbs of cultural debris were removed as part of the investigation and removal action activities conducted at the Seaside MRA outside the roadway alignment and utility corridor. Table 5-1 summarizes the 16 MEC items removed from outside the roadway alignment and utility corridor during site preparation activities. Appendix L contains photographs of the MEC items removed during these activities. Figures 5-1 through 5-9 show the locations of the items removed from the Seaside MRA outside the roadway alignment and utility corridor. The results are summarized by activity in Tables 5-1 and 5-2.

The following subsections discuss the Seaside MRA outside the roadway alignment and utility corridor MEC investigation and removal results in greater detail.

5.1 Site Preparation Results

During visual inspection sweeps while conducting site preparation activities, 16 MEC items were encountered and removed. The locations where these items were removed are shown on Figure 5-1. The suspected MEC items were determined to be an acceptable risk to hand-carry a short distance and were moved to the field magazine to await transfer to the Army. Table 5-1 summarizes the 16 MEC items removed from outside the roadway alignment and utility corridor. Appendix L contains photographs of the MEC items removed during these activities.

5.2 Soil Sifting and Oversized Material Results

As described in Section 3.8, the sift plant operations and activities that occurred from April 9, 2008 to July 23, 2008 (excluding reuse of oversized, rejected materials discussed below) were presented in the Roadway and Utility Corridor TIP (ESCA RP Team 2008h) and the results are not included in this report. Sifting operations were resumed on August 15, 2008. From August 15, 2008 to August 28, 2008, approximately 4,500 yd^3 of material from SCA polygons located outside the roadway alignment and utility corridor was sifted. The majority of this material came from SCA_W074 located outside of the roadway alignment.

No MEC and three MD items (totaling approximately 16 lbs) were found during the sifting operations that occurred from August 15, 2008 to August 28, 2008. Table 5-2 summarizes the MD results.

A total of approximately 7,000 yd^3 were separated as oversized material and segregated for additional inspection, crushing, and/or reuse by the Army. The Army used approximately 5,000 yd^3 of the processed oversized material for fire road repairs. As stated earlier, a 40mm M407 A1 practice projectile was found during the Army's use of the material during fire road repairs, which prompted field variance form FVF SEAMRA-007. The 40mm M407 A1 practice projectile was presented in the Roadway and Utility Corridor TIP. No other MEC items were found in the oversized material used by the Army. The remaining roughly 2,000 yd^3 of oversized material was sorted and crushed by SEI. No MEC items were found during SEI's sorting and crushing of the oversized material.

5.3 MEC Removal Action SCA Point Location Results

A total of 423 SCA point anomaly locations were investigated outside the roadway alignment and utility corridor. No MEC was recovered during the SCA point anomaly location removal actions outside the roadway alignment and utility corridor. MD items totaling approximately 16.6 lbs were recovered from five SCA point location excavations. The MD was recovered from SCA points in MRS-15SEA.1 and MRS-15SEA.4 outside the roadway alignment and utility corridor. The MD items found at SCA Point locations consisted of an inert, 40mm M385 practice projectile; inert fragments of a projectile, 4-inch, trench mortar, practice, MK I (Stokes); an inert M205 practice hand grenade fuze; and inert blank ammunition. The remainder of the Seaside SCA point locations outside the roadway alignment and the utility corridor contained cultural debris (417 point locations) or the targets were documented as no contact (56 SCA points). Approximately 3,616 lbs total of cultural debris were collected from the SCA points. The depth of the MD and cultural debris items found ranged from 0 to 48 inches below the ground surface (in some cases point anomalies fell within scrape areas for DGM survey). The results of the point excavations are shown by MRS on Figures 5-2 through 5-5.

5.4 MEC Removal Action SCA Polygon Results

To identify anomalies within the SCA polygons, a DGM survey was conducted over a majority of these areas. Terrain and physical constraints prevented DGM surveys from being completed in certain areas of some SCA polygons. In these areas where a DGM could not be conducted, an analog survey and removal action was completed. The following subsections present the results of these activities.

5.4.1 DGM Anomaly Investigation Results

The anomaly selection process conducted as part of the DGM resulted in a total of 4,962 targets requiring investigation. The geophysicist selected anomaly coordinates and imported the coordinates into the project database. Color contour maps showing the processed digital geophysical data and the 4,962 anomaly locations are included in Appendix E. No MEC items were found during the anomaly investigations within the SCA polygons. A total of approximately 210 lbs of MD were removed. Table 5-2 summarizes the MD removed. Figures 5-6 through 5-9 show the results of the anomaly excavations that occurred within the SCA polygons by MRS.

5.4.1.1 SCA Polygons

A total of 4,962 anomaly locations were identified in the DGM survey and data analysis of the SCA polygons. The UXO Dig Teams investigated the 4,962 anomaly locations within the SCA polygons. Of the 4,962 anomaly locations identified, 4,251 were successfully reacquired, and a total of 711 were recorded as no contact.

The SCA polygon excavations resulted in no items identified as MEC and approximately 209.7 lbs of MD (29 items). An estimated 18,128 lbs of cultural debris were encountered during the investigations, although cultural features were left in place, as discussed in Section 5.6 below, because they were very large or could not be removed. The depths of detection for all the items encountered in the SCA polygons ranged from 0 to 42 inches below ground surface. The depths of these items were recorded after the polygons had been scraped and/or excavated. As discussed in Section 3.7, scraping was conducted to the required depth until minimal anomaly responses were detected by the handheld instruments. Typically, the depth of scraping was approximately 6 inches; however, in some areas scraping extended deeper.

5.4.1.2 Analog Surveys of SCA Polygons Results

As indicated in Section 3.10.6, a number of SCA polygons required analog surveys due to terrain or other constraints preventing the collection of DGM data. A total of 52 detected anomalies were investigated from 37 SCA polygons with terrain-related data gaps. No MEC or MD items were found during the analog surveys conducted in SCA polygons. Cultural debris, however, was recovered during the analog investigations throughout the Seaside MRA. Approximately 1.5 lbs of cultural debris (cable, trash, scrap metal, etc.) were recovered from these SCAs. The remaining 19 SCAs did not have any detectable anomalies.

5.5 Demolition Results

No in-place demolitions for UXO items were conducted during investigation and removal activities in the Seaside MRA outside the roadway alignment and utility corridor.

As indicated in Table 5-1, MEC items recovered during the site preparation activities were transferred to the Army as these items were not associated with SCA removal actions.

Documentation of these transfers is included in the MEC Incident Report Forms provided in Appendix H.

5.6 Left-In-Place Anomaly Locations

There were a number of anomaly locations where the item(s) encountered were left in place. These locations were investigated for the presence of MEC or MD, without removing the obstructions. The UXO Technicians did not encounter MEC or MD items. These items are recorded in the anomaly target database as being left in place. A number of these targets that were identified as metallic soil or rocks and were entered into the database as “hot dirt.” These items were not removed and will not be investigated further.

In a number of other anomaly locations, the item(s) encountered were not removed because the anomaly sources were very large and/or likely the result of existing infrastructure. The removal of the anomaly sources would have required a disruption in utility services or existing infrastructure. Grading activities associated with the construction of the planned roadway alignment and utility corridor will require active UXO construction support for these obstructions. These anomaly locations were logged as cultural debris in the target anomaly database and consist of the following:

- Existing Culverts – Culverts were not removed because they ran underneath the existing GJMB.
- Wooden Communication Poles with Guy Wires – The wooden communications poles are active and are supported by guy wires, which caused interference and these locations could not be surveyed. The communication poles, guy wires, and the cable tie-downs for the guy wires were not removed because their removal would interrupt services to the surrounding area.
- High-Voltage Electrical Transmission Towers – Two high-voltage electrical transmission towers were identified within SCA polygons that completely or partially lie within the roadway alignment. DGM surveys were performed as close as possible to the base of each tower; however, the area directly under the tower did not undergo a DGM survey. The towers were not removed because their removal would interrupt electrical services to the surrounding area.
- Fence Posts – Due to site security issues and the presence of fence posts embedded next to the water treatment plant, one fence post was not removed.
- Monitoring well and survey marker – A groundwater monitoring well and survey marker were not removed because they are considered site infrastructure currently in use.
- Asphalt – Asphalt was left in place because the asphalt was part of an existing road or part of an apron left at gated site entrances, which were kept in place to provide stabilized construction site entrances to minimize erosion and dirt track-out onto the streets.

Anomaly locations are shown in the DGM grid plots provided in Appendix E.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The FORA ESCA RP Team has successfully completed the Seaside MRA Phase II Removal Action for the SCAs (points and polygons) or portions of SCA polygons outside of the roadway alignment and utility corridor. The removal action was completed using BADT in accordance with the Final SSWP Addendum and associated FVFs. The BADT included both analog and digital instruments, which were used to detect subsurface anomalies in the SCAs.

Subsurface anomalies that potentially represented MEC were intrusively investigated and removed from the SCAs or portions of SCAs outside the roadway alignment and utility corridor. The few exceptions where anomalies were left in place included the following features:

- existing metal culverts extending underneath the existing GJMB
- wooden communication poles, associated guy wires, and tie-downs
- high-voltage electrical transmission towers
- monitoring well and survey marker
- fence post near the water treatment facility
- asphalt roadway

These anomaly locations were defined in Section 5.6 as “left in place” because the areas could not be adequately investigated using BADT.

During the investigation and removal actions, all required QC and QA inspections were successfully completed in accordance with the Final SSWP Addendum and associated FVFs. The FORA ESCA RP Team QC and QA approach has resulted in a quality level that is greater than or equivalent to that performed by the Army during previous removal actions. In addition, the removal action activities were overseen by an independent QA professional on behalf of FORA.

In total, the removal action outside the roadway alignment and utility corridor included the following activities:

- 6,944 yd^3 of oversized material was separated by the sift plant operations. Approximately 5,000 yd^3 of the oversized material was reused by the Army for fire road repairs. The remaining 1,944 yd^3 of oversized material was sorted and processed before disposal off site
- 4,962 DGM targets were selected for further investigation
- 4,251 DGM targets were successfully reacquired and intrusively investigated (the remaining 711targets resulted in no contacts)

In total, these activities resulted in the recovery and disposal of the following:

- 16 MEC items that were recovered during site preparation activities

- approximately 247 lbs of MD consisting of more than 89 MD items
- approximately 7,363 lbs of cultural debris

Based upon the results of the removal action, the potential for residual MEC risks to remain within the Seaside MRA has been significantly reduced.

This TIP presents the results for only those portions of the Seaside MRA removal action activities conducted outside the roadway alignment and utility corridor. In addition to being presented in this TIP, the results of the removal action activities conducted outside the roadway alignment will be incorporated into the Group 1 RI/FS report to support a final remedial decision.

Based upon the results of the removal action, no further removal activities are recommended for the Phase II, Seaside Munitions Response Area, Outside Roadway Alignment and Utility Corridor. The Group 1 RI/FS report will evaluate the remaining explosive risks and the work completed at the Seaside MRA. This evaluation will consider the future reuse of the Seaside MRA.

7.0 REFERENCES

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GUIDANCE DOCUMENTS

EP 385-1-95a	U.S. Army Corps of Engineers - Huntsville Center (CEHNC) Safety Concepts and Basic Safety Concepts and Considerations for Munitions and Explosives of Concern (MEC) Response Action Operations
27 CFR 55	Alcohol, Tobacco Products and Firearms
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction
49 CFR 100-199	Hazardous Materials Transportation
AR 190-11	Physical Security
AR 385-10	The Army Safety Program
AR 385-16	System Safety Engineering and Management
AR 385-64	Army Regulation, Ammunition and Explosives Safety Standards
ATF P-5400.7	ATF Explosives Laws and Regulations
DA PAM 385-64	Department of the Army Pamphlet, Ammunition and Explosives Safety Standards
DOD 4145.26-M	U.S. Department of Defense, Contractors' Safety Manual for Ammunition and Explosives
DOD 6055.9-STD	DOD Ammunition and Explosives Safety Standards
EM 385-1-1	USACE Safety and Health Requirements Manual, September 1996
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Table 2-1 Historical Types of MEC Removed

Location	MEC Item	UXO	DMM	Hazard Classification
MRS-15 SEA.1	Cap, blasting, electric, M6	0	4	1
	Cartridge, 40mm, practice, M781	0	20	1
	Fuze, grenade, hand, M10 series	0	86	1
	Fuze, grenade, hand, practice, M205 series	0	2	1
	Fuze, grenade, hand, practice, M228	2	3	1
	Fuze, projectile, combination, M1907	1	0	1
	Fuze, projectile, point detonating, M48 series	1	0	2
	Fuze, trench mortar, point detonating, MK VI	1	0	2
	Grenade, hand, fragmentation, MK II	1	0	3
	Grenade, hand, incendiary, TH3, AN-M14	1	0	1
	Grenade, hand, riot, CS, M7A3	1	0	1
	Grenade, hand, smoke, M18 series	5	0	1
	Ordnance Components	19	0	NS
	Projectile, 22mm, subcaliber, practice, M744	1	0	1
	Projectile, 37mm, low explosive, MK I	3	0	3
	Projectile, 3-inch, trench mortar, practice, MK I (Stokes)	28	0	1
	Projectile, 40mm, parachute, illumination, M583 series	1	0	1
	Projectile, 4-inch, mortar, screening smoke, FM (Stokes)	6	0	3
	Projectile, 4-inch, mortar, smoke, HC (Stokes)	4	0	2
	Projectile, 4-inch, trench mortar, practice, MK I (Stokes)	5	0	1
	Projectile, 4-inch, trench mortar, smoke, white phosphorous, MK I (Stokes)	1	0	3
	Projectile, 75mm, high explosive, MK I	1	0	3
	Projectile, 75mm, Shrapnel, MK I	6	0	3
	Projector, Livens, screening smoke, FM	2	0	3
	Rocket, 35mm, subcaliber, practice, M73	1	0	1
	Signal, ground, rifle, parachute, M17 series	2	0	1
	Signal, illumination, M187	1	0	1
	Simulator, grenade, hand, M116A1	1	0	2
	MRS TOTAL	**95**	**115**	
MRS-15 SEA.2	Bulk, high explosive (model unknown) – 1 pound *	0	0	NS
	Fuze, grenade, hand, M10 series	0	2	1
	Fuze, grenade, hand, practice, M205 series	0	2	1
	Grenade, hand, smoke, M18 series	1	0	1
	Projectile, 3-inch, trench mortar, practice, MK I (Stokes)	6	0	1
	Signal, illumination, ground, M125 series	1	0	2
	MRS TOTAL	**8**	**4**	
MRS-15 SEA.3	Cap, blasting, electric, M6	0	1	1
	Fuze, grenade, hand, M10 series	98	10	1
	Fuze, grenade, hand, practice, M205 series	2	0	1
	Fuze, grenade, hand, practice, M228	0	4	1

Location	MEC Item	UXO	DMM	Hazard Classification
	Grenade, rifle, smoke, M22 series	1	0	1
	Projectile, 37mm, high explosive, MK II	1	0	1
	Projectile, 37mm, low explosive, MK I	1	0	3
	Rocket, 3.5-inch, practice, M29 series	1	0	0
	Rocket, 35mm, subcaliber, practice, M73	2	0	1
	Signal, ground, rifle, parachute, M17 series	1	0	1
	Signal, illumination, ground, M21A1	1	0	1
	MRS TOTAL	**108**	**15**	
MRS-15 SEA.4	Activator, mine, antitank, practice, M1	0	1	1
	Cap, blasting, non-electric, M7	0	1	1
	Cartridge, ignition, M2 series	39	3	1
	Flare, surface, trip, M49 series	3	0	1
	Fuze, grenade, hand, M10 series	2	12	1
	Fuze, grenade, hand, practice, M228	1	11	1
	Fuze, mine, antitank, practice, M604	0	1	1
	Fuze, mine, combination, M6A1	0	1	1
	Fuze, projectile, point detonating, M503 series	1	0	2
	Grenade, hand, fragmentation, MK II	3	0	3
	Grenade, hand, practice, M30	22	0	1
	Grenade, hand, practice, MK II	32	0	1
	Grenade, hand, smoke, M18 series	1	0	1
	Grenade, rifle, smoke, M22 series	15	0	1
	Mine, antitank, practice, M1	1	0	1
	Ordnance Components	7	0	NS
	Pot, 10lb, smoke, HC, screening, M1	3	0	1
	Primer, igniter tube, M57	2	0	1
	Projectile, 3-inch, Hotchkiss	1	0	3
	Projectile, 40mm, high explosive, M386	1	0	3
	Projectile, 57mm, high explosive, M306 series	14	0	3
	Projectile, 60mm, mortar, high explosive, M49 series	2	0	3
	Projectile, 75mm, Shrapnel, MK I	2	0	3
	Projectile, 81mm mortar, high explosive M43 series	1	0	3
	Rocket, 35mm, subcaliber, practice, M73	4	0	1
	Signal, illumination, ground, M125 series	1	0	2
	Simulator, flash artillery, M110	1	0	1
	MRS TOTAL	**159**	**30**	
	SEASIDE MRA TOTAL	**370**	**164**	

Notes:

* = MMRP database identified item as UXO with a quantity of zero.

DMM = discarded military munitions

lb = pound

MEC = munitions and explosives of concern

mm = millimeter

MMRP = Military Munitions Response Program
MRS = Munitions Response Site
NS = not specified
UXO = unexploded ordinance
Reference: Fort Ord MMRP Database

Please note: Munitions descriptions have been taken directly from the Army's MMRP Database and/or other historical documents. Any errors in terminology, filler type, and/or discrepancies between model number and caliber/size are a result of misinformation from the data sources.

Table 3-1
SCA Point Locations Outside Roadway Alignment and Utility Corridor

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
Outside Roadway Alignment				
MRS-15SEA.1	1	A-1	Backhoe Excavation	
	2	A-1	Backhoe Excavation	
	3	A-1	Scrape Area	
	4	A-1	Backhoe Excavation	
	5	A-1	Scrape Area	
	6	A-1	Backhoe Excavation	
	7	A-1	Culvert	
	8	A-1	Backhoe Excavation	
	9	A-1	Backhoe Excavation	
	10	A-2	Asphalt / Concrete	
	11	A-2	Asphalt / Concrete	
	12	A-2	Asphalt / Concrete	
	13	A-2	Asphalt / Concrete	
	14	A-2	Asphalt / Concrete	
	15	A-2	Culvert	Inside SCA

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
				Polygon W140
	16	A-9	Scrape Area	
	17	A-3	Flag Poles/Utility Poles	
	18	A-3	Flag Poles/Utility Poles	
	19	A-3	Buried Cable / Wire	
	20	A-3	Flag Poles/Utility Poles	
	21	A-4	Asphalt / Concrete	Inside SCA Polygon W024
	22	A-4	Concrete bunker	
	23	A-4	Concrete bunker	
	24	A-4	Concrete bunker	Inside SCA Polygon W024
	25	A-4	Concrete bunker	Inside SCA Polygon W024
	26	A-4	Asphalt / Concrete	Inside SCA Polygon W024
	27	A-4	Asphalt / Concrete	Inside SCA Polygon W024
	28	A-4	Backhoe Excavation	
	29	A-3	Buried Cable / Wire	
	30	A-3	Scrape Area	

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	31	A-4	Asphalt / Concrete	
	32	A-4	Backhoe Excavation	
	33	A-4	Backhoe Excavation	
	34	A-4	Backhoe Excavation	
	35	A-4	Backhoe Excavation	
	36	A-4	Backhoe Excavation	
	37	A-4	Backhoe Excavation	
	38	A-4	Backhoe Excavation	
	39	A-4	Backhoe Excavation	
	40	A-4	Backhoe Excavation	
	41	A-4	Backhoe Excavation	
	42	A-3	Burial Pit	
	43	A-8	Asphalt / Concrete	
	44	A-5	Asphalt / Concrete	
	45	A-5	Backhoe Excavation	
	46	A-5	Backhoe Excavation	
	47	A-8	Asphalt / Concrete	

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	48	A-8	Asphalt / Concrete	
	49	A-8	Backhoe Excavation	
	50	A-8	Buried Cable / Wire	
	51	A-8	Grounding Rod	Same location as Point SCA 52
	52	A-8	Grounding Rod	Same location as Point SCA 51
	53	A-8	Scrape Area	
	54	A-5	Asphalt / Concrete	
	55	A-5	Asphalt / Concrete	
	56	A-6	Asphalt / Concrete	Same location as Point SCA 60
	57	A-6	Asphalt / Concrete	Same location as Point SCA 61
	58	A-6	Asphalt / Concrete	Same location as Point SCA 63
	59	A-6	Asphalt / Concrete	Same location as Point SCA 64
	60	A-6	Berm	Same location as Point SCA 56
	61	A-6	Berm	Same location as Point SCA 57

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	62	A-6	Berm	
	63	A-6	Berm	Same location as Point SCA 58
	64	A-6	Berm	Same location as Point SCA 59
	65	A-6	Berm	
	66	A-6	Berm	
	67	A-5	Berm	Inside SCA Polygon W037
	68	A-5	Berm	Inside SCA Polygon W037
	69	A-5	Berm	Inside SCA Polygon W037
	70	A-5	Berm	Inside SCA Polygon W037
	71	A-5	Berm	Inside SCA Polygon W037
	72	A-6	Berm	
	73	A-6	Berm	
	74	A-5	Berm	Inside SCA Polygon W037
	75	A-5	Berm	Inside SCA Polygon W037

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	76	A-5	Berm	Inside SCA Polygon W037
	77	A-5	Berm	Inside SCA Polygon W037
	78	A-6	Berm	
	79	A-5	Berm	Inside SCA Polygon W037
	80	A-5	Berm	Inside SCA Polygon W037
	81	A-5	Scrape Area	Inside SCA Polygon W037
	82	A-6	Asphalt / Concrete	
	83	A-6	Asphalt / Concrete	
	84	A-6	Asphalt / Concrete	
	85	A-6	Asphalt / Concrete	
	86	A-6	Asphalt / Concrete	
	87	A-6	Asphalt / Concrete	Inside SCA Polygon W022
	88	A-6	Asphalt / Concrete	Inside SCA Polygon W022
	89	A-6	Asphalt / Concrete	
	90	A-6	Asphalt / Concrete	

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	91	A-6	Asphalt / Concrete	
	92	A-6	Asphalt / Concrete	
	93	A-6	Asphalt / Concrete	
	94	A-6	Asphalt / Concrete	Same location as Point SCA 95
	95	A-6	Berm	Same location as Point SCA 94
	96	A-6	Berm	
	97	A-6	Berm	Inside SCA Polygon W022
	98	A-6	Buried Cable / Wire	
	99	A-6	Buried Cable / Wire	Inside SCA Polygon W021
	100	A-6	Buried Cable / Wire	
	101	A-6	Buried Cable / Wire	
	102	A-6	Buried Cable / Wire	
	103	A-6	Buried Cable / Wire	
	104	A-6	Buried Cable / Wire	
	105	A-6	Buried Cable / Wire	
	106	A-6	Buried Cable / Wire	

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	107	A-5		
	108	A-6	Asphalt / Concrete	Inside SCA Polygon W037
	109	A-6	Asphalt / Concrete	Inside SCA Polygon W037
	110	A-6	Garbage Pile	Inside SCA Polygon W037
	111	A-5	Grounding Rod	
	112	A-6	Range Structure	Inside SCA Polygon W037
	113	A-6	Range Structure	Inside SCA Polygon W037
	114	A-6	Range Structure	Inside SCA Polygon W037
	115	A-6	Range Structure	Inside SCA Polygon W037
	116	A-6	Range Structure	Inside SCA Polygon W037
	117	A-6	Range Structure	Inside SCA Polygon W037
	118	A-6	Range Structure	Inside SCA Polygon W037
	119	A-6	Range Structure	Inside SCA Polygon W037

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	120	A-6	Range Structure	Inside SCA Polygon W037
	121	A-6	Range Structure	Inside SCA Polygon W037
	122	A-6	Range Structure	Inside SCA Polygon W037
	123	A-6	Range Structure	
	124	A-5	Scrape Area	Inside SCA Polygon W037
	125	A-5	Scrape Area	Inside SCA Polygon W037
	126	A-5	Scrape Area	Inside SCA Polygon W037
	127	A-5	Scrape Area	Inside SCA Polygon W037
	128	A-6	Asphalt / Concrete	
	129	A-6	Asphalt / Concrete	
	130	A-6	Asphalt / Concrete	
	131	A-6	Asphalt / Concrete	
	132	A-6	Asphalt / Concrete	
	133	A-6	Asphalt / Concrete	
	134	A-6	Asphalt / Concrete	

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	135	A-6	Backhoe Excavation	
	136	A-6	Backhoe Excavation	
	137	A-6	Buried Cable / Wire	
	138	A-6	Grounding Rod	
	139	A-8	Buried Cable / Wire	
	140	A-7	Asphalt / Concrete	
	141	A-7	Grounding Rod	Inside SCA Polygon W037
	142	A-6	Asphalt / Concrete	Inside SCA Polygon W037
	143	A-6	Asphalt / Concrete	Inside SCA Polygon W037
	144	A-7	Asphalt / Concrete	
	145	A-7	Asphalt / Concrete	
	146	A-7	Asphalt / Concrete	
	147	A-7	Asphalt / Concrete	
	148	A-7	Asphalt / Concrete	
	149	A-7	Asphalt / Concrete	
	150	A-7	Flag Poles/Utility Poles	

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	151	A-7	Survey Marker	
	152	A-6	Buried Cable / Wire	
	161	A-9	Backhoe Excavation	
	162	A-9	Backhoe Excavation	
	163	A-9	Scrape Area	
	164	A-9	Backhoe Excavation	
	168	A-8	Garbage Pile	
	169	A-8	Scrape Area	
	170	A-10	Buried Cable / Wire	
	171	A-10	Scrape Area	
	172	A-10	Scrape Area	
	173	A-10	Scrape Area	
	174	A-10	Scrape Area	
	175	A-10	Culvert	
	176	A-10	Culvert	
	177	A-11	Asphalt / Concrete	Inside SCA Polygon W134
	178	A-11	Asphalt / Concrete	Inside SCA

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
				Polygon W134
	179	A-11	Asphalt / Concrete	Inside SCA Polygon W134
	180	A-11	Backhoe Excavation	Inside SCA Polygon W134
	181	A-11	Backhoe Excavation	Inside SCA Polygon W134
	182	A-11	Backhoe Excavation	Inside SCA Polygon W134
	183	A-11	Backhoe Excavation	Inside SCA Polygon W134
	184	A-11	Backhoe Excavation	Inside SCA Polygon W134
	185	A-11	Backhoe Excavation	Inside SCA Polygon W134
	186	A-11	Backhoe Excavation	Inside SCA Polygon W134
	187	A-11	Backhoe Excavation	Inside SCA Polygon W134
	188	A-11	Backhoe Excavation	Inside SCA Polygon W134
	189	A-11	Backhoe Excavation	Inside SCA Polygon W134
	190	A-11	Flag Poles/Utility Poles	Inside SCA Polygon W134

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	191	A-11	Flag Poles/Utility Poles	
	192	A-11	Asphalt / Concrete	
	193	A-11	Backhoe Excavation	
	195	A-11	Backhoe Excavation	
	196	A-11	Backhoe Excavation	
	197	A-11	Backhoe Excavation	
	198	A-11	Backhoe Excavation	
	199	A-11	Backhoe Excavation	
	200	A-11	Backhoe Excavation	
	201	A-11	Scrap metal	
	202	A-11	Asphalt / Concrete	
	203	A-11	Asphalt / Concrete	
	204	A-11	Asphalt / Concrete	
	205	A-11	Asphalt / Concrete	
	206	A-12	Backhoe Excavation	
	210	A-13	Flag Poles/Utility Poles	Inside SCA Polygon W005
	211	A-12	Backhoe Excavation	

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	212	A-12	Backhoe Excavation	
	213	A-13	Field Latrine	Inside SCA Polygon W005
	214	A-13	Scrape Area	
	215	A-13	Scrape Area	
	216	A-14	Buried Cable / Wire	Inside SCA Polygon W005
	217	A-14	Asphalt / Concrete	
	218	A-14	Asphalt / Concrete	
	219	A-14	Asphalt / Concrete	
	220	A-14	Asphalt / Concrete	
	221	A-14	Asphalt / Concrete	
	222	A-14	Asphalt / Concrete	
	223	A-14	Asphalt / Concrete	
	224	A-14	Asphalt / Concrete	
	225	A-14	Asphalt / Concrete	
	226	A-14	Asphalt / Concrete	Inside SCA Polygon W005
	227	A-14	Asphalt / Concrete	Inside SCA Polygon W005

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	228	A-14	Asphalt / Concrete	Inside SCA Polygon W005
	229	A-14	Asphalt / Concrete	Inside SCA Polygon W005
	230	A-14	Asphalt / Concrete	Inside SCA Polygon W005
	231	A-14	Asphalt / Concrete	Inside SCA Polygon W005
	232	A-14	Asphalt / Concrete	Inside SCA Polygon W005
	233	A-14	Asphalt / Concrete	
	234	A-14	Asphalt / Concrete	
	235	A-14	Asphalt / Concrete	
	236	A-14	Asphalt / Concrete	
	237	A-14	Asphalt / Concrete	
	238	A-14	Asphalt / Concrete	Inside SCA Polygon W005
	239	A-14	Asphalt / Concrete	Inside SCA Polygon W005
	240	A-14	Asphalt / Concrete	
	241	A-14	Asphalt / Concrete	Inside SCA Polygon W005

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	242	A-14	Asphalt / Concrete	Inside SCA Polygon W005
	243	A-14	Asphalt / Concrete	Inside SCA Polygon W005
	244	A-14	Asphalt / Concrete	Inside SCA Polygon W005
	245	A-14	Asphalt / Concrete	Inside SCA Polygon W005
MRS-15SEA.2	249	A-15	Garbage Pile	
	250	A-15	Asphalt / Concrete	
	251	A-15	Asphalt / Concrete	
	252	A-15	Buried Cable / Wire	
	253	A-15	Buried Cable / Wire	
	254	A-15	Retaining wall	
	255	A-15	Retaining wall	
	256	A-15	Retaining wall	
	257	A-15	Backhoe Excavation	
	258	A-15	Backhoe Excavation	
	261	A-15	Retaining wall	Inside SCA Polygon W160

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	262	A-15	Retaining wall	Inside SCA Polygon W160
	265	A-15	Flag Poles/Utility Poles	Inside SCA Polygon W160
	266	A-15	Retaining wall	Inside SCA Polygon W160
	267	A-15	Buried Cable / Wire	
	268	A-15	Field Latrine	Same location as Point SCA 273
	270	A-15	Flag Poles/Utility Poles	
	273	A-15	Field Latrine	Same location as Point SCA 268
	274	A-15	Retaining wall	Inside SCA Polygon W160
	275	A-15	Asphalt / Concrete	Inside SCA Polygon W160
	276	A-15	Buried Cable / Wire	
	277	A-15	Culvert	
	282	A-15	Backhoe Excavation	Inside SCA Polygon W048
	285	A-15	Culvert	Inside SCA Polygon W140
	297	A-16	Backhoe Excavation	

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	298	A-16	Backhoe Excavation	
	300	A-16	Buried Cable / Wire	
	301	A-16	Garbage Pile	Inside SCA Polygon W010
	302	A-16	Backhoe Excavation	
	303	A-16	Garbage Pile	
	305	A-16	Buried Cable / Wire	
	306	A-16	Buried Cable / Wire	
	307	A-16	Buried Cable / Wire	
	533	A-16	Buried Cable / Wire	
	534	A-16	Buried Cable / Wire	
MRS-15SEA.3	309	A-16	Buried Cable / Wire	
	310	A-16	Buried Cable / Wire	
	311	A-16	Backhoe Excavation	
	312	A-16	Backhoe Excavation	
	313	A-16	Backhoe Excavation	
	314	A-16	Backhoe Excavation	
	315	A-16	Backhoe Excavation	

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	316	A-16	Backhoe Excavation	
	335	A-18	Backhoe Excavation	
	347	A-17	Scrape Area	
	348	A-17	Scrape Area	
	349	A-17	Scrape Area	
	350	A-17	Scrape Area	
	351	A-17	Scrape Area	
	352	A-17	Scrape Area	
	353	A-17	Scrape Area	
	354	A-17	Scrape Area	
	355	A-17	Scrape Area	
	356	A-17	Scrape Area	
	357	A-17	Scrape Area	
	358	A-17	Scrape Area	
	359	A-17	Scrape Area	
	360	A-17	Scrape Area	
	361	A-17	Scrape Area	

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	362	A-17	Scrape Area	
	363	A-18	Buried Cable / Wire	
	364	A-18	Buried Cable / Wire	
	365	A-18	Buried Cable / Wire	
	366	A-18	Buried Cable / Wire	
	367	A-18	Buried Cable / Wire	
	368	A-18	Buried Cable / Wire	
	369	A-18	Buried Cable / Wire	
	370	A-18	Buried Cable / Wire	
	371	A-18	Buried Cable / Wire	
	372	A-18	Asphalt / Concrete	
	373	A-18	Buried Cable / Wire	
	374	A-18	Buried Cable / Wire	
MRS-15SEA.4	377	A-19	Buried Cable / Wire	
	378	A-19	Buried Cable / Wire	
	379	A-19	Asphalt / Concrete	
	380	A-19	Wooden stairs	

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	381	A-19	Asphalt / Concrete	
	382	A-19	Wood	
	383	A-19	Backhoe Excavation	
	385	A-20	Burial Pit	
	386	A-20	Asphalt / Concrete	
	387	A-20	Buried Cable / Wire	
	388	A-20	Buried Cable / Wire	
	389	A-20	Fighting Position	
	390	A-20	Asphalt / Concrete	
	391	A-20	Backhoe Excavation	
	392	A-20	Backhoe Excavation	
	393	A-20	Fighting Position	
	394	A-20	Backhoe Excavation	
	395	A-20	Backhoe Excavation	
	396	A-20	Buried Cable / Wire	
	401	A-20	Backhoe Excavation	
	402	A-20	Garbage Pile	

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	403	A-20	Scrape Area	
	404	A-20	Burial Pit	
	405	A-20	Flag Poles/Utility Poles	
	406	A-20	Flag Poles/Utility Poles	
	407	A-20	Grounding Rod	
	408	A-20	Asphalt / Concrete	
	409	A-20	Asphalt / Concrete	
	410	A-20	Fighting Position	
	411	A-21	Buried Cable / Wire	
	412	A-21	Buried Cable / Wire	
	413	A-21	Buried Cable / Wire	
	414	A-21	Buried Cable / Wire	
	415	A-21	Buried Cable / Wire	
	416	A-21	Buried Cable / Wire	
	417	A-21	Buried Cable / Wire	
	418	A-22	Buried Cable / Wire	
	421	A-20	Burial Pit	

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	422	A-20	Burial Pit	
	424	A-20	Culvert	
	425	A-20	Garbage Pile	
	426	A-22	Asphalt / Concrete	
	427	A-22	Banding material	
	428	A-22	Scrap metal	
	429	A-22	Buried Cable / Wire	
	430	A-23	Garbage Pile	
	431	A-23	Scrape Area	
	433	A-22	Burial Pit	
	434	A-22	Buried Cable / Wire	
	436	A-23	Backhoe Excavation	
	440	A-23	Tree w/ Metal Object	
	442	A-23	Scrape Area	
	444	A-23	Backhoe Excavation	
	445	A-23	Backhoe Excavation	
	446	A-23	Burial Pit	

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	450	A-24	Scrape Area	
	451	A-23	Garbage Pile	
	452	A-23	Garbage Pile	
	453	A-24	Scrape Area	
	454	A-24	Scrape Area	
	455	A-24	Scrape Area	
	456	A-24	Scrape Area	
	457	A-24	Scrape Area	
	458	A-24	Scrape Area	
	459	A-24	Scrape Area	
	460	A-24	Scrape Area	
	461	A-24	Buried Cable / Wire	
	465	A-24	Field Latrine	
	466	A-25	Backhoe Excavation	
	469	A-24	Buried Cable / Wire	
	470	A-24	Buried Cable / Wire	
	471	A-24	Scrape Area	

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	472	A-24	Backhoe Excavation	
	473	A-24	Buried Cable / Wire	
	474	A-24	Field Latrine	
	475	A-24	Scrape Area	
	476	A-24	Scrape Area	
	477	A-24	Asphalt / Concrete	Inside SCA Polygon W074
	478	A-25	Buried Cable / Wire	
	479	A-25	Buried Cable / Wire	
	480	A-25	Buried Cable / Wire	
	481	A-25	Buried Cable / Wire	
	482	A-25	Buried Cable / Wire	
	487	A-25	Burial Pit	
	488	A-25	Garbage Pile	
	489	A-25	Scrape Area	
	490	A-25	Scrape Area	
	491	A-25	Buried Cable / Wire	
	492	A-25	Buried Cable / Wire	

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	493	A-25	Scrape Area	
	494	A-25	Scrape Area	
	495	A-25	Scrape Area	
	496	A-25	Scrape Area	
	497	A-25	Scrape Area	
	498	A-25	Scrape Area	
	499	A-25	Scrape Area	
	500	A-25	Scrape Area	
	501	A-26	Burial Pit	
	502	A-26	Field Latrine	Inside SCA Polygon W099
	503	A-26	Scrape Area	
	504	A-26	Scrape Area	
	505	A-26	Target Box / Fighting Position	
	506	A-26	Garbage Pile	
	509	A-27	Backhoe Excavation	
	510	A-27	Buried Cable / Wire	
	511	A-27	Backhoe Excavation	

MRS Location	ESCA RP Team SCA Point ID	Location Map (Appendix A)	SCA Type as Previously Defined by the Army	Notes
	512	A-27	Buried Cable / Wire	
	515	A-27	Buried Cable / Wire	
	518	A-27	Asphalt / Concrete	
	519	A-27	Asphalt / Concrete	
	520	A-27	Asphalt / Concrete	
	524	A-27	Buried Cable / Wire	
	525	A-27	Buried Cable / Wire	
	526	A-27	Buried Cable / Wire	
	527	A-27	Backhoe Excavation	
	528	A-27	Backhoe Excavation	
	529	A-27	Backhoe Excavation	
	530	A-27	Scrape Area	
	531	A-27	Field Latrine	Inside SCA Polygon W119
	532	A-27	Backhoe Excavation	
	535	A-22	Stairs	

Notes:
MRA = Munitions Response Area
MRS = Munitions Response Site
SCA = special case area

Table 3-2
SCA Polygon Locations outside Roadway Alignment and Utility Corridor

MRS Location	ESCA RP Team SCA Polygon ID	Location Map (Appendix B)	Total Polygon Area (sq ft)	Polygon Area Outside Roadway and Utility Corridor (sq ft)	SCA Type as Previously Defined by the Army	Notes
MRS-15SEA.1	SCA_W003	B-1	2,863	367	Towers	High voltage electrical transmission tower in SCA.
	SCA_W004	B-2	1,755	1,755	Data Gap	No Gaps
	SCA_W005	B-2	76,723	66,258	Scrape Area, Data Gap	Analog performed for terrain-related data gap.
	SCA_W016	B-2	13	13	Data Gap	No Gaps
	SCA_W017	B-2	11	11	Data Gap	No Gaps
	SCA_W018	B-1, B-2	50,544	44,486	Asphalt/Concrete, Backhoe Excavation, Data Gap	
	SCA_W019	B-1	107	107	Data Gap	No Gaps
	SCA_W020	B-1	2,711	2,711	Data Gap	Analog performed for terrain-related data gap.
	SCA_W021	B-1	191	191	Data Gap	No Gaps

MRS Location	ESCA RP Team SCA Polygon ID	Location Map (Appendix B)	Total Polygon Area (sq ft)	Polygon Area Outside Roadway and Utility Corridor (sq ft)	SCA Type as Previously Defined by the Army	Notes
	SCA_W022	B-1	140	140	Data Gap	Analog performed for terrain-related data gap.
	SCA_W023	B-1	15	15	Data Gap	No Gaps
	SCA_W024	B-1	724	724	Data Gap	No Gaps
	SCA_W025	B-1	22	22	Data Gap	No Gaps
	SCA_W026	B-1	36	36	Data Gap	No Gaps
	SCA_W027	B-1	11	11	Data Gap	No Gaps
	SCA_W028	B-1	16	16	Data Gap	No Gaps
	SCA_W029	B-1	1,597	1,597	Scrape Area	
	SCA_W030	B-1	1,568	1,568	Backhoe Excavation	Analog performed for terrain-related data gap.
	SCA_W031	B-1	1,008	1,008	Scrape Area	
	SCA_W032	B-1	364	364	Backhoe Excavation	
	SCA_W033	B-1	609	609	Scrape Area	

MRS Location	ESCA RP Team SCA Polygon ID	Location Map (Appendix B)	Total Polygon Area (sq ft)	Polygon Area Outside Roadway and Utility Corridor (sq ft)	SCA Type as Previously Defined by the Army	Notes
	SCA_W035	B-1	9,849	6,947	Asphalt/Concrete, Backhoe Excavation, Towers	High voltage electrical transmission tower in SCA. Analog performed for terrain-related data gap.
	SCA_W036	B-1	2,520	2,520	Reason Undefined	No Gaps
	SCA_W037	B-1	45,050	40,386	Data Gap	Analog performed for terrain-related data gap.
	SCA_W038	B-1	2,659	2,659	Reason Undefined	No Gaps
	SCA_W040	B-2	2,361	2,361		Analog performed for terrain-related data gap.
	SCA_W079	B-1	901	902	Reason Undefined	No Gaps
	SCA_W123	B-1	2,100	760	Towers	High voltage electrical transmission tower in SCA. Analog performed for terrain-related data gap.
	SCA_W124	B-1	2,738	753	Towers	High voltage electrical transmission tower in SCA. Analog performed for terrain-related data gap.

MRS Location	ESCA RP Team SCA Polygon ID	Location Map (Appendix B)	Total Polygon Area (sq ft)	Polygon Area Outside Roadway and Utility Corridor (sq ft)	SCA Type as Previously Defined by the Army	Notes
	SCA_W125	B-2	1,936	1,369	Towers	High voltage electrical transmission tower in SCA. Analog performed for terrain-related data gap.
	SCA_W130	B-1	18,883	12,433	Data Gap	Analog performed for terrain-related data gap.
	SCA_W134	B-2	69,294	66,845	Data Gap	Analog performed for terrain-related data gap.
	SCA_W135	B-1	2,418	908	Reason Undefined	No Gaps
	SCA_W136	B-1	454	454	Reason Undefined	No Gaps
	SCA_W137	B-1	3,265	3,099	Gate	Fence/Gate, Analog performed around fence/gate.
	SCA_W138	B-1	30,233	30,198	Reason Undefined	Failed areas were polygoned and investigated with Corrective Action report procedures
	SCA_W141	B-1	13,020	8,391		Analog performed for terrain-related data gap.
	SCA_W144	B-1	1,834	1,834	Reason Undefined	No Gaps

MRS Location	ESCA RP Team SCA Polygon ID	Location Map (Appendix B)	Total Polygon Area (sq ft)	Polygon Area Outside Roadway and Utility Corridor (sq ft)	SCA Type as Previously Defined by the Army	Notes
	SCA_W146	B-1	2,455	2,455	Data Gap	Analog performed for terrain-related data gap.
	SCA_W147	B-1	25	25	Reason Undefined	No Gaps
	SCA_W148	B-1	872	872	Reason Undefined	No Gaps
	SCA_W149	B-1	48	48	Data Gap	Analog performed for terrain-related data gap.
	SCA_W150	B-1	47	47	Reason Undefined	No Gaps
	SCA_W154	B-1	381	381	Reason Undefined	No Gaps
	SCA_W155	B-1	346	346	Data Gap	Analog performed for terrain-related data gap.
	SCA_W156	B-1	101	101	Reason Undefined	No Gaps
	SCA_W162	B-2	4,715	9	Fence	Fence/Gate, Analog performed around fence/gate.
	SCA_W165	B-1, B-2	8,197	4,691	Asphalt/concrete	Asphalt road not scraped

MRS Location	ESCA RP Team SCA Polygon ID	Location Map (Appendix B)	Total Polygon Area (sq ft)	Polygon Area Outside Roadway and Utility Corridor (sq ft)	SCA Type as Previously Defined by the Army	Notes
MRS-15SEA.2	SCA_W002	B-4	1,611	1,611	Data Gap	Water Treatment Machinery
	SCA_W008	B-4	108	108	Reason Undefined	No Gaps
	SCA_W009	B-4	15	15	Reason Undefined	No Gaps
	SCA_W010	B-4	11,347	11,347	Data Gap	Water Treatment Machinery
	SCA_W011	B-4	426	426	Reason Undefined	No Gaps
	SCA_W041	B-3	406	406	Reason Undefined	No Gaps
	SCA_W042	B-3	466	466	Reason Undefined	No Gaps
	SCA_W044	B-3	1,342	1,342	Reason Undefined	No Gaps
	SCA_W046	B-4	2,301	1,344	Towers	High voltage electrical transmission tower in SCA.
	SCA_W050	B-4	825	825	Reason Undefined	No Gaps
	SCA_W051	B-4	445	445	Reason Undefined	No Gaps
	SCA_W121	B-4	1,222	1,222	Reason Undefined	No Gaps

MRS Location	ESCA RP Team SCA Polygon ID	Location Map (Appendix B)	Total Polygon Area (sq ft)	Polygon Area Outside Roadway and Utility Corridor (sq ft)	SCA Type as Previously Defined by the Army	Notes
	SCA_W126	B-3	1,862	1	Towers	High voltage electrical transmission tower in SCA.
	SCA_W127	B-3	1,511	505	Towers	High voltage electrical transmission tower in SCA.
	SCA_W128	B-3, B-4	1,950	592	Towers	High voltage electrical transmission tower in SCA.
	SCA_W129	B-4	2,697	1,340	Towers	High voltage electrical transmission tower in SCA. Analog performed for terrain-related data gap.
	SCA_W157	B-3, B-4	896	35	Reason Undefined	No Gaps
	SCA_W160	B-3, B-4	134,120	86,419	Data Gap	Analog performed for terrain-related data gap.
	SCA_W161	B-3, B-4	2,869	2,094	Data Gap	Analog performed for terrain-related data gap.
MRS-15SEA.3	SCA_W014	B-4, B-5, B-6	6,820	638	Fence	Fence/Gate, Analog performed around fence/gate.
	SCA_W015	B-4, B-5, B-6	30,380	29,398	Data Gap	Analog performed for terrain-related data gap.

MRS Location	ESCA RP Team SCA Polygon ID	Location Map (Appendix B)	Total Polygon Area (sq ft)	Polygon Area Outside Roadway and Utility Corridor (sq ft)	SCA Type as Previously Defined by the Army	Notes
	SCA_W052	B-4, B-5	3,061	3,061	Reason Undefined	No Gaps
	SCA_W053	B-4, B-5, B-6	406	406	Reason Undefined	No Gaps
	SCA_W054	B-4, B-5, B-6	904	905	Reason Undefined	No Gaps
	SCA_W055	B-4, B-5, B-6	11,960	8,500	Data Gap	Analog performed for terrain-related data gap.
	SCA_W059	B-6	828	262	Reason Undefined	No Gaps
	SCA_W060	B-6, B-7	180	180	Reason Undefined	No Gaps
	SCA_W062	B-6, B-7	1,129	1,129	Data Gap	Analog performed for terrain-related data gap.
	SCA_W063	B-6, B-7	313	313	Reason Undefined	No Gaps
MRS-15SEA.4	SCA_W061	B-6, B-7	2,450	2,450	Reason Undefined	No Gaps
	SCA_W064	B-7	963	963	Reason Undefined	No Gaps
	SCA_W065	B-7	566	566	Reason Undefined	No Gaps
	SCA_W066	B-7	345	342	Data Gap	Analog performed for terrain-related data gap.
	SCA_W069	B-7, B-8	1,020	1,020	Reason Undefined	No Gaps

MRS Location	ESCA RP Team SCA Polygon ID	Location Map (Appendix B)	Total Polygon Area (sq ft)	Polygon Area Outside Roadway and Utility Corridor (sq ft)	SCA Type as Previously Defined by the Army	Notes
	SCA_W070	B-7, B-8	101	102	Data Gap	Analog performed for terrain-related data gap.
	SCA_W071	B-7	438	438	Reason Undefined	No Gaps
	SCA_W072	B-7, B-8	131	131	Reason Undefined	No Gaps
	SCA_W073	B-7, B-8	66	66	Reason Undefined	No Gaps
	SCA_W074	B-7, B-8	111,404	89,783	Reason Undefined	No Gaps
	SCA_W075	B-7, B-8	762	762	Reason Undefined	No Gaps
	SCA_W076	B-7, B-8	157	157	Reason Undefined	No Gaps
	SCA_W077	B-7, B-8	1,189	1,189	Reason Undefined	No Gaps
	SCA_W078	B-8	655	655	Reason Undefined	No Gaps
	SCA_W081	B-8	606	606	Reason Undefined	No Gaps
	SCA_W082	B-8	488	488	Reason Undefined	No Gaps
	SCA_W083	B-8	146	146	Reason Undefined	No Gaps
	SCA_W084	B-8	49	50	Reason Undefined	No Gaps
	SCA_W085	B-8	212	212	Reason Undefined	No Gaps

MRS Location	ESCA RP Team SCA Polygon ID	Location Map (Appendix B)	Total Polygon Area (sq ft)	Polygon Area Outside Roadway and Utility Corridor (sq ft)	SCA Type as Previously Defined by the Army	Notes
	SCA_W086	B-8	182	182	Reason Undefined	No Gaps
	SCA_W087	B-8	19,635	10,578	Data Gap	Analog performed for terrain-related data gap.
	SCA_W088	B-8	135	135	Reason Undefined	No Gaps
	SCA_W089	B-8	541	541	Reason Undefined	No Gaps
	SCA_W092	B-8	283	283	Reason Undefined	No Gaps
	SCA_W093	B-8	196	196	Reason Undefined	No Gaps
	SCA_W094	B-8	352	352	Reason Undefined	No Gaps
	SCA_W095	B-8	541	541	Reason Undefined	No Gaps
	SCA_W096	B-8	309	309	Reason Undefined	No Gaps
	SCA_W097	B-8	390	390	Reason Undefined	No Gaps
	SCA_W098	B-8	587	587	Reason Undefined	No Gaps
	SCA_W099	B-8	175	175	Reason Undefined	No Gaps
	SCA_W100	B-8	4,933	4,933	Reason Undefined	No Gaps
	SCA_W101	B-8	1,193	414	Flag Poles/Utility Poles	

MRS Location	ESCA RP Team SCA Polygon ID	Location Map (Appendix B)	Total Polygon Area (sq ft)	Polygon Area Outside Roadway and Utility Corridor (sq ft)	SCA Type as Previously Defined by the Army	Notes
	SCA_W102	B-8	774	774	Reason Undefined	No Gaps
	SCA_W103	B-8	179	179	Reason Undefined	No Gaps
	SCA_W104	B-8	42	42	Reason Undefined	No Gaps
	SCA_W105	B-8	732	732	Reason Undefined	No Gaps
	SCA_W106	B-8	393	393	Reason Undefined	No Gaps
	SCA_W107	B-8	1,786	1,786	Reason Undefined	No Gaps
	SCA_W108	B-8	1,125	1,125	Reason Undefined	No Gaps
	SCA_W109	B-8	139	139	Data Gap	Analog performed for terrain-related data gap.
	SCA_W111	B-8	16,620	418	Data Gap	Analog performed for terrain-related data gap.
	SCA_W113	B-8	4,652	4,652	Data Gap	Analog performed for terrain-related data gap.
	SCA_W115	B-8	322	322	Reason Undefined	No Gaps
	SCA_W116	B-8	1,839	1,839	Reason Undefined	No Gaps
	SCA_W117	B-8	2,438	2,432	Reason Undefined	No Gaps

MRS Location	ESCA RP Team SCA Polygon ID	Location Map (Appendix B)	Total Polygon Area (sq ft)	Polygon Area Outside Roadway and Utility Corridor (sq ft)	SCA Type as Previously Defined by the Army	Notes
	SCA_W118	B-8	34,370	28,677	Reason Undefined	No Gaps
	SCA_W119	B-8	2,100	1,761	Data Gap	Analog performed for terrain-related data gap.
	SCA_W120	B-8	217	138	Reason Undefined	No Gaps
	SCA_W139	B-6, B-7	900	900	Reason Undefined	No Gaps
MRS-15SEA.1 through MRS-15SEA.4 (crosses multiple MRS boundaries)	SCA_W048	B-1, B-2, B-3, B-4, B-5, B-6	376,946	188,217	Data Gap	Analog performed for terrain-related data gap.
	SCA_W140	B-1, B-2, B-3, B-4, B-5, B-6, B-7, B-8	412,664	178,377	Data Gap	Analog performed for terrain-related data gap.

Notes:
MRA = Munitions Response Area
MRS = Munitions Response Site
SCA = special case area

Table 3-3
EM61-MK2 Data Processing Parameters

Process	Parameter
Drift – Median Drift Correction (UCEDRIFT.GX)	Window Length: 100 Channels 1-4 were processed using the same parameters then were summed to create the Stack channel
Statistical Evaluation of Background Noise	Windowed section of background/using UX-Process QC module evaluated standard deviation, minimum, maximum, mean, mode
Grid	Cell Size: 0.25 feet Blanking Distance: 1.25 feet Search Radius: 2 feet
Blakely Peak Picking Algorithm	Smooth Filter: 3 Normal Peak Detection Grid Value Cutoff: Dependent on each individual Special Case Area ranged from EM- 3.0 milliVolt-14 millivolt
Target Decay Analysis	Performed based on each data channel
Target Review	Performed

Table 4-1
Summary of Known and Blind QC Seed Items for DGM Surveys

Seed ID	ESCA RP Team Location ID	Anomaly ID	Response Amplitude (mV)	Offset from Control (ft)
QC Seed Data (Known Seed IDs and Locations - SCA Polygons)				
SEA1-A24	SCA_W004	12	311.17	0.00
SEA1-A56b	SCA_W005	190	699.07	0.50
SEA1-A56a	SCA_W005	329	501.82	0.50
SEA2-A45	SCA_W011	12	249.87	0.00
SEA3-A23c	SCA_W015	35	325.59	0.00
SEA3-A23b	SCA_W015	94	157.85	0.00
SEA3-A25	SCA_W015	129	315.63	0.00
SEA3-A23a	SCA_W015	300	200.17	0.00
SEA1-A55	SCA_W016	1	234.74	0.50
SEA1-A54	SCA_W017	1	95.59	0.25
SEA1-A52	SCA_W018	6236	21.19	0.33
SEA1-A25	SCA_W029	38	350.96	0.50
SEA1-A20	SCA_W030	15	231.78	0.50
SEA1-A27	SCA_W031	6	291.46	0.00
SEA1-A26	SCA_W032	4	297.06	0.00

Seed ID	ESCA RP Team Location ID	Anomaly ID	Response Amplitude (mV)	Offset from Control (ft)
SEA1-A32	SCA_W033	9	244.16	0.00
SEA1-A4	SCA_W035	39	252.91	0.00
SEA1-A46	SCA_W036	5	248.84	0.50
SEA1-A51	SCA_W038	2	290.04	0.17
SEA2-A30	SCA_W041	9	200.49	0.00
SEA2-A31	SCA_W042	7	236.33	0.00
SEA2-A33	SCA_W044	1	39.01	1.67
SEA2-A42	SCA_W050	1	270.36	0.00
SEA2-A43	SCA_W051	2	214.64	0.00
SEA3-A20	SCA_W052	61	211.51	0.50
SEA3-A22	SCA_W053	2	178.59	0.00
SEA3-A21	SCA_W054	1	276.99	0.50
SEA3-A27	SCA_W060	1	216.80	0.00
SEA4-A74a	SCA_W064	6	174.15	2.00
SEA4-A72	SCA_W065	3	252.45	0.00
SEA4-A73	SCA_W066	5	233.64	0.00
SEA4-A68	SCA_W069	13	281.70	0.00

Seed ID	ESCA RP Team Location ID	Anomaly ID	Response Amplitude (mV)	Offset from Control (ft)
SEA4-A70	SCA_W071	1	118.03	0.00
SEA4-A66c	SCA_W074	4033	400.76	0.00
SEA4-A66b	SCA_W074	4158	377.55	0.00
SEA4-A55	SCA_W078	5	220.98	0.50
SEA4-A53	SCA_W078	8	251.40	0.33
SEA1-A33	SCA_W079	14	276.06	0.00
SEA4-A56	SCA_W082	2	261.06	0.33
SEA4-A57	SCA_W082	4	231.05	0.33
SEA4-A54	SCA_W084	2	199.56	0.33
SEA4-A60	SCA_W087	315	285.84	0.00
SEA4-A49	SCA_W092	3	151.48	0.00
SEA4-A48	SCA_W093	6	145.58	0.00
SEA4-A41	SCA_W094	6	168.12	0.00
SEA4-A51	SCA_W095	9	164.90	0.50
SEA4-A50	SCA_W097	12	34.37	0.00
SEA4-A47	SCA_W098	10	163.24	0.33
SEA4-A43	SCA_W100	44	264.69	0.50

Seed ID	ESCA RP Team Location ID	Anomaly ID	Response Amplitude (mV)	Offset from Control (ft)
SEA4-A43	SCA_W100	68	221.21	0.25
SEA4-A44	SCA_W101	3	280.07	0.50
SEA4-A39	SCA_W102	17	236.78	0.50
SEA4-A38	SCA_W106	1	237.90	0.50
SEA4-A37	SCA_W107	15	258.25	0.00
SEA4-A35	SCA_W108	13	192.68	0.00
SEA4-A34	SCA_W109	2	162.42	0.00
SEA4-A42	SCA_W111	30	304.41	0.50
SEA4-A30	SCA_W113	46	321.20	0.50
SEA4-A28	SCA_W115	2	216.54	0.00
SEA4-A27	SCA_W116	5	207.29	0.00
SEA4-A24	SCA_W117	20	199.14	0.00
SEA4-A26	SCA_W118	295	203.35	0.00
SEA4-A25	SCA_W118	296	348.37	0.83
SEA4-A23	SCA_W118	357	295.25	0.50
SEA4-A1	SCA_W120	1	188.34	0.00
SEA1-A15	SCA_W125	20	303.39	0.50

Seed ID	ESCA RP Team Location ID	Anomaly ID	Response Amplitude (mV)	Offset from Control (ft)
SEA1-A40	SCA_W130	127	236.27	0.17
SEA1-A53b	SCA_W134	209	235.18	0.33
SEA1-A49	SCA_W136	6	287.99	0.00
SEA1-A22b	SCA_W138	26	220.20	0.33
SEA1-A22a	SCA_W138	103	263.99	0.00
SEA4-A74b	SCA_W139	4	183.99	0.00
SEA1-A29	SCA_W146	30	321.09	0.00
SEA1-A23	SCA_W148	4	191.77	0.00
SEA1-A31	SCA_W154	3	187.51	0.00
SEA1-A57	SCA_W156	1	231.88	0.50
SEA2-A32a	SCA_W160	4438	869.36	0.00
SEA2-A32c	SCA_W160	7109	332.93	0.50
SEA2-A32b	SCA_W160	7714	551.85	0.00
SEA2-A35	SCA_W161	29	160.46	0.00
			Offset Statistics (Known Seed Items)	
			Minimum Offset	**0.00**

Seed ID	ESCA RP Team Location ID	Anomaly ID	Response Amplitude (mV)	Offset from Control (ft)
			Maximum Offset	**2.00**
			Average Offset	**0.23**
QC Seed Data (Blind Seed IDs and Locations)				
ESCA-SEA-011	SCA_W005	128	30.14	0.50
ESCA-SEA-010	SCA_W005	336	71.46	0.00
ESCA-SEA-017	SCA_W015	113	44.05	0.00
ESCA-SEA-006	SCA_W036	17	51.78	0.00
ESCA-SEA-009	SCA_W037	135	86.66	1.00
ESCA-SEA-012	SCA_W050	2	33.92	0.00
ESCA-SEA-014	SCA_W052	65	26.32	0.50
ESCA-SEA-013	SCA_W053	3	26.96	0.00
ESCA-SEA-018	SCA_W063	2	40.45	0.50
ESCA-SEA-020	SCA_W074	4083	60.17	0.50
ESCA-SEA-022	SCA_W113	26	27.24	0.83
QC item ESCA -SEA-023 in between 364	SCA_W118	362	25.56	0.67
QC item ESCA -SEA-023 in between 362	SCA_W118	364	25.44	0.67

Seed ID	ESCA RP Team Location ID	Anomaly ID	Response Amplitude (mV)	Offset from Control (ft)
ESCA-SEA-008	SCA_W130	175	35.33	0.00
ESCA-SEA-005	SCA_W134	130	69.07	0.00
ESCA-SEA-007	SCA_W138	146	39.56	0.50
ESCA-SEA-002	SCA_W160	4445	27.45	0.00
ESCA-SEA-004	SCA_W160	7120	78.15	0.00
ESCA-SEA-003	SCA_W160	8079	0.00	0.50
			Offset Statistics Blind Seed Items)	
			Minimum Offset	**0.00**
			Maximum Offset	**1.00**
			Average Offset	**0.32**

Notes:
ESCA RP = Environmental Services Cooperative Agreement Remediation Program
ft = feet
ID = Identification
mV = millivolts
QC = quality control
SCA = Special Case Area

Table 4-2
Summary of QC-2 Survey Results

MRS Location	ESCA RP Team SCA Polygon ID	Polygon Size Designation	Total Polygon Area (acres)	Total QC-2 Survey Area Outside Roadway Alignment and Utility Corridor (acres)	Total QC-2 Survey Area Inside Roadway and Utility Corridor (acres)	Total QC-2 Survey Area (acres)	Total % QC-2	Total No. QC-2 Anomalies Identified	Pass / Fail
MRS-15SEA.1	SCA_W003	Large	0.07	0	0.017	0.017	26%	0	Pass
	SCA_W004	Large	0.04	0.01402	0	0.01402	35%	0	Pass
	SCA_W005	Large	1.76	0.31387	0.081	0.39487	22%	15	Pass
	SCA_W018	Large	1.16	0.15997	0.06723	0.2272	20%	10	Pass
	SCA_W020	Large	0.06	0.01006	0	0.01006	16%	0	Pass
	SCA_W021	Small	0.004	0.00437		0.00437	100%	3	Pass
	SCA_W024	Small	0.017	0.01661		0.01661	100%	19	Pass
	SCA_W029	Large	0.04	0.00786	0	0.00786	21%	1	Pass
	SCA_W030	Large	0.04	0.00919	0	0.00919	26%	0	Pass
	SCA_W031	Large	0.02	0.00603	0	0.00603	26%	0	Pass
	SCA_W032	Small	0.008	0.00836		0.00836	100%	0	Pass
	SCA_W035	Large	0.23	0.03042	0.0139	0.04432	20%	11	Pass
	SCA_W036	Large	0.06	0.01176		0.01176	20%	0	Pass
	SCA_W037	Large	1.03	0.21867	0.01743	0.2361	23%	42	Pass
	SCA_W038	Large	0.06	0.01303		0.01303	21%	0	Pass
	SCA_W040	Large	0.05	Analog Survey Completed. No QC-2 conducted					
	SCA_W079	Small	0.021	0.0207		0.0207	100%	0	Pass
	SCA_W123	Large	0.05	0.00518	0.0089	0.01408	29%	1	Pass
	SCA_W124	Large	0.06	0.00827	0.011	0.01927	31%	0	Pass
	SCA_W125	Large	0.04	0.00735	0.013	0.02035	46%	2	Pass
	SCA_W130	Large	0.43	0.06015	0.04	0.10015	23%	0	Pass

MRS Location	ESCA RP Team SCA Polygon ID	Polygon Size Designation	Total Polygon Area (acres)	Total QC-2 Survey Area Outside Roadway Alignment and Utility Corridor (acres)	Total QC-2 Survey Area Inside Roadway and Utility Corridor (acres)	Total QC-2 Survey Area (acres)	Total % QC-2	Total No. QC-2 Anomalies Identified	Pass / Fail
	SCA_W134	Large	1.59	0.29757	0.0562	0.35377	22%	14	Pass
	SCA_W135	Large	0.06	0.00157	0.00812	0.00969	17%	0	Pass
	SCA_W137	Large	0.07	Analog Survey Completed. No QC-2 conducted					
	SCA_W138	Large	0.69	0.14655	0.0008	0.14735	21%	24	Fail
	SCA_W141	Large	0.30	0.08394	0.068	0.15194	51%	3	Pass
	SCA_W144	Large	0.04	0.00755		0.00755	18%	1	Pass
	SCA_W146	Large	0.06	0.01408		0.01408	25%	1	Pass
	SCA_W162	Large	0.11	0	0.0285	0.0285	26%	0	Pass
	SCA_W165	Large	0.19	Analog Survey Completed. No QC-2 conducted					
MRS-15SEA.2	SCA_W002	Large	0.04	ASR Location. No QC-2 Conducted					
	SCA_W010	Large	0.26	ASR Location. No QC-2 Conducted					
	SCA_W044	Large	0.03	0.00827	0	0.00827	27%	1	Pass
	SCA_W046	Large	0.05	0	0.01493	0.01493	28%	0	Pass
	SCA_W121	Large	0.03	0.00513	0	0.00513	18%	1	Pass
	SCA_W126	Large	0.04	0	0.01675	0.01675	39%	0	Pass
	SCA_W127	Large	0.03	0.00307	0.013	0.01607	46%	0	Pass
	SCA_W128	Large	0.04	0.00436	0.008	0.01236	28%	0	Pass
	SCA_W129	Large	0.06	0.0136	0.02125	0.03485	56%	5	Pass
	SCA_W157	Small	0.021	0.00081	0.0198	0.02061	100%	1	Pass
	SCA_W160	Large	3.08	0.5641	0.3323	0.8964	29%	138	Pass
	SCA_W161	Large	0.07	0.01858	0.0178	0.03638	55%	0	Pass
MRS-15SEA.3	SCA_W014	Large	0.16	0.00053	0.036	0.03653	23%	0	Pass
	SCA_W015	Large	0.70	0.11941	0.0265	0.14591	21%	6	Pass
	SCA_W052	Large	0.07	0.01697	0	0.01697	24%	0	Pass

MRS Location	ESCA RP Team SCA Polygon ID	Polygon Size Designation	Total Polygon Area (acres)	Total QC-2 Survey Area Outside Roadway Alignment and Utility Corridor (acres)	Total QC-2 Survey Area Inside Roadway and Utility Corridor (acres)	Total QC-2 Survey Area (acres)	Total % QC-2	Total No. QC-2 Anomalies Identified	Pass / Fail
	SCA_W055	Large	0.27	0.05215	0.02092	0.07307	27%	8	Pass
	SCA_W062	Large	0.03	0.00366	0	0.00366	14%	1	Pass
MRS-15SEA.4	SCA_W061	Large	0.06	0.01126	0	0.01126	20%	0	Pass
	SCA_W064	Small	0.022	0.0221	0	0.0221	100%	4	Pass
	SCA_W065	Small	0.013	0.013	0	0.013	100%	0	Pass
	SCA_W069	Large	0.02	0.00549	0	0.00549	23%	2	Pass
	SCA_W071	Small	0.010	0.01005	0	0.01005	100%	4	Pass
	SCA_W074	Large	2.56	0.28854	0.054	0.34254	13%	21	Pass
	SCA_W076	Small	0.004	0.0036	0	0.0036	100%	4	Pass
	SCA_W077	Large	0.03	0.00492	0	0.00492	18%	1	Pass
	SCA_W082	Small	0.011	0.0112	0	0.0112	100%	2	Pass
	SCA_W085	Small	0.005	0.00486	0	0.00486	100%	3	Fail
	SCA_W086	Small	0.004	0.00417	0	0.00417	100%	3	Pass
	SCA_W087	Large	0.45	0.04506	0.034	0.07906	18%	6	Pass
	SCA_W092	Small	0.006	0.00649	0	0.00649	100%	1	Pass
	SCA_W094	Small	0.008	0.00807	0	0.00807	100%	5	Pass
	SCA_W100	Large	0.11	0.01955	0	0.01955	17%	10	Pass
	SCA_W101	Large	0.03	0	0.00866	0.00866	32%	0	Pass
	SCA_W103	Small	0.004	0.0041	0	0.0041	100%	1	Pass
	SCA_W107	Large	0.04	0.00715	0	0.00715	17%	0	Pass
	SCA_W108	Large	0.03	0.00393	0	0.00393	15%	0	Pass
	SCA_W109	Small	0.003	0.003	0	0.003	100%	0	Pass
	SCA_W111	Large	0.38	0.00007	0.03645	0.03652	10%	0	Pass
	SCA_W113	Large	0.11	0.01845	0	0.01845	17%	0	Pass

MRS Location	ESCA RP Team SCA Polygon ID	Polygon Size Designation	Total Polygon Area (acres)	Total QC-2 Survey Area Outside Roadway Alignment and Utility Corridor (acres)	Total QC-2 Survey Area Inside Roadway and Utility Corridor (acres)	Total QC-2 Survey Area (acres)	Total % QC-2	Total No. QC-2 Anomalies Identified	Pass / Fail
	SCA_W115	Small	0.007	0.0074	0	0.0074	100%	3	Pass
	SCA_W116	Large	0.04	0.0097	0	0.0097	23%	0	Pass
	SCA_W117	Large	0.06	0.02045	0.00015	0.0206	37%	0	Pass
	SCA_W118	Large	0.79	0.15917	0.1307	0.28987	37%	7	Pass
	SCA_W119	Large	0.05	0.00142	0.0078	0.00922	19%	1	Pass
	SCA_W120	Small	0.005	0.003	0.002	0.005	100%	1	Pass
MRS-15SEA.1 thru .4	SCA_W048	Large	8.65	1.76016	1.009	2.76916	32%	58	Pass
	SCA_W140	Large	9.47	0.02273	1.368	1.39073	15%	2	Pass

Notes:
QC = quality control
MRS = munitions response site
SCA = special case area

Table 5-1
Summary of MEC Results

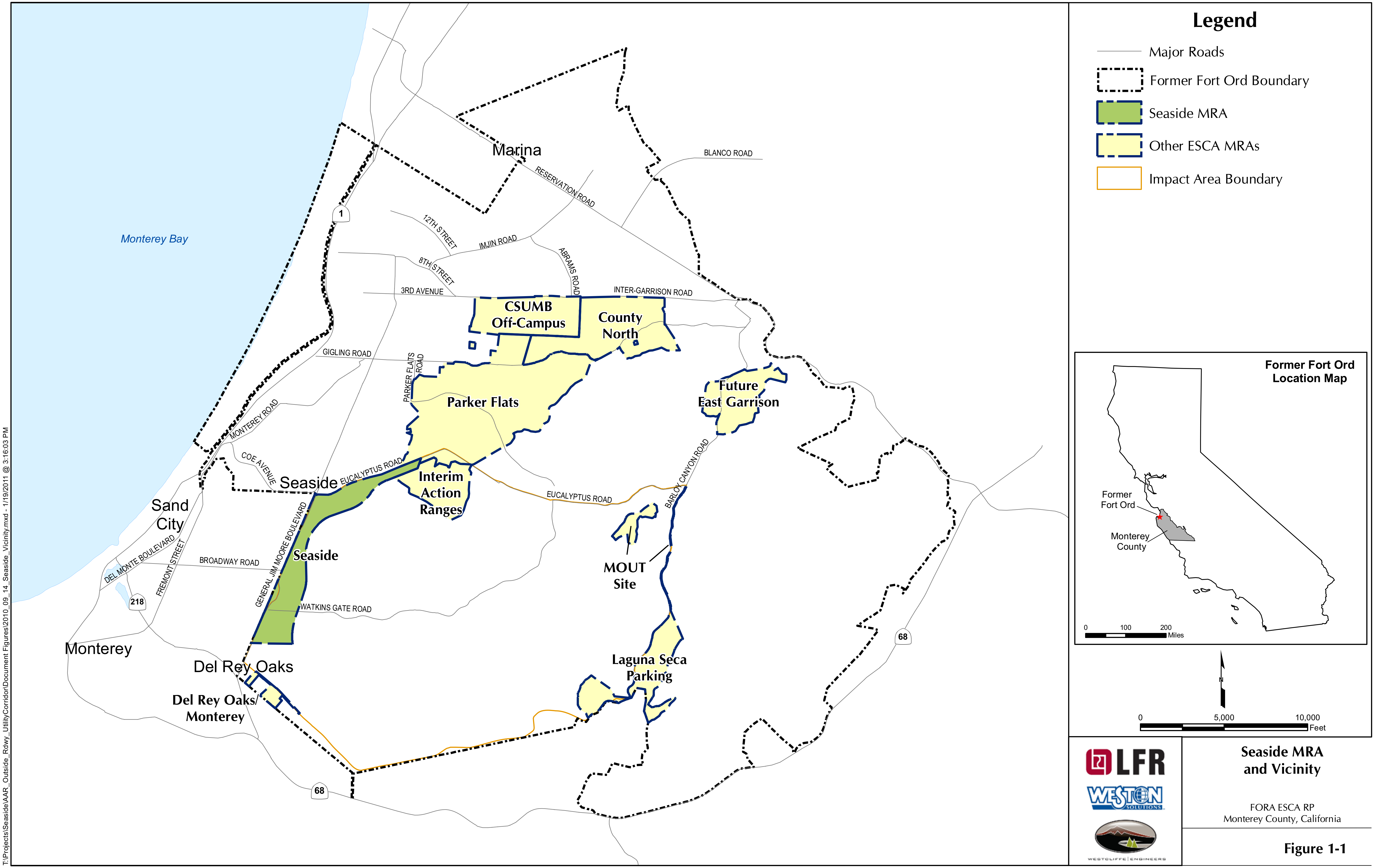
Location	MEC Item	MEC Quantity			Hazard Classification	Date	Status
		UXO	DMM	MC			
Site Preparation Results							
MRS15-SEA.1	Rocket, 2.36inch, practice, M7A3		5		1	4/2/2008	Transferred to the Army
	Rocket, 2.36inch, Heat, M6A3		3		3	4/2/2008	Transferred to the Army
	pot, 2.5lb, smoke, HC, screen, M1		1		1	4/11/2008	Transferred to the Army
	pot, 2.5lb, smoke, HC, screen, M1		5		1	4/18/2008	Transferred to the Army
MRS15-SEA.4	Projectile, 60mm, mortar, HE, M49		1		3	12/18/2007	Transferred to the Army
	Rocket, 2.36inch, practice, M7		1		1	3/5/2008	Transferred to the Army
	Total	**0**	**16**	**0**			

Notes:
MEC = munitions and explosives of concern
UXO = unexploded ordnance
DMM = discarded military munitions
MC = munitions constituents

Table 5-2
Summary of Munitions Debris Results

MRS Location	Item Count	MD Weight	
SCA Point Locations			
MRS15-SEA.1	4	11	lbs
MRS15-SEA.2	0	0	lbs
MRS15-SEA.3	0	0	lbs
MRS15-SEA.4	1	0.1	lbs
Total	**5**	**11.1**	**lbs**
DGM Survey SCA Polygons			
MRS15-SEA.1	11	47.7	lbs
MRS15-SEA.2	1	.1	lbs
MRS15-SEA.3	1	0.1	lbs
MRS15-SEA.4	16	161.8	lbs
Total	**29**	**209.7**	**lbs**
Small Arms/Ammunition found during DGM Surveys			
MRS15-SEA.1	3	0.3	lbs
MRS15-SEA.2	12	0.8	lbs
MRS15-SEA.3	0	0	lbs
MRS15-SEA.4	33	2.6	lbs
Total	**50**	**9.2**	**lbs**
MRA Summary			
MRS15-SEA.1	**18**	**59**	**lbs**
MRS15-SEA.2	**13**	**1.8**	**lbs**
MRS15-SEA.3	**1**	**0.1**	**lbs**
MRS15-SEA.4	**50**	**164.5**	**lbs**
MRA Total	**82**	**225.4**	**lbs**

Notes:
DGM = digital geophysical mapping
lbs = pounds
MD = munitions debris
MRA = Munitions Response Area
MRS = Munitions Response Site
SCA = Special Case Area



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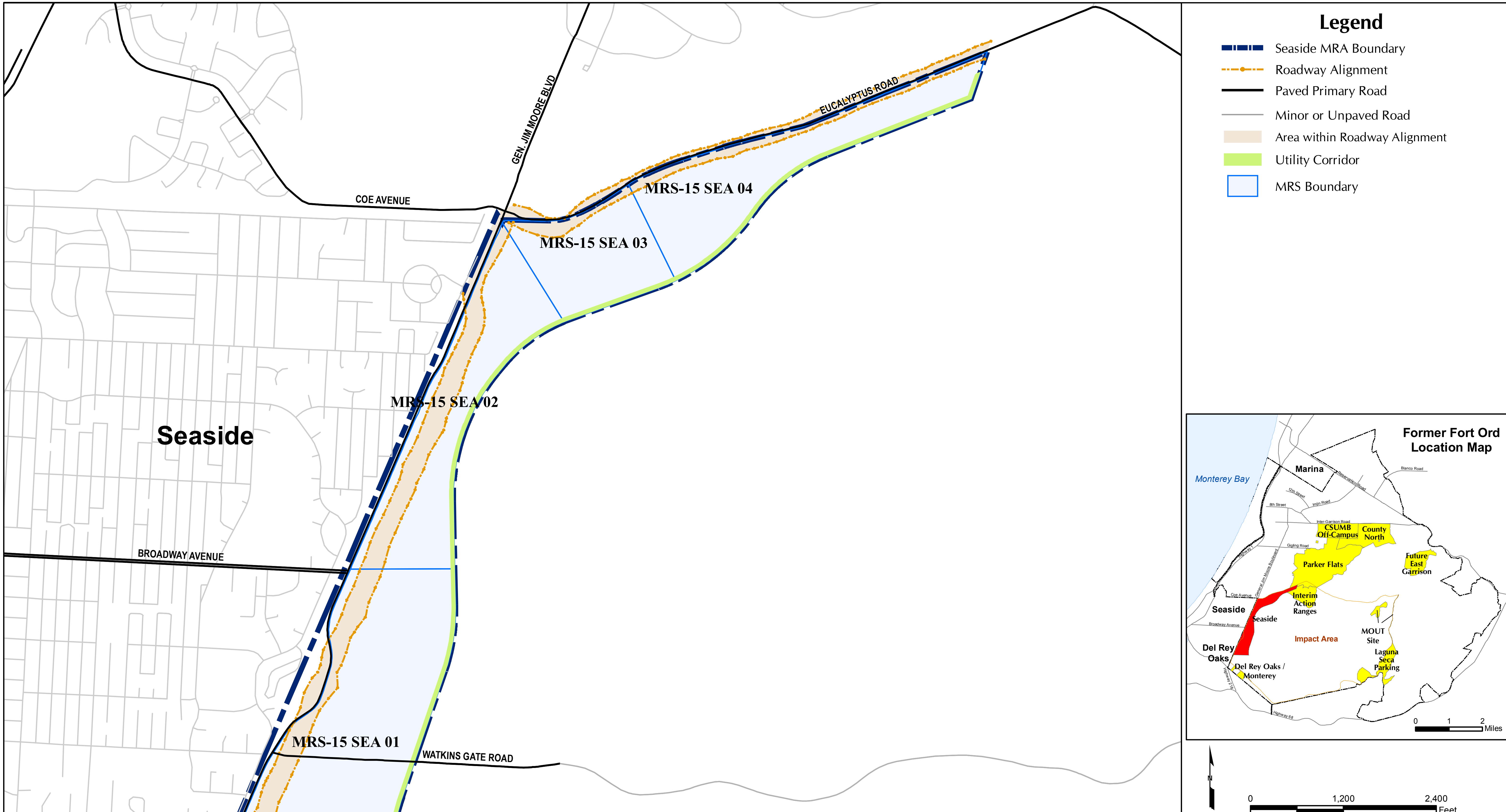
Seaside MRA and Vicinity

FORA ESCA RP
Monterey County, California

Figure 1-1



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Seaside MRA Roadway Alignment and Utility Corridor

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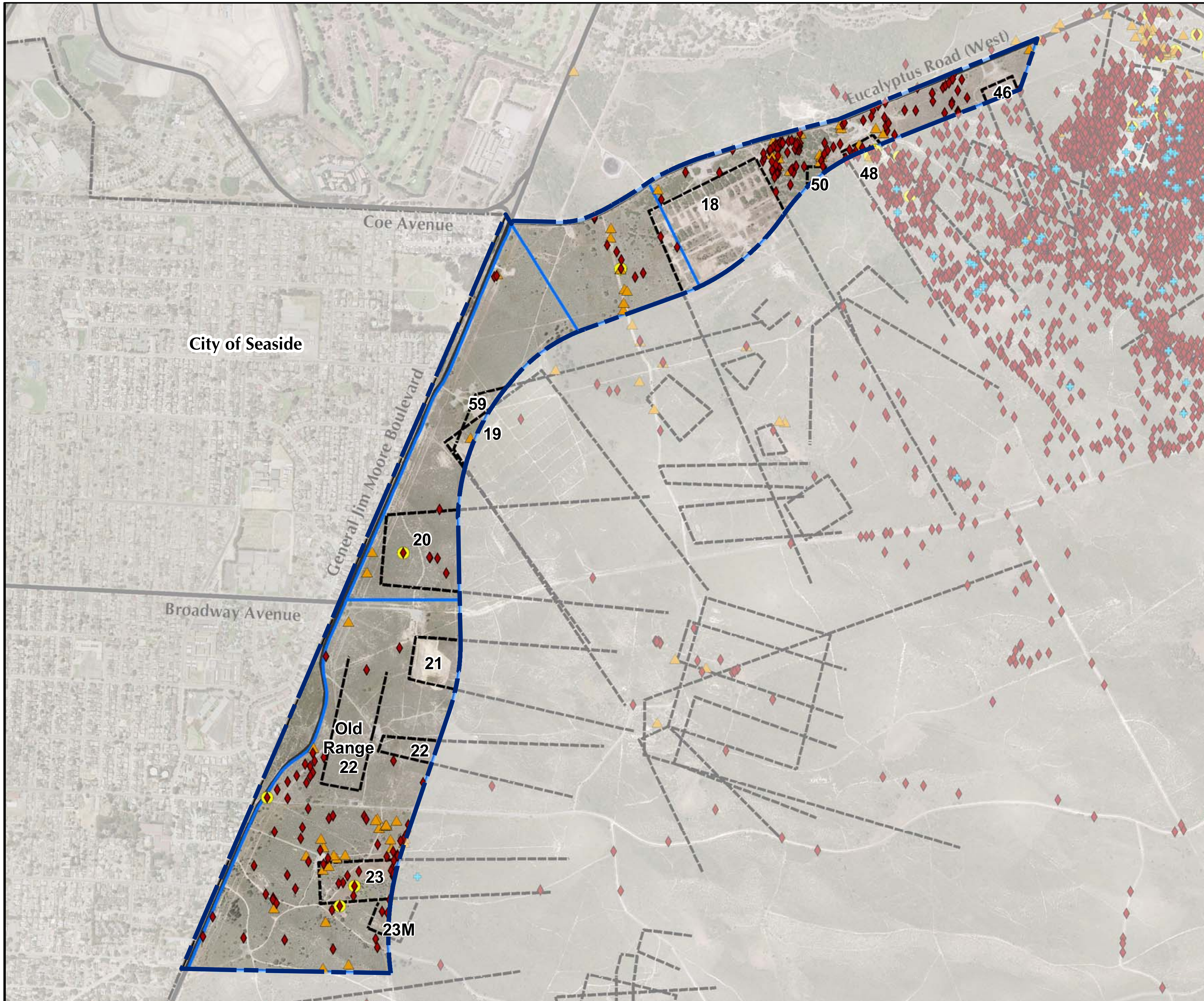
Monterey County, California

Figure 1-2

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2010_09_14_Seaside_MRA_UtilityCorridor.mxd - 1/19/2011 @ 5:19:52 PM



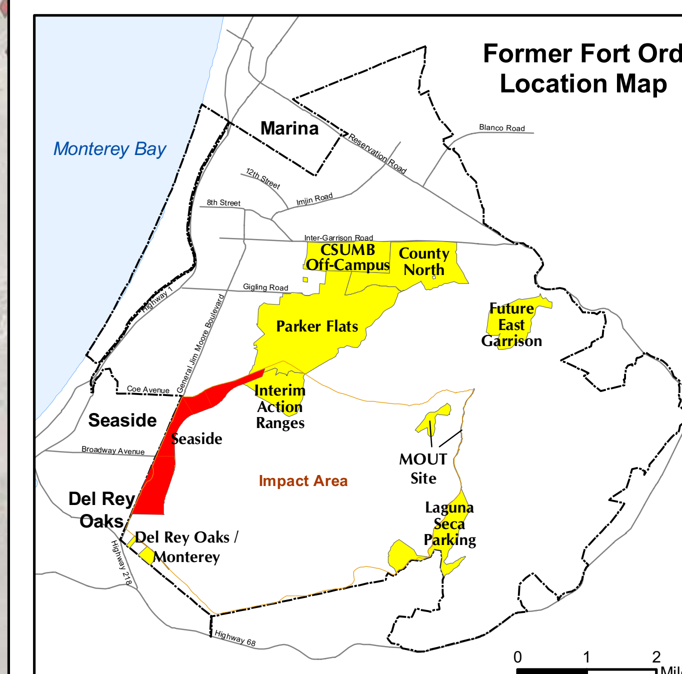
Legend

- Munitions Response Area
- Munitions Response Site
- 22 Firing Range
- Major Road
- Former Fort Ord Boundary

MEC Type

- Unexploded Ordnance (UXO)
- Discarded Military Munition (DMM)
- Insufficient Data (ISD)
- Burial Pit Containing MEC

Note: MEC locations may include more than one item.



0 1,200 2,400 Feet

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Seaside MRA Historical MEC Locations

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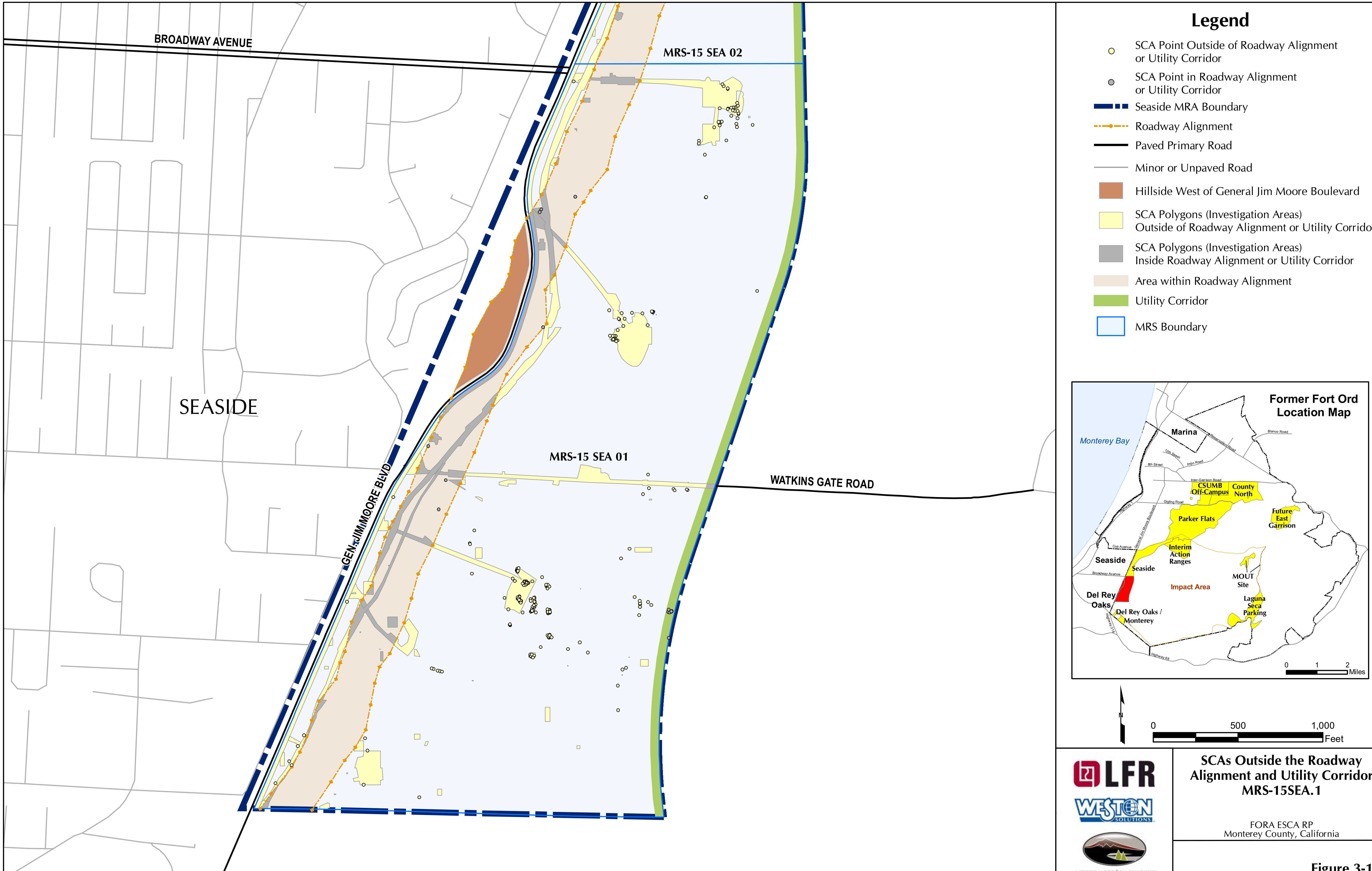
Monterey County, California

Figure 2-1

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2010_09_03_SEA_MRA_Historical_MEC_Locations.mxd - 1/19/2011 @ 3:16:07 PM



SCAs Outside the Roadway Alignment and Utility Corridor MRS-15SEA.1

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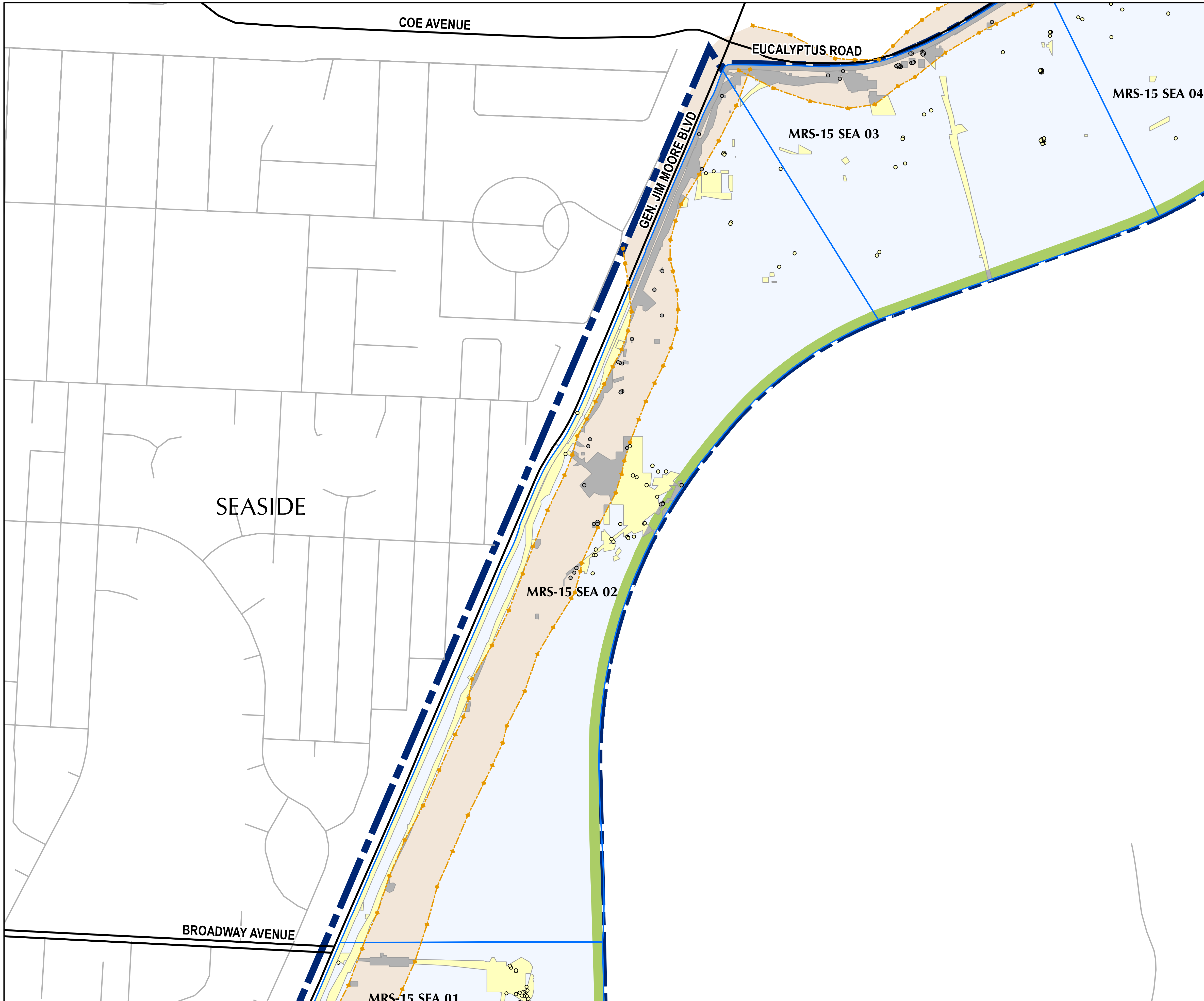
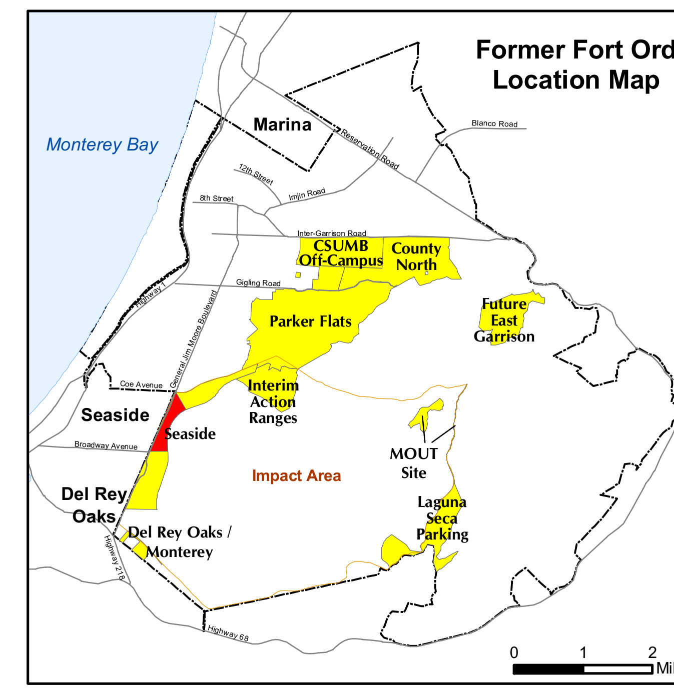
Figure 3-1

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2009_06_03_SEA Seaside1 SCAs.mxd - 1/19/2011 @ 3:32:54 PM



Legend

- SCA Point Outside of Roadway Alignment or Utility Corridor
- SCA Point in Roadway Alignment or Utility Corridor
- Seaside MRA Boundary
- Roadway Alignment
- Paved Primary Road
- Minor or Unpaved Road
- SCA Polygons (Investigation Areas) Outside of Roadway Alignment or Utility Corridor
- SCA Polygons (Investigation Areas) Inside Roadway Alignment or Utility Corridor
- Area within Roadway Alignment
- Utility Corridor
- MRS Boundary



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Feet

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SCAs Outside the Roadway Alignment and Utility Corridor MRS-15SEA.2

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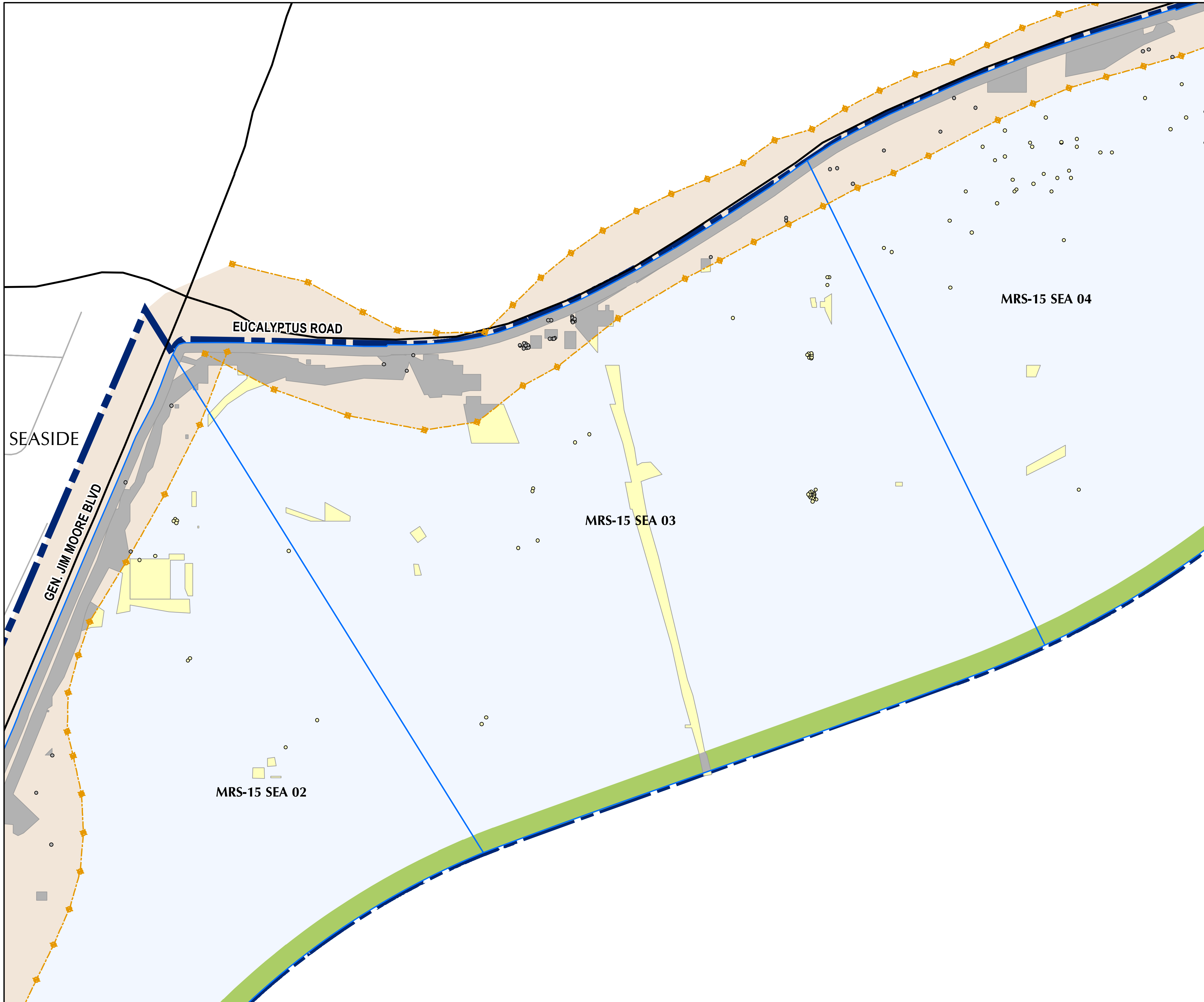
Monterey County, California

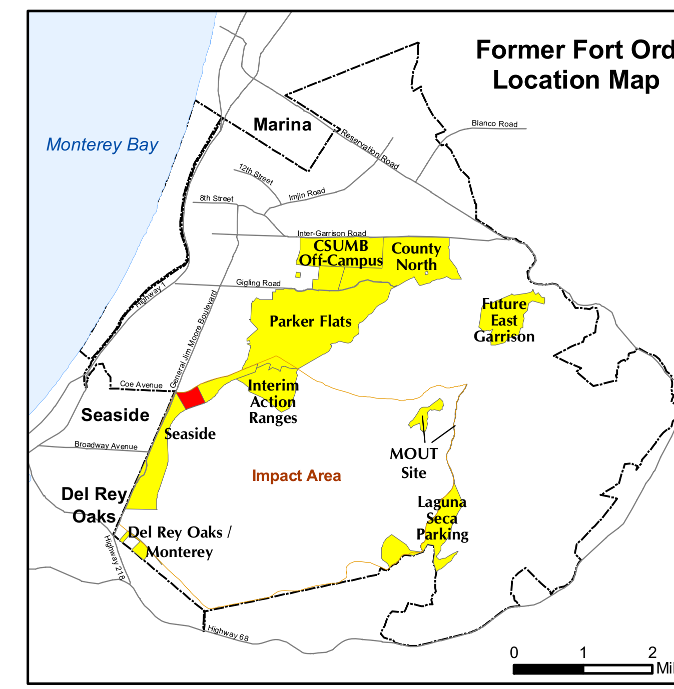
Figure 3-2

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2009_06_03_SEA Seaside2 SCAs.mxd - 1/19/2011 @ 3:32:54 PM



Legend

- SCA Point Outside of Roadway Alignment or Utility Corridor
- SCA Point in Roadway Alignment or Utility Corridor
- Seaside MRA Boundary
- Roadway Alignment
- Paved Primary Road
- Minor or Unpaved Road
- SCA Polygons (Investigation Areas) Outside of Roadway Alignment or Utility Corridor
- SCA Polygons (Investigation Areas) Inside Roadway Alignment or Utility Corridor
- Area within Roadway Alignment
- Utility Corridor
- MRS Boundary



N

0 250 500 Feet

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SCAs Outside the Roadway Alignment and Utility Corridor MRS-15SEA.3

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Monterey County, California

Figure 3-3

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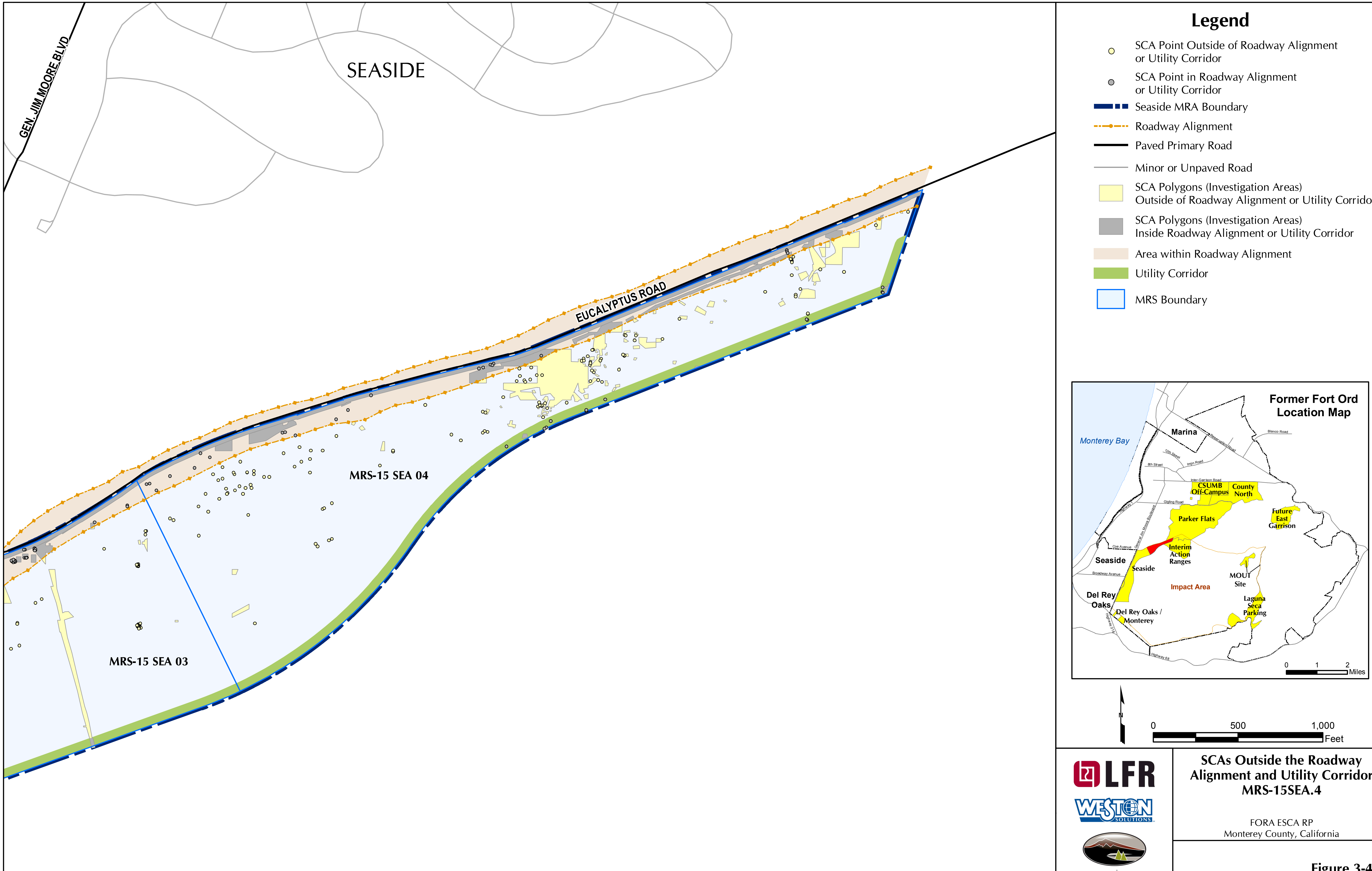

SCAs Outside the Roadway Alignment and Utility Corridor MRS-15SEA.4

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Monterey County, California

Figure 3-4

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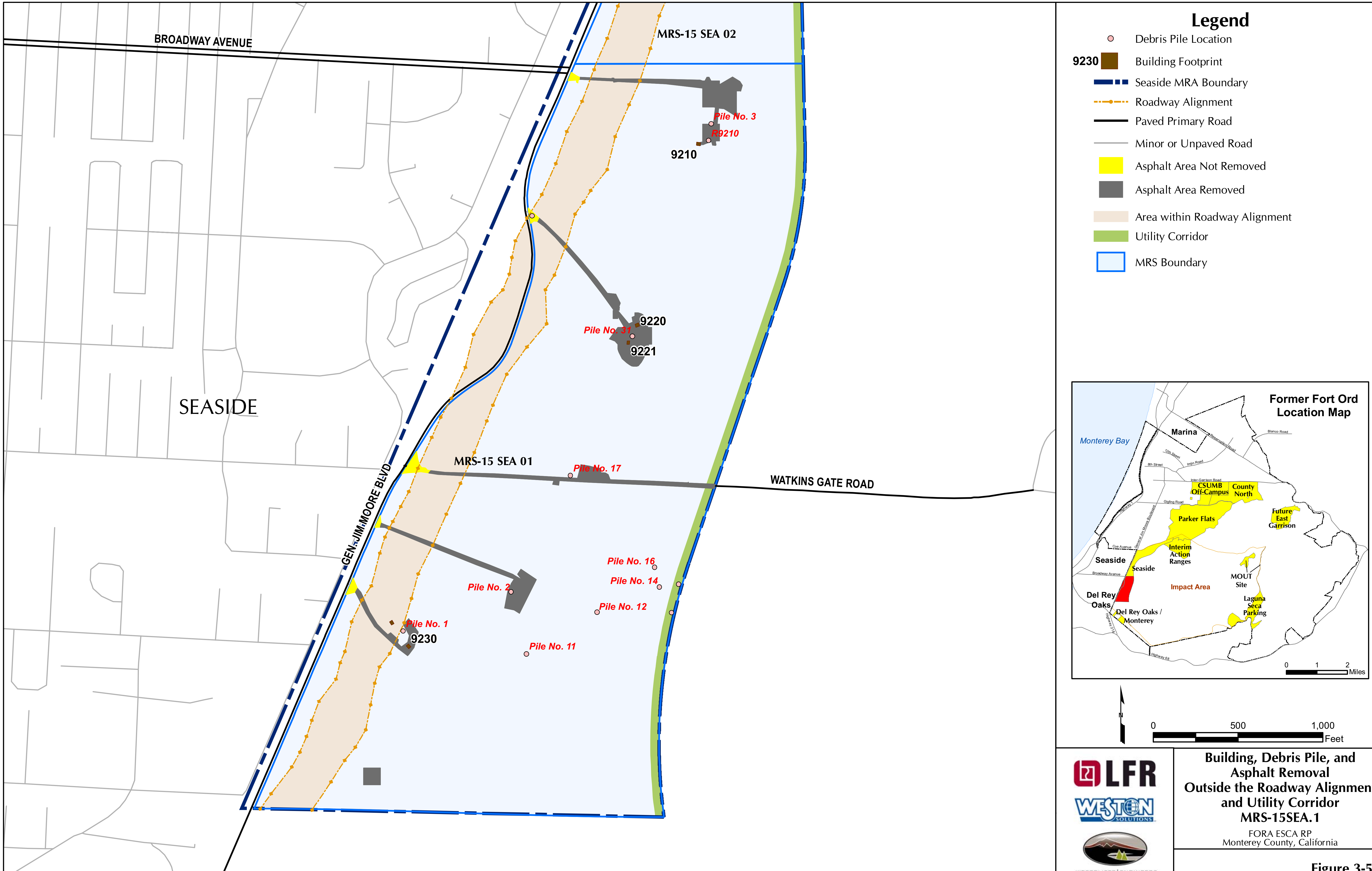

Building, Debris Pile, and Asphalt Removal Outside the Roadway Alignment and Utility Corridor MRS-15SEA.1

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Monterey County, California

Figure 3-5

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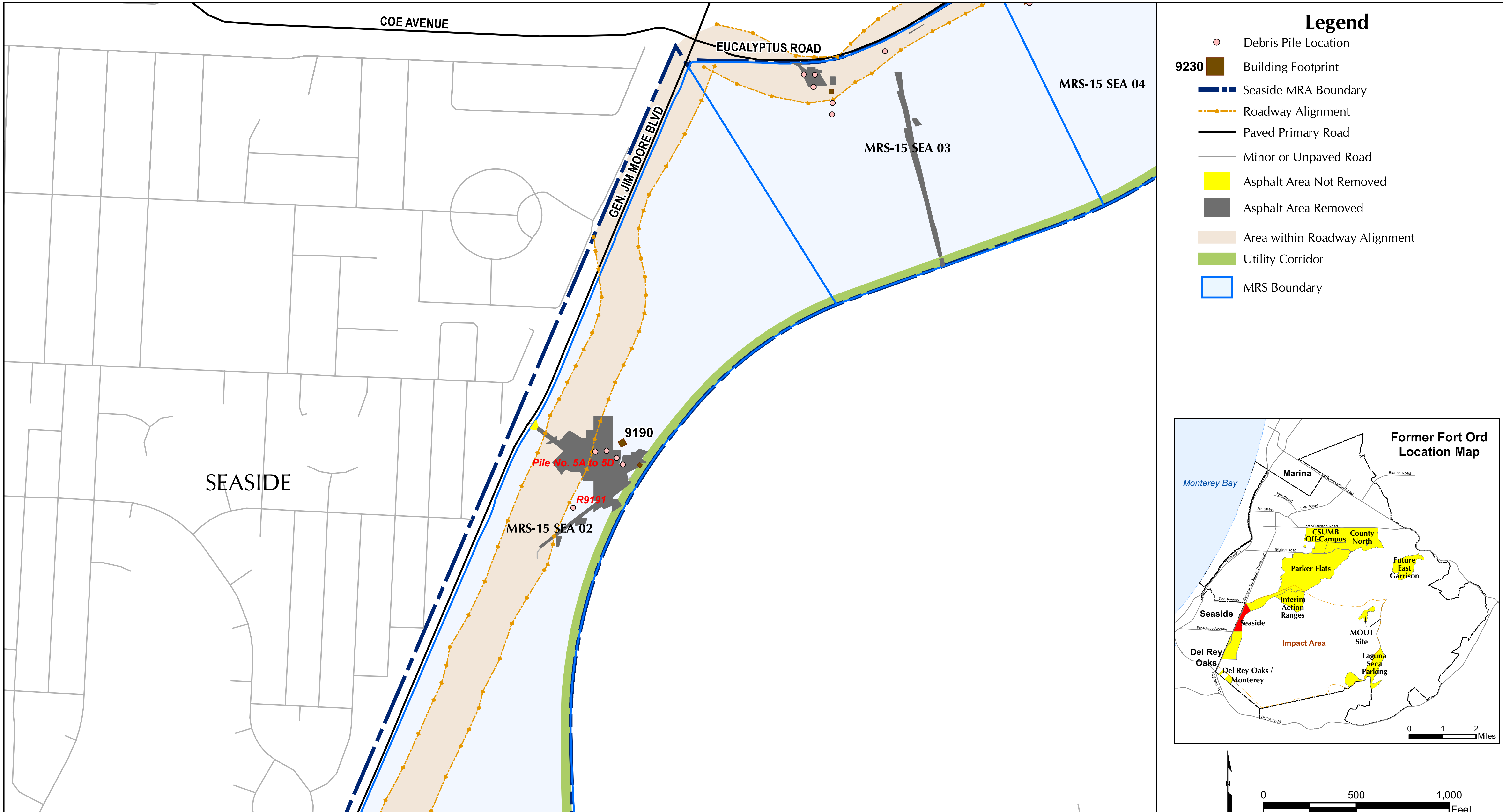

Building, Debris Pile, and Asphalt Removal Outside the Roadway Alignment and Utility Corridor MRS-15SEA.2

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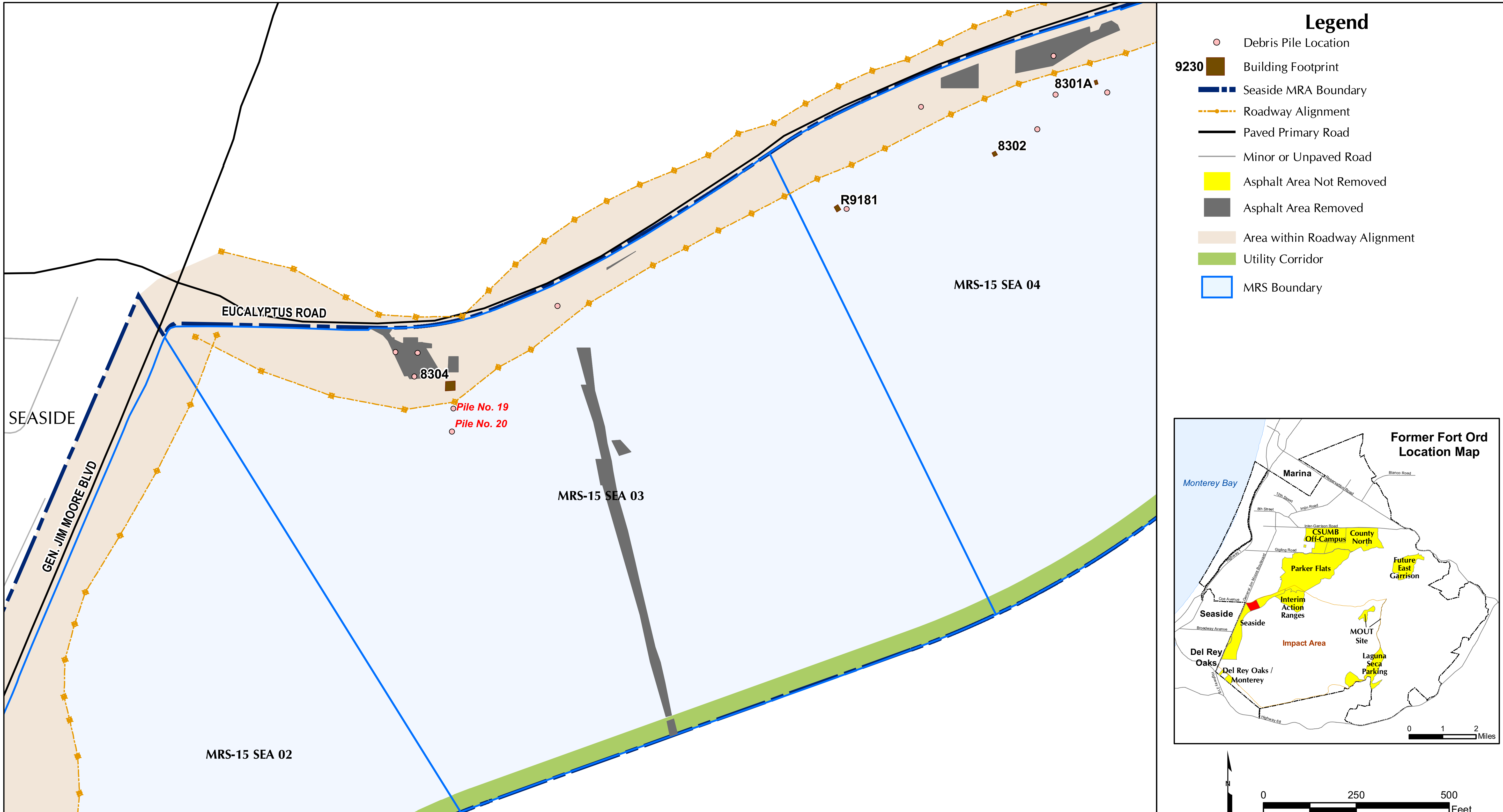
Monterey County, California

Figure 3-6

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2009_06_04_SEA Seaside2_AsphaltBldgDebris_Removal.mxd - 1/19/2011 @ 3:45:05 PM



Building, Debris Pile, and Asphalt Removal Outside the Roadway Alignment and Utility Corridor MRS-15SEA.3

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Monterey County, California

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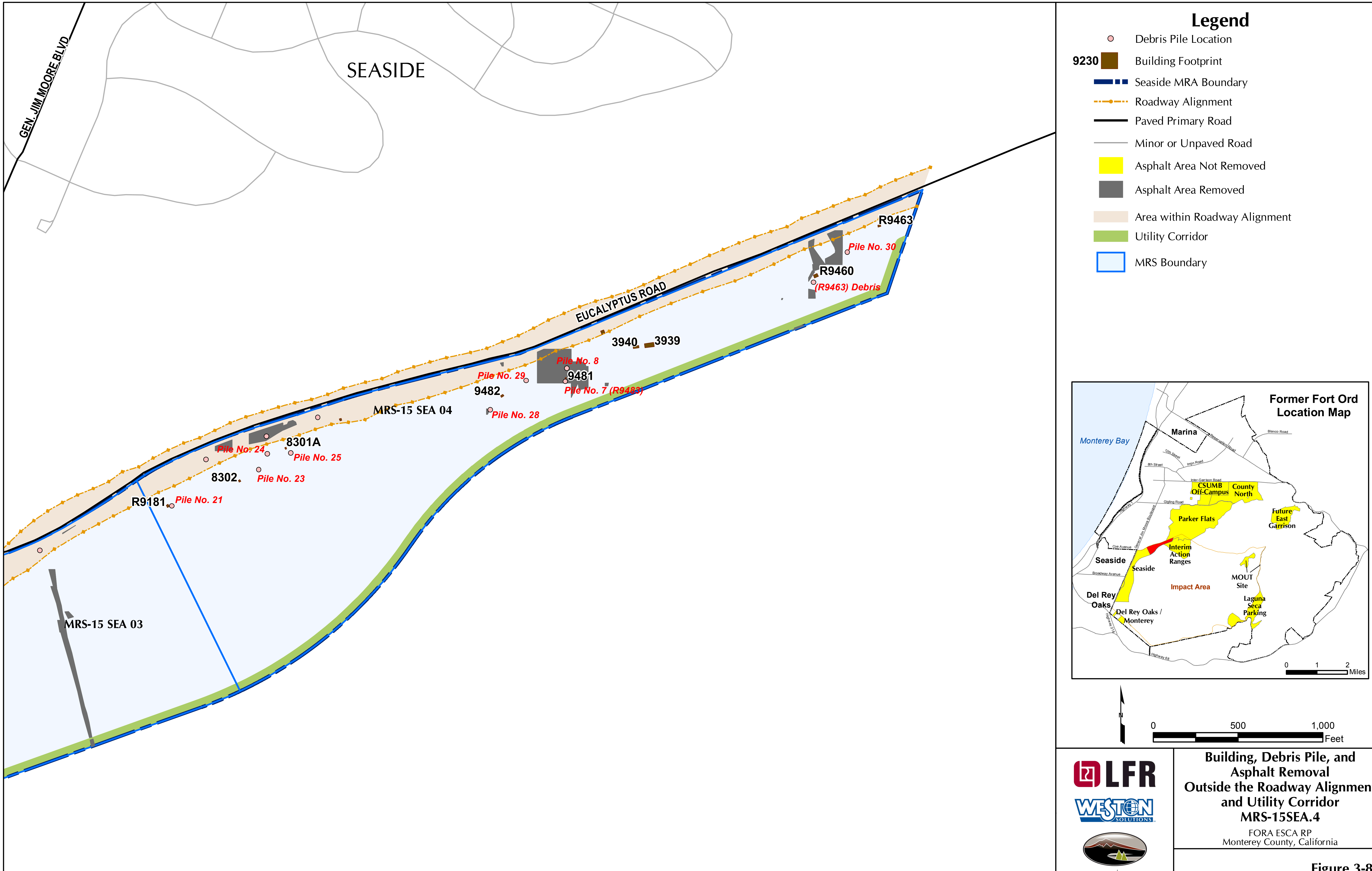
Figure 3-7

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2009_06_04_SEA Seaside3_AsphaltBldgDebris_Removal.mxd - 1/19/2011 @ 3:45:04 PM



Building, Debris Pile, and Asphalt Removal Outside the Roadway Alignment and Utility Corridor MRS-15SEA.4

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Monterey County, California

Figure 3-8

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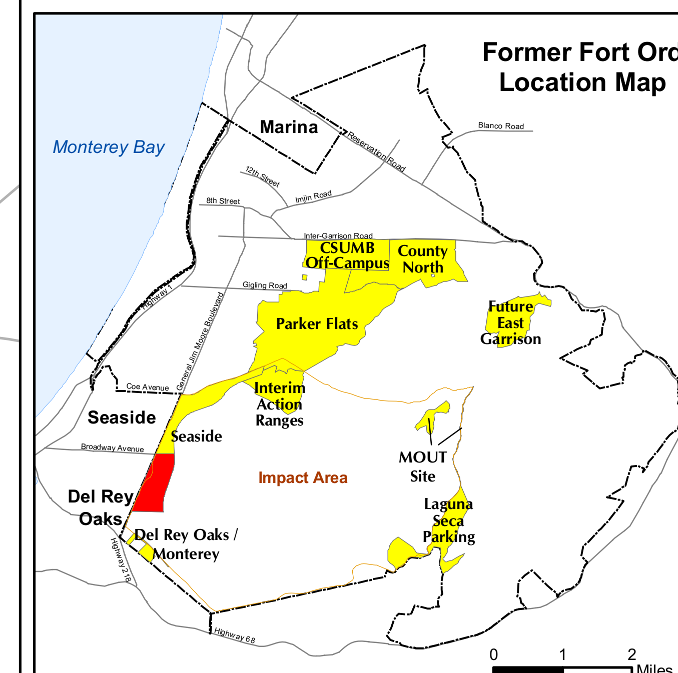
Legend

- Transmission Line Tower
- Seaside MRA Boundary
- Roadway Alignment
- Paved Primary Road
- Minor or Unpaved Road

SCA Polygons (Investigation Areas) Outside the Roadway Alignment or Utility Corridor

- Area Scraped
- Area Not Scraped
- Hillside West of General Jim Moore Boulevard
- SCA Polygons (Investigation Areas) Inside of Roadway Alignment or Utility Corridor
- Area within Roadway Alignment
- Utility Corridor
- MRS Boundary



0 500 1,000 Feet

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Scraped SCA Polygons Outside the Roadway Alignment and Utility Corridor MRS-15SEA.1

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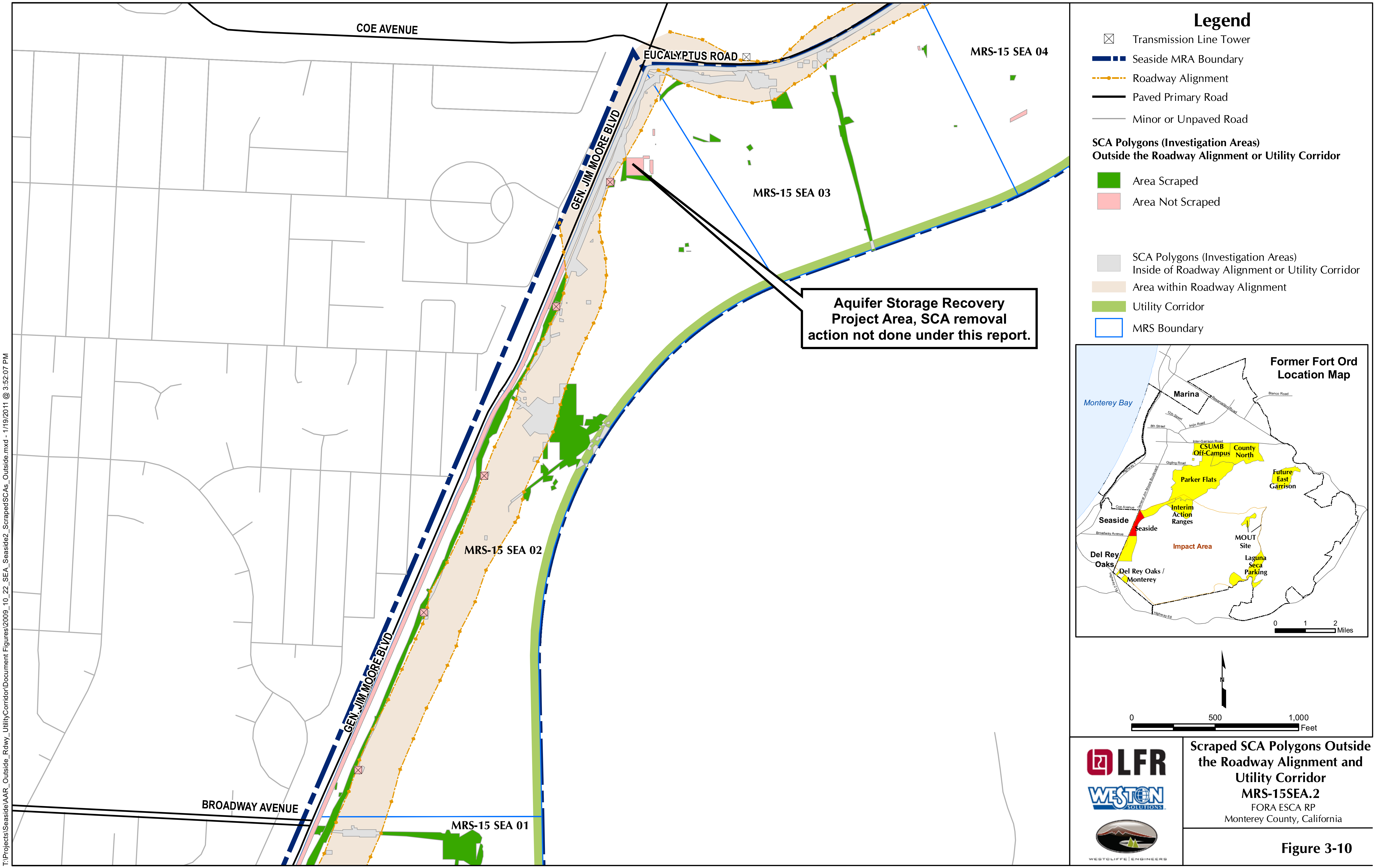
Figure 3-9

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2009_10_22_SEA_Seaside1_ScrapedSCAs_Outside.mxd - 1/19/2011 @ 3:52:07 PM



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Scraped SCA Polygons Outside the Roadway Alignment and Utility Corridor MRS-15SEA.2

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Figure 3-10

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Scraped SCA Polygons Outside the Roadway Alignment and Utility Corridor
MRS-15SEA.3
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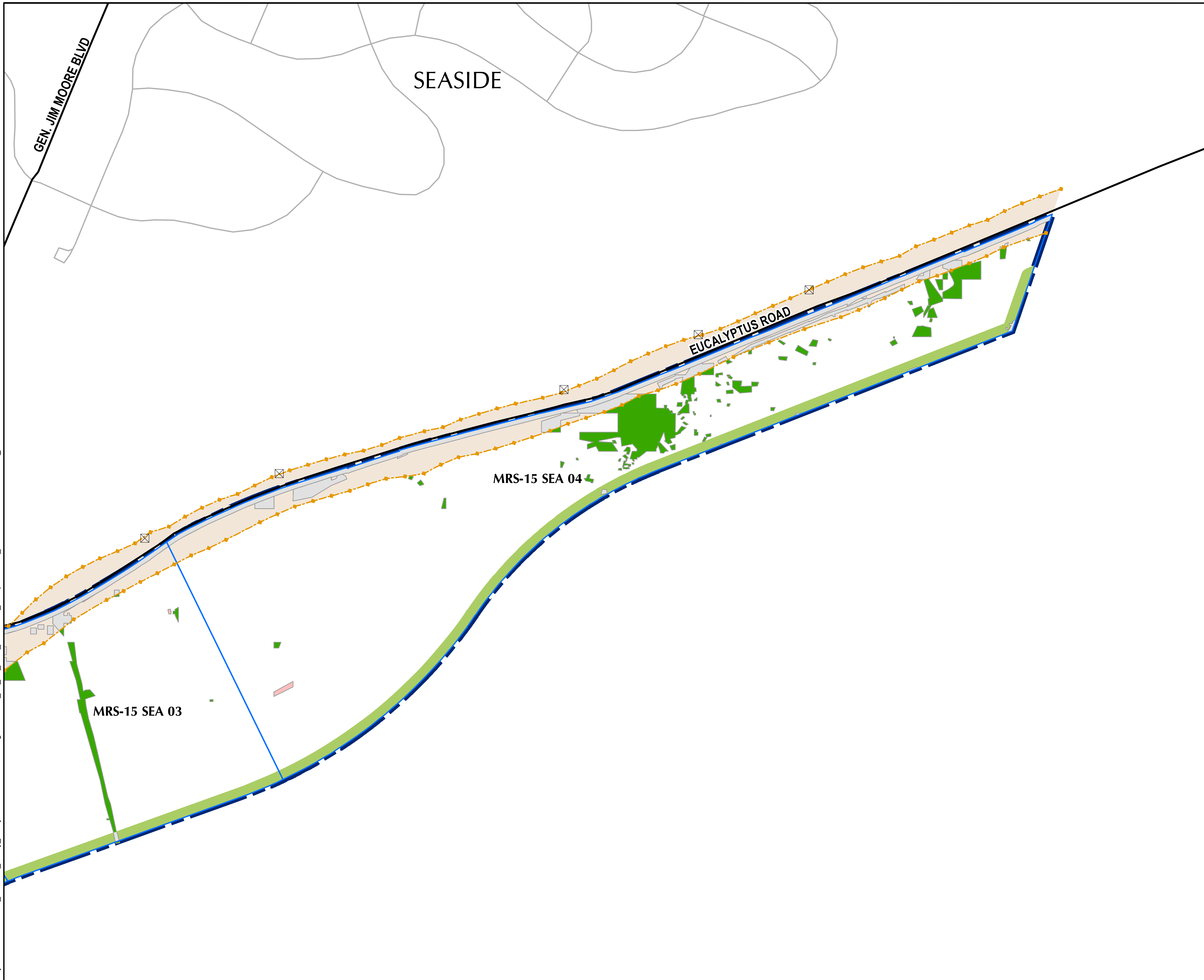
Monterey County, California

Figure 3-11

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2009_10_22_SEA_Seaside3_ScrapedSCAs_Outside.mxd - 1/19/2011 @ 3:52:07 PM



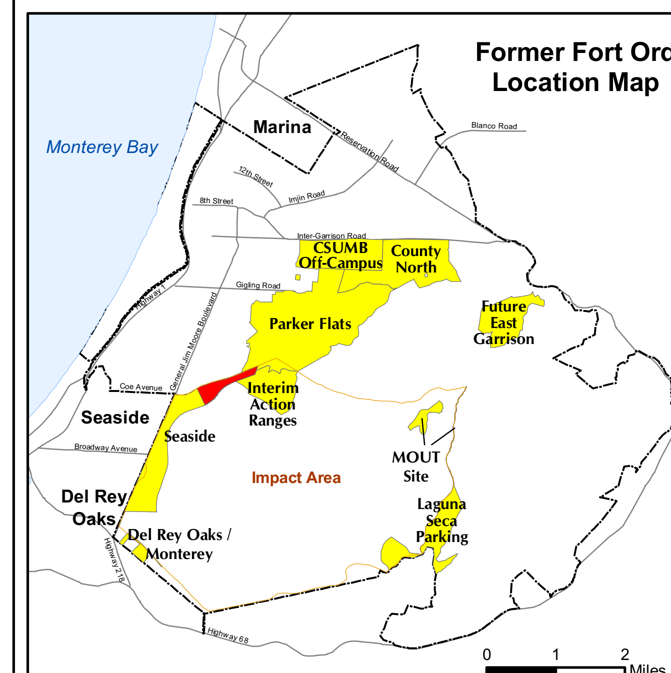
Legend

- Transmission Line Tower
- Seaside MRA Boundary
- Roadway Alignment
- Paved Primary Road
- Minor or Unpaved Road

SCA Polygons (Investigation Areas) Outside the Roadway Alignment or Utility Corridor

- Area Scraped
- Area Not Scraped

- SCA Polygons (Investigation Areas) Inside of Roadway Alignment or Utility Corridor
- Area within Roadway Alignment
- Utility Corridor
- MRS Boundary



0 500 1,000 Feet

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Scraped SCA Polygons Outside the Roadway Alignment and Utility Corridor
MRS-15SEA.4
FORA ESCA RP
Monterey County, California

Figure 3-12

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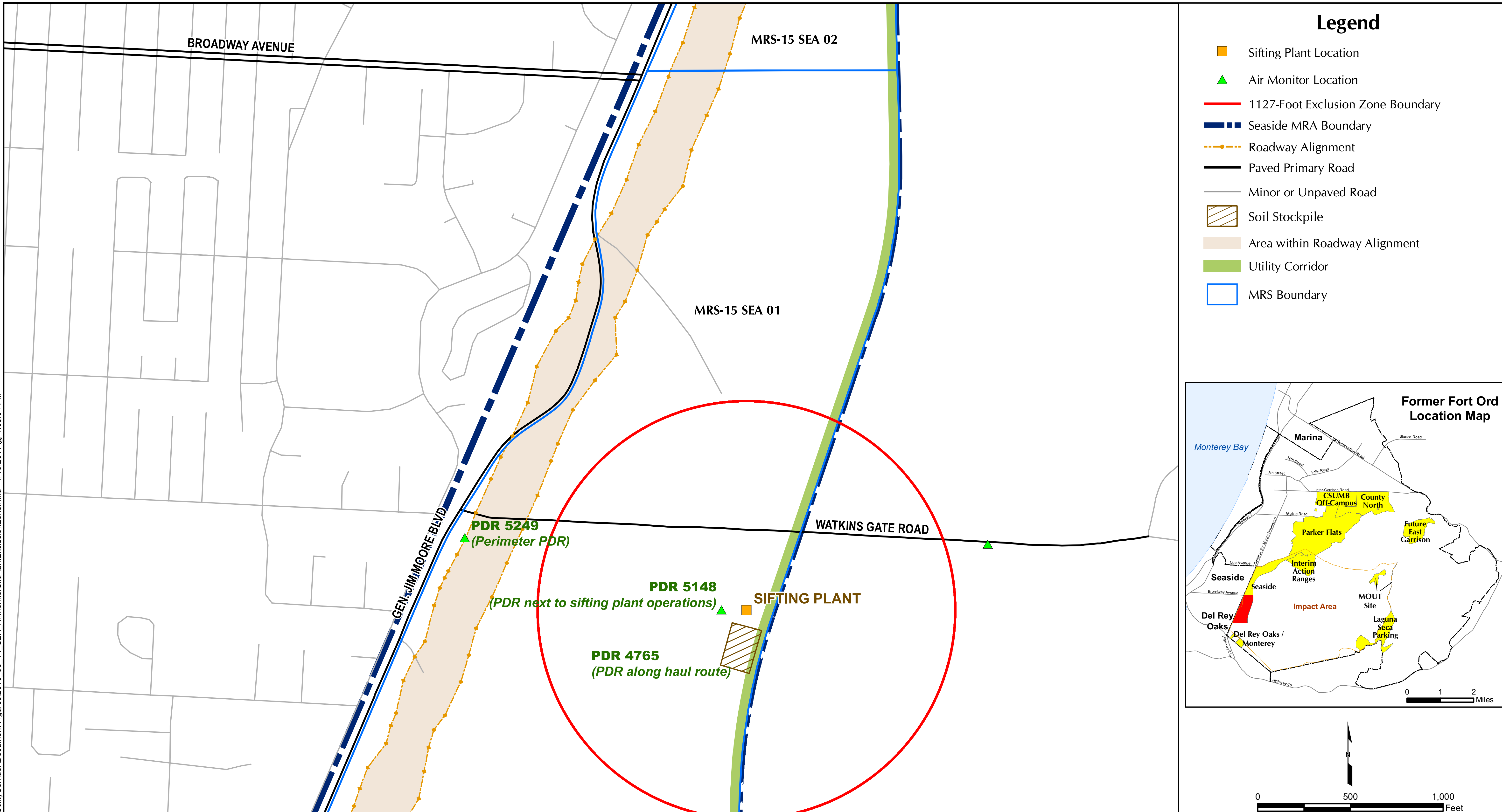

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Location of Sifting Plant Operations and Air Monitoring Detectors

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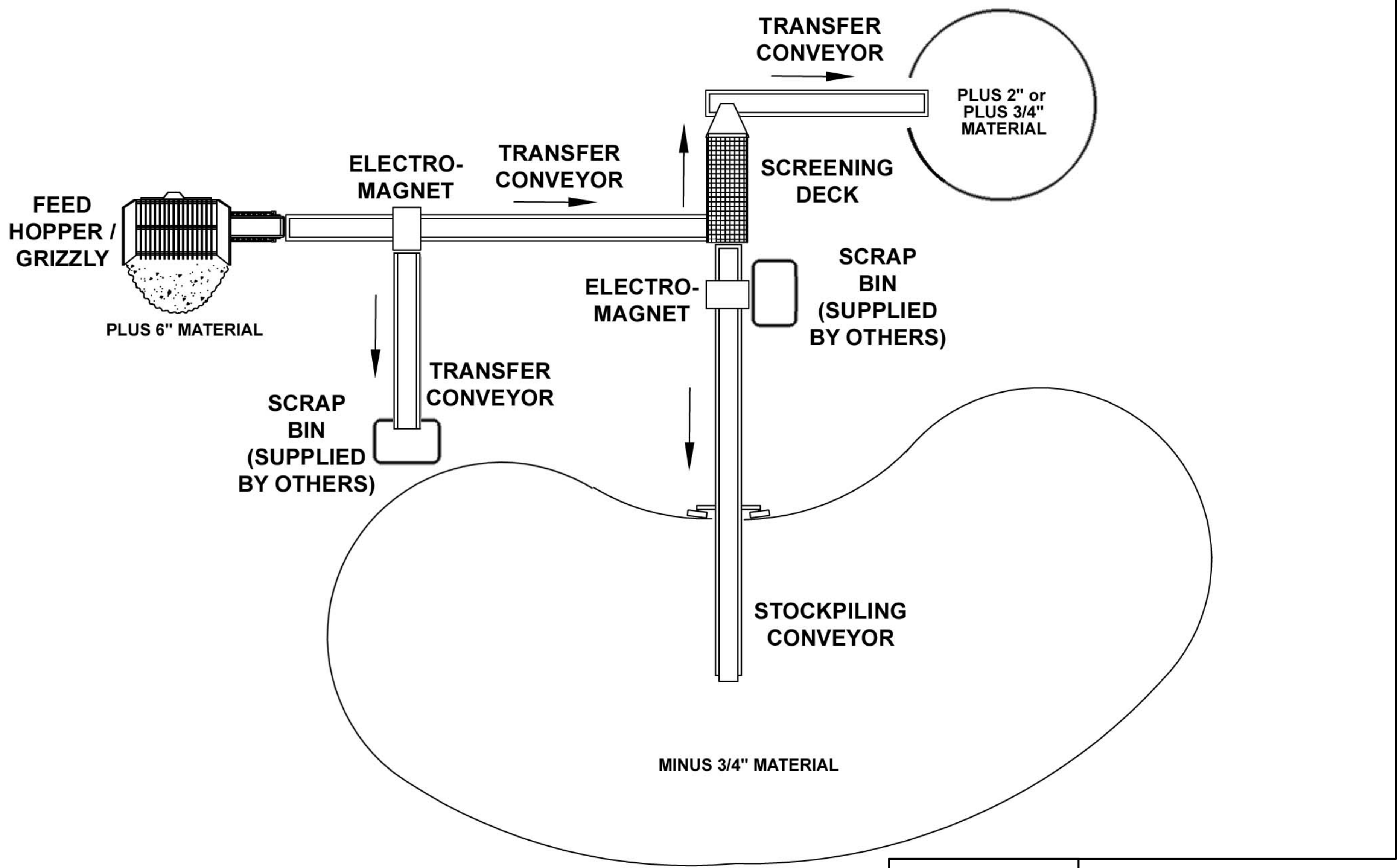
Monterey County, California

Figure 3-13

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2010_09_14_SEA_AirMonitorSiftPlantExclusionZone.mxd - 1/19/2011 @ 4:05:04 PM



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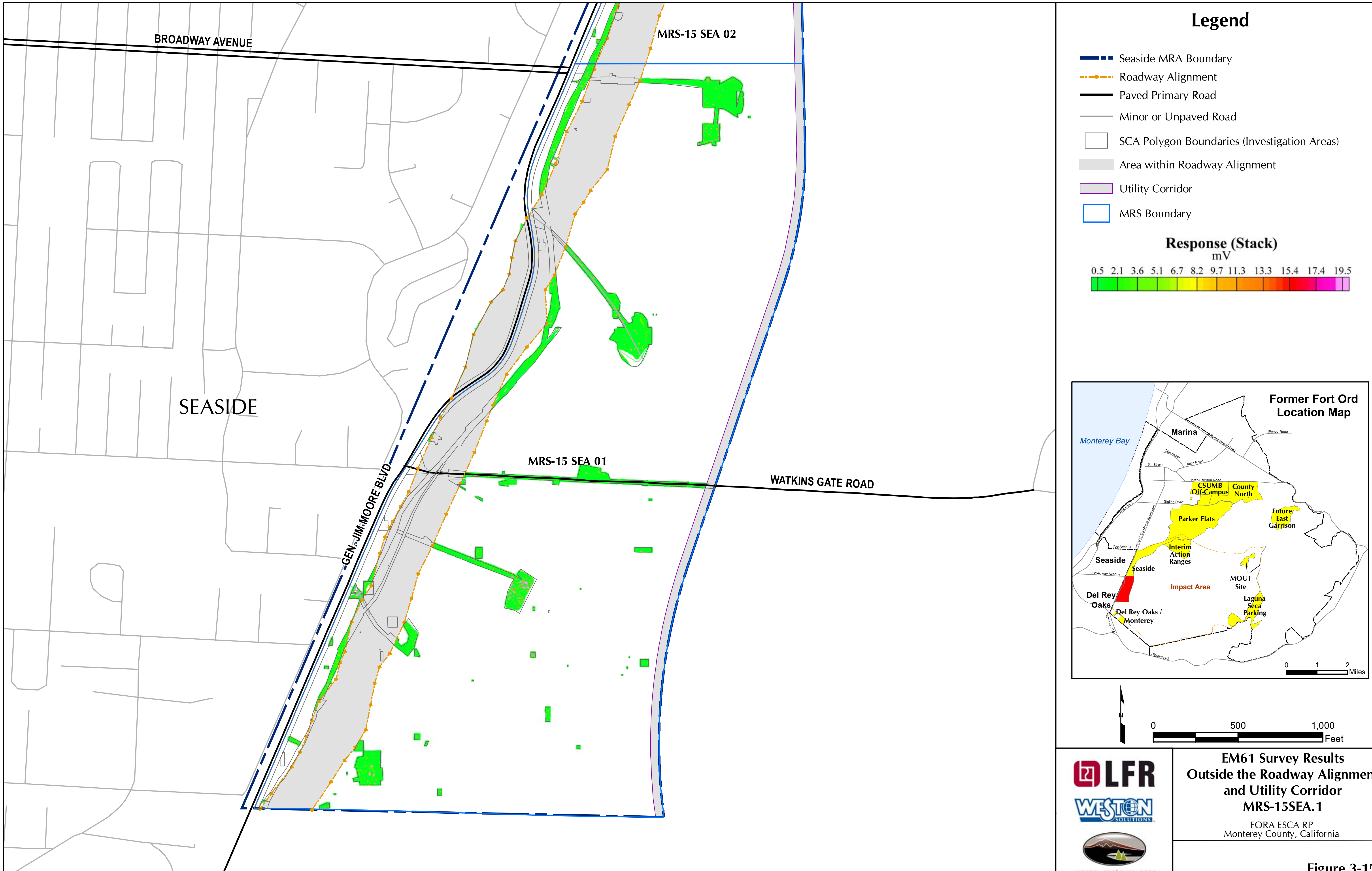
Sifting Plant
Schematic Diagram

Figure 3-14

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2010_09_14_SEA_SiftPlantDiagram.mxd



EM61 Survey Results
Outside the Roadway Alignment
and Utility Corridor
MRS-15SEA.1

FORA ESCA RP
Monterey County, California

Figure 3-15

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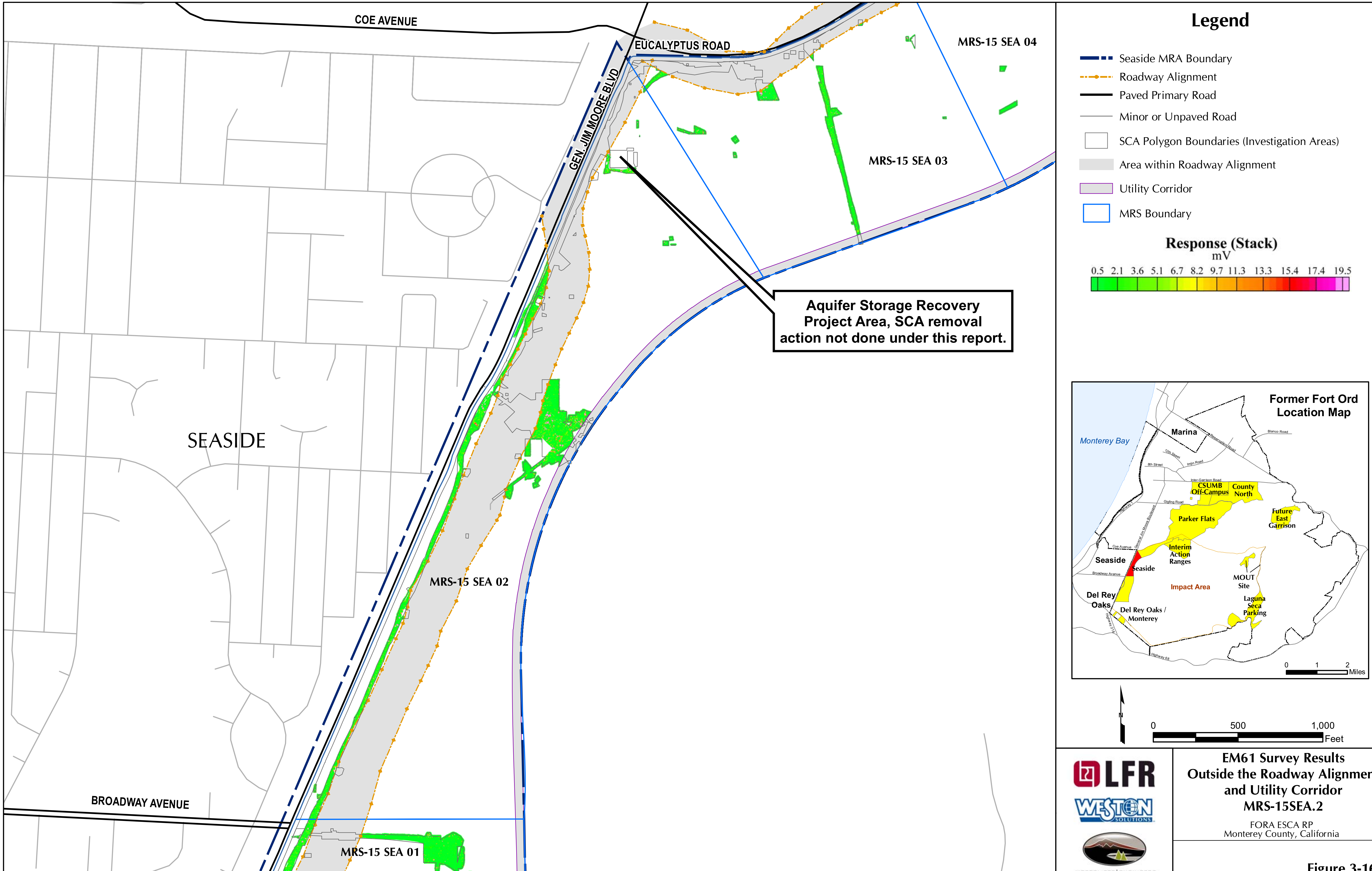

EM61 Survey Results
Outside the Roadway Alignment
and Utility Corridor
MRS-15SEA.2

FORA ESCA RP
Monterey County, California

Figure 3-16

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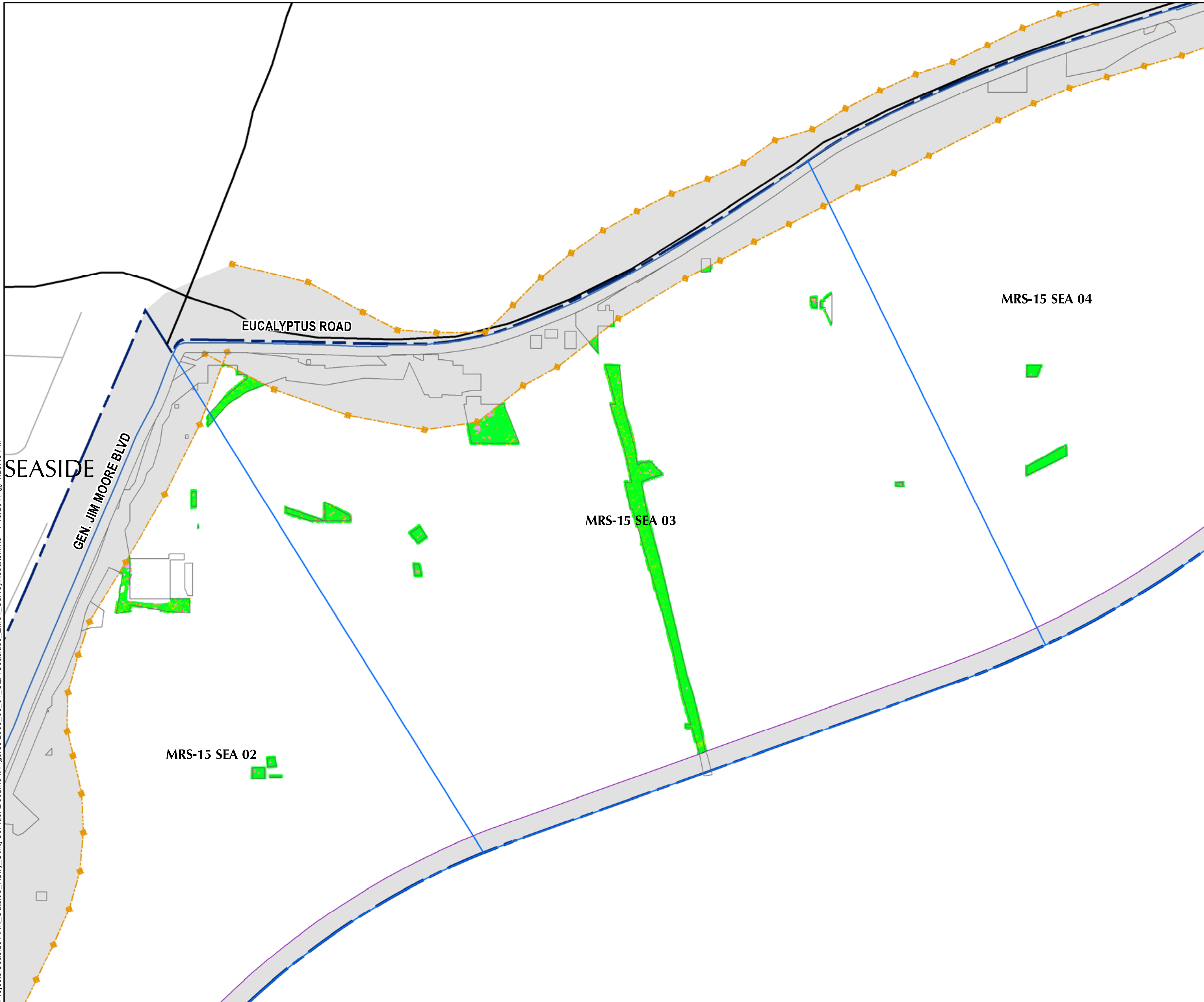
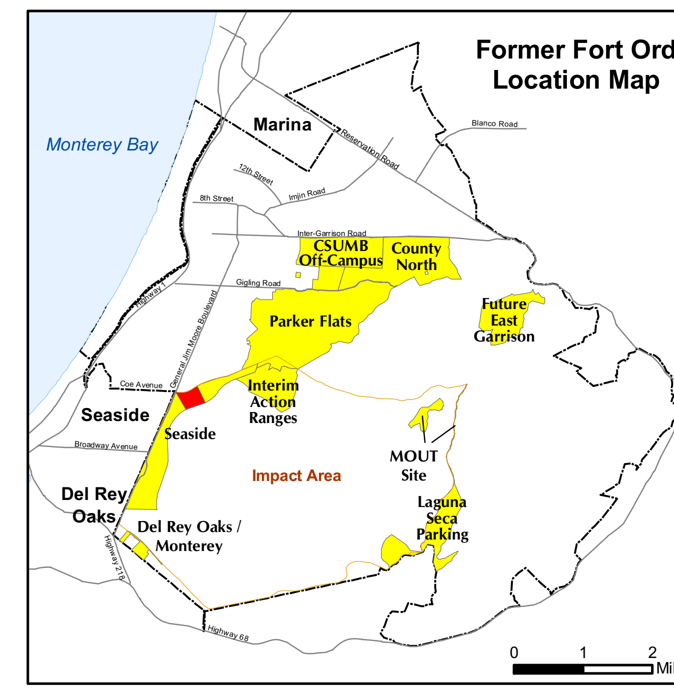


Legend

- Seaside MRA Boundary
- Roadway Alignment
- Paved Primary Road
- Minor or Unpaved Road
- SCA Polygon Boundaries (Investigation Areas)
- Area within Roadway Alignment
- Utility Corridor
- MRS Boundary

Response (Stack)
mV

0.5 2.1 3.6 5.1 6.7 8.2 9.7 11.3 13.3 15.4 17.4 19.5



0 250 500
Feet

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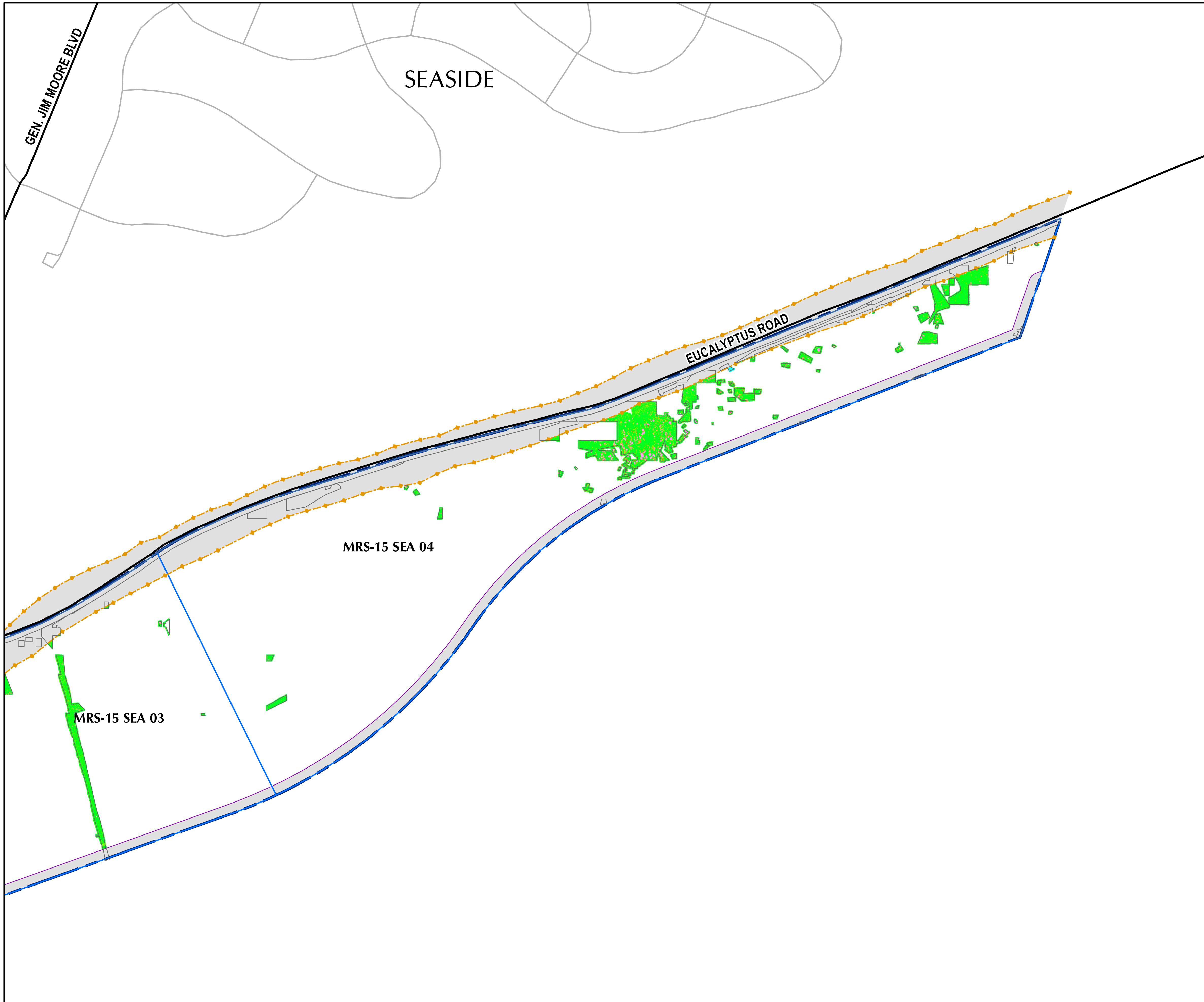
EM61 Survey Results Outside the Roadway Alignment and Utility Corridor MRS-15SEA.3

FORA ESCA RP
Monterey County, California

Figure 3-17

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2009_06_04_SEA Seaside3_EM61_SurveyResults.mxd - 1/19/2011 @ 4:26:45 PM

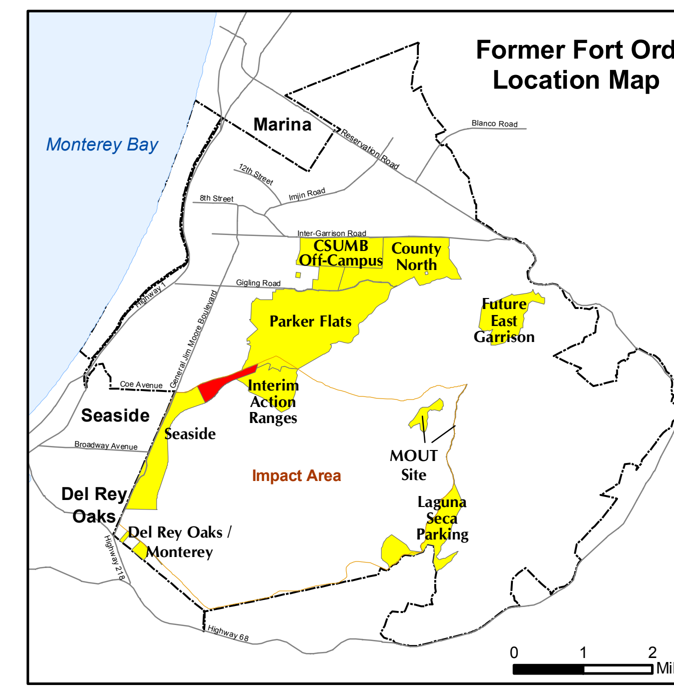


Legend

- Seaside MRA Boundary
- Roadway Alignment
- Paved Primary Road
- Minor or Unpaved Road
- SCA Polygon Boundaries (Investigation Areas)
- Area within Roadway Alignment
- Utility Corridor
- MRS Boundary

Response (Stack)
mV

0.5 2.1 3.6 5.1 6.7 8.2 9.7 11.3 13.3 15.4 17.4 19.5



N

0 500 1,000
Feet

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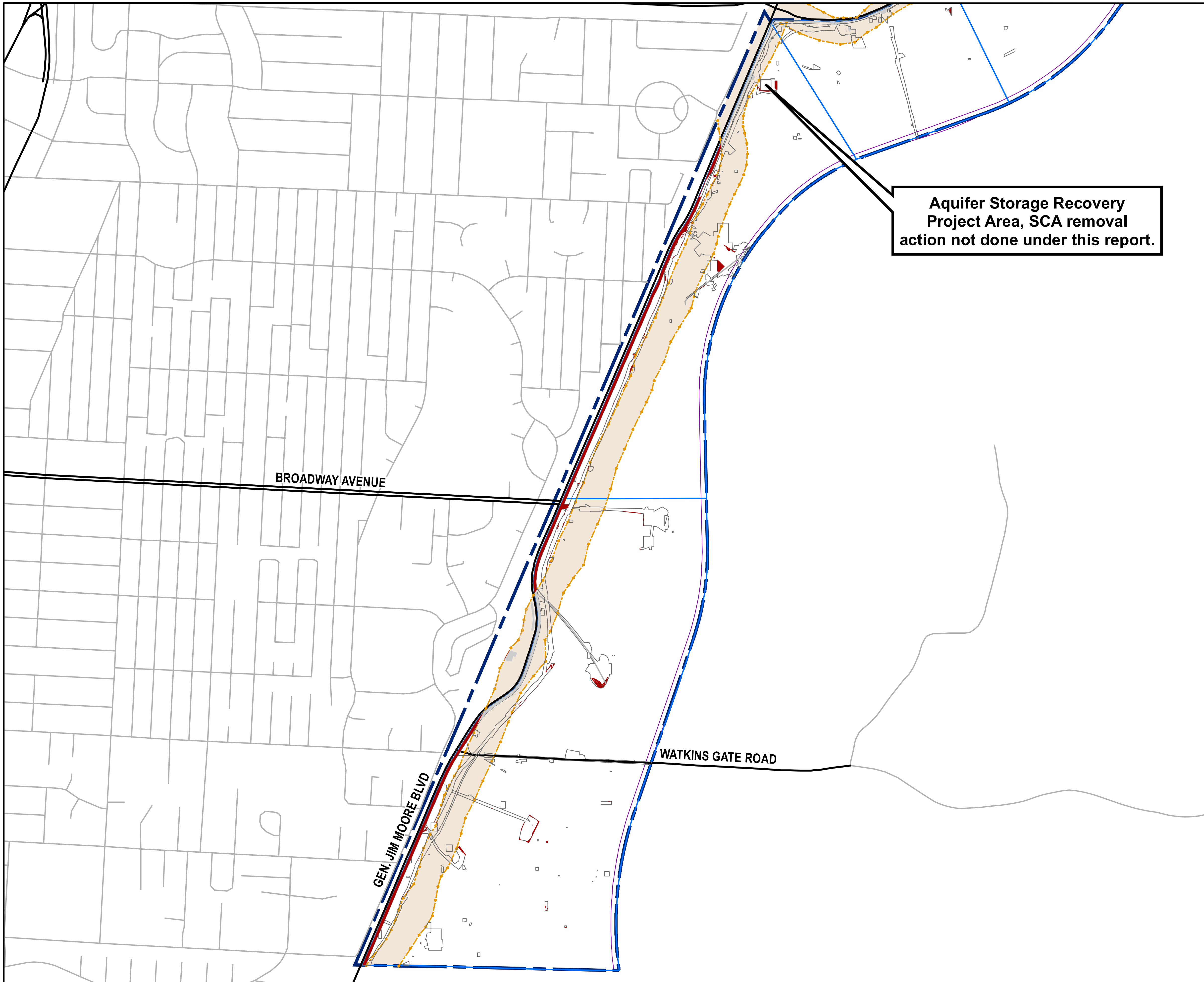
EM61 Survey Results Outside the Roadway Alignment and Utility Corridor MRS-15SEA.4

FORA ESCA RP
Monterey County, California

Figure 3-18

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2009_06_04_SEA Seaside4_EM61_SurveyResults.mxd - 1/19/2011 @ 4:26:45 PM



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Analog Survey Locations MRS-15SEA.1 and MRS-15SEA.2 Outside Roadway and Utility Corridor

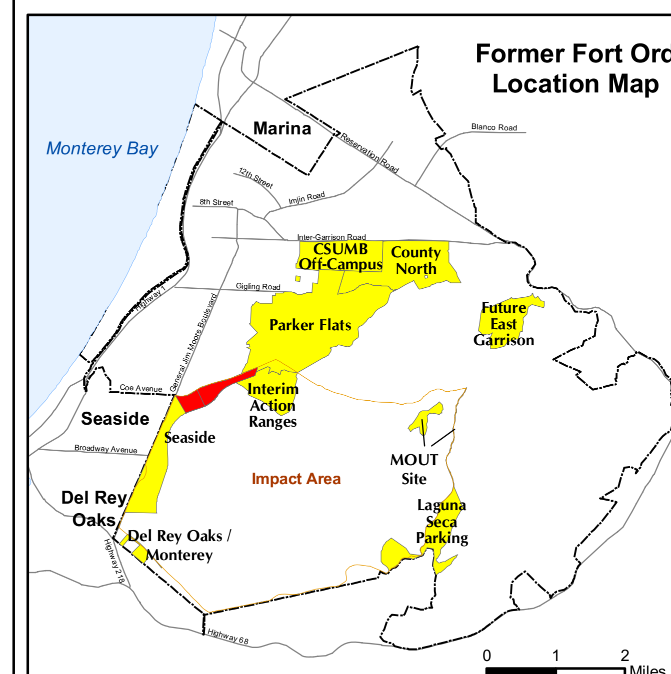
FORA ESCA RP
Monterey County, California

Figure 3-19

Legend

- Seaside MRA Boundary
- Roadway Alignment
- Paved Primary Road
- Minor or Unpaved Road
- Analog Survey Areas Oustide Roadway and Utility Corridor
- Analog Survey Areas Inside Roadway or Utility Corridor
- SCA Polygon Boundaries (Investigation Areas)
- Area within Roadway Alignment
- Utility Corridor
- MRS Boundary

For detail of areas where analog survey was performed, see 100-ft grid maps in Appendix E



N

0 600 1,200 Feet

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Analog Survey Locations MRS-15SEA.3 and MRS-15SEA.4 Outside Roadway and Utility Corridor

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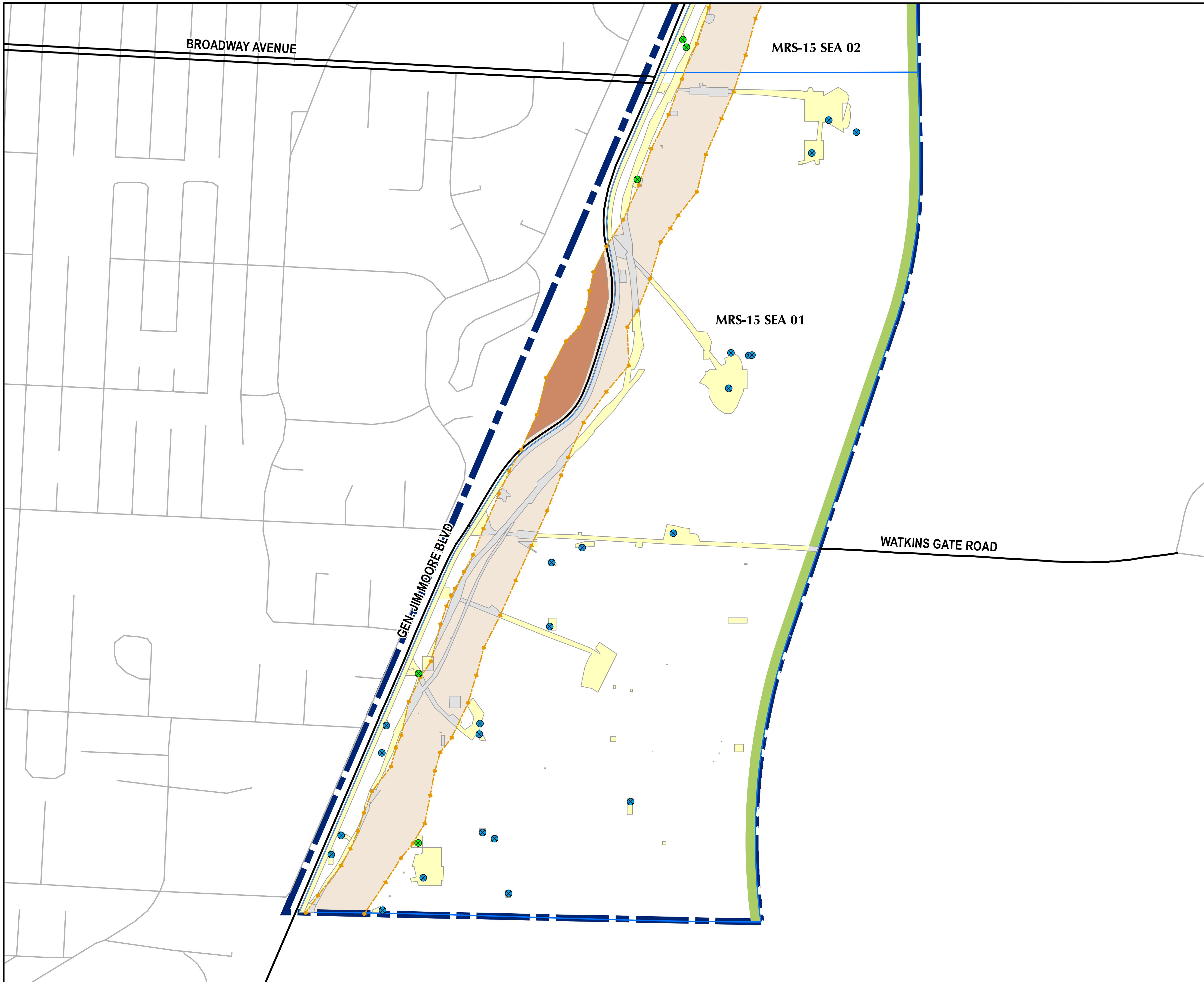
Monterey County, California

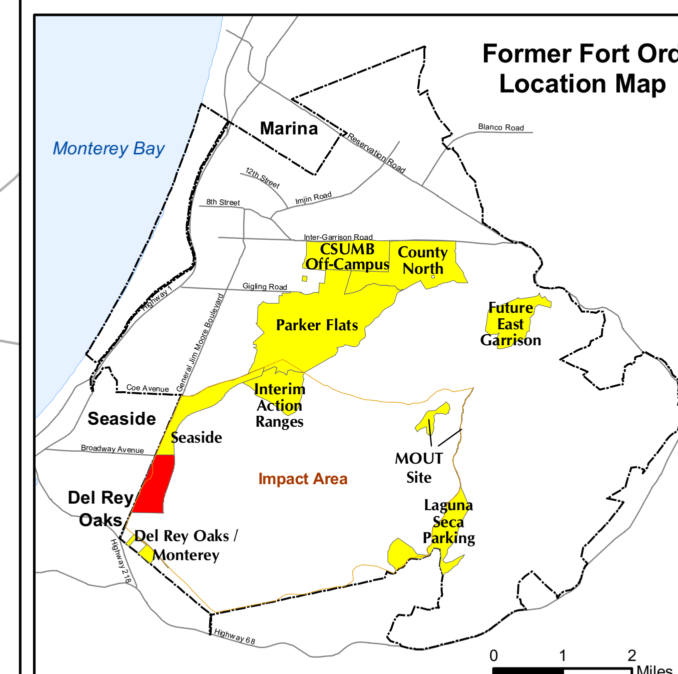
Figure 3-20

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2009_10_22_SEA_Seaside3_4_AnalogAreas_Outside.mxd - 1/19/2011 @ 4:34:03 PM



Legend

- Known QC Seed Item Location
- Known QC Seed Item Found During DGM Activities
- Blind QC Seed Item Location
- Seaside MRA Boundary
- Roadway Alignment
- Paved Primary Road
- Minor or Unpaved Road
- Hillside West of General Jim Moore Boulevard
- SCA Polygons (Investigation Areas) Outside Roadway Alignment or Utility Corridor
- SCA Polygons (Investigation Areas) Inside of Roadway Alignment or Utility Corridor
- Area within Roadway Alignment
- Utility Corridor
- MRS Boundary



0 500 1,000 Feet

QC Seeding Outside the Roadway Alignment and Utility Corridor MRS-15SEA.1

FORA ESCA RP
Monterey County, California

Figure 4-1

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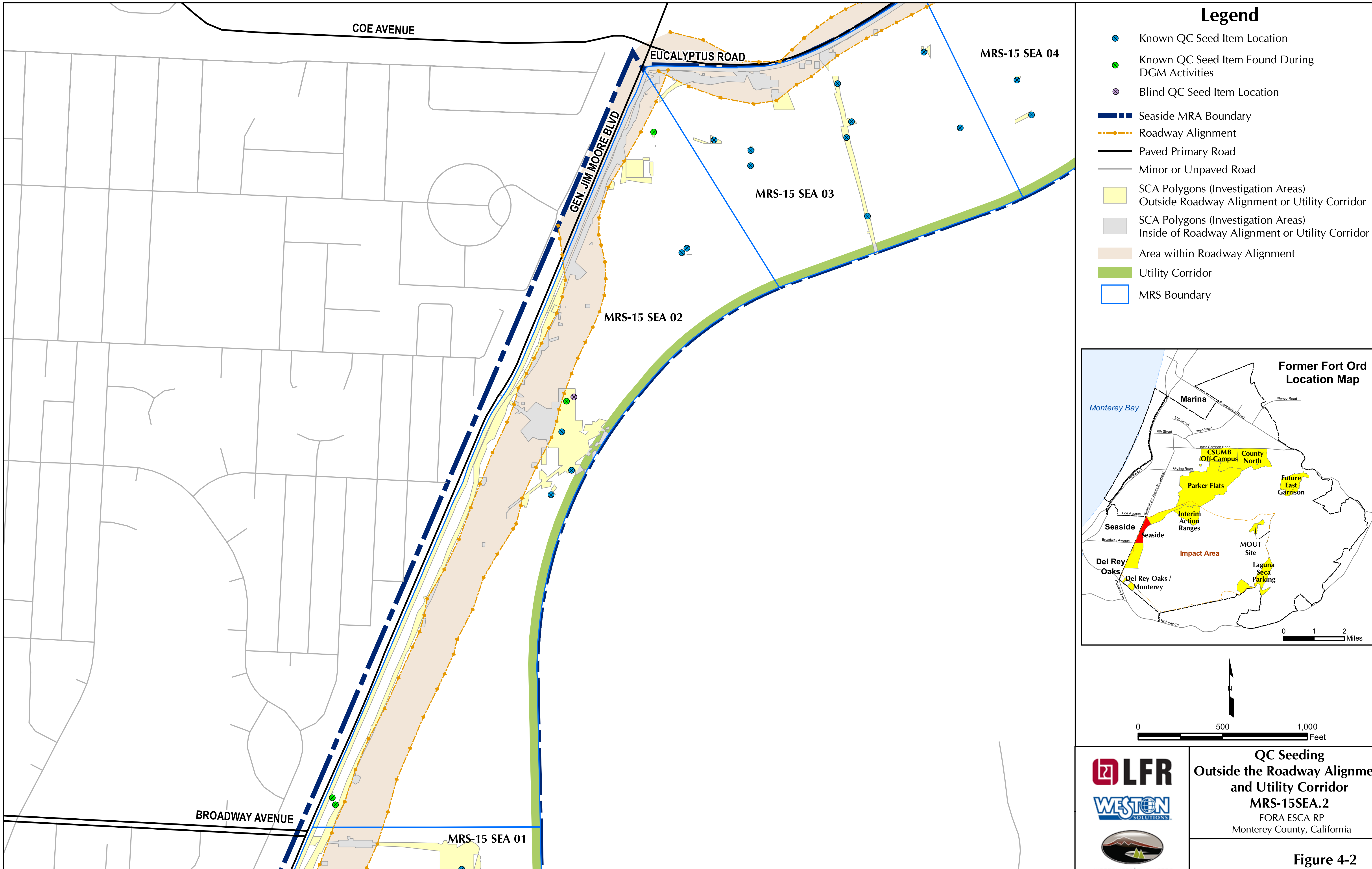

QC Seeding
Outside the Roadway Alignment
and Utility Corridor
MRS-15SEA.2
FORA ESCA RP
Monterey County, California

Figure 4-2

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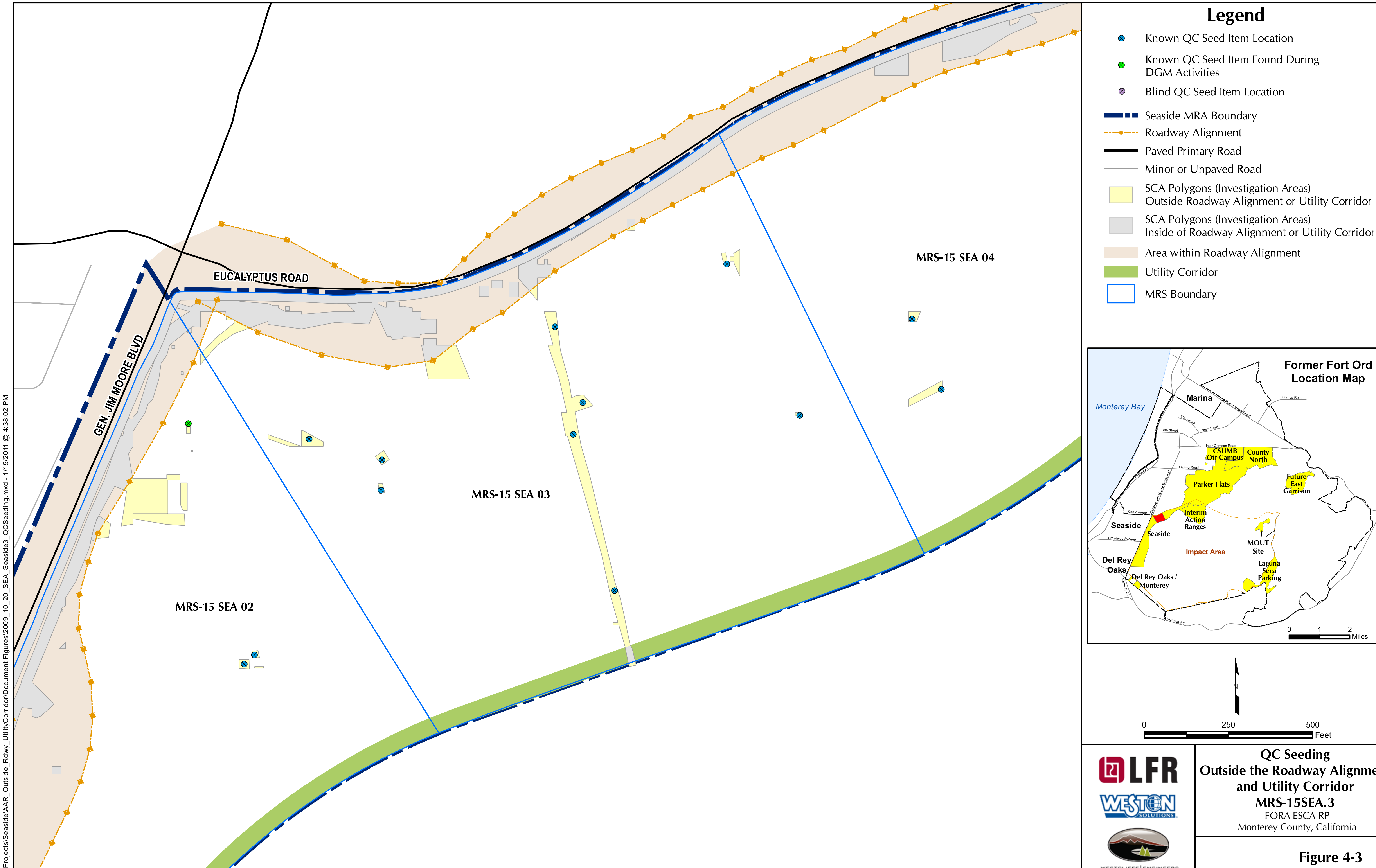

QC Seeding
Outside the Roadway Alignment and Utility Corridor
MRS-15SEA.3
FORA ESCA RP
Monterey County, California

Figure 4-3

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2009_10_20_SEA_Seaside4_QCSeeding.mxd - 1/19/2011 @ 4:37:57 PM

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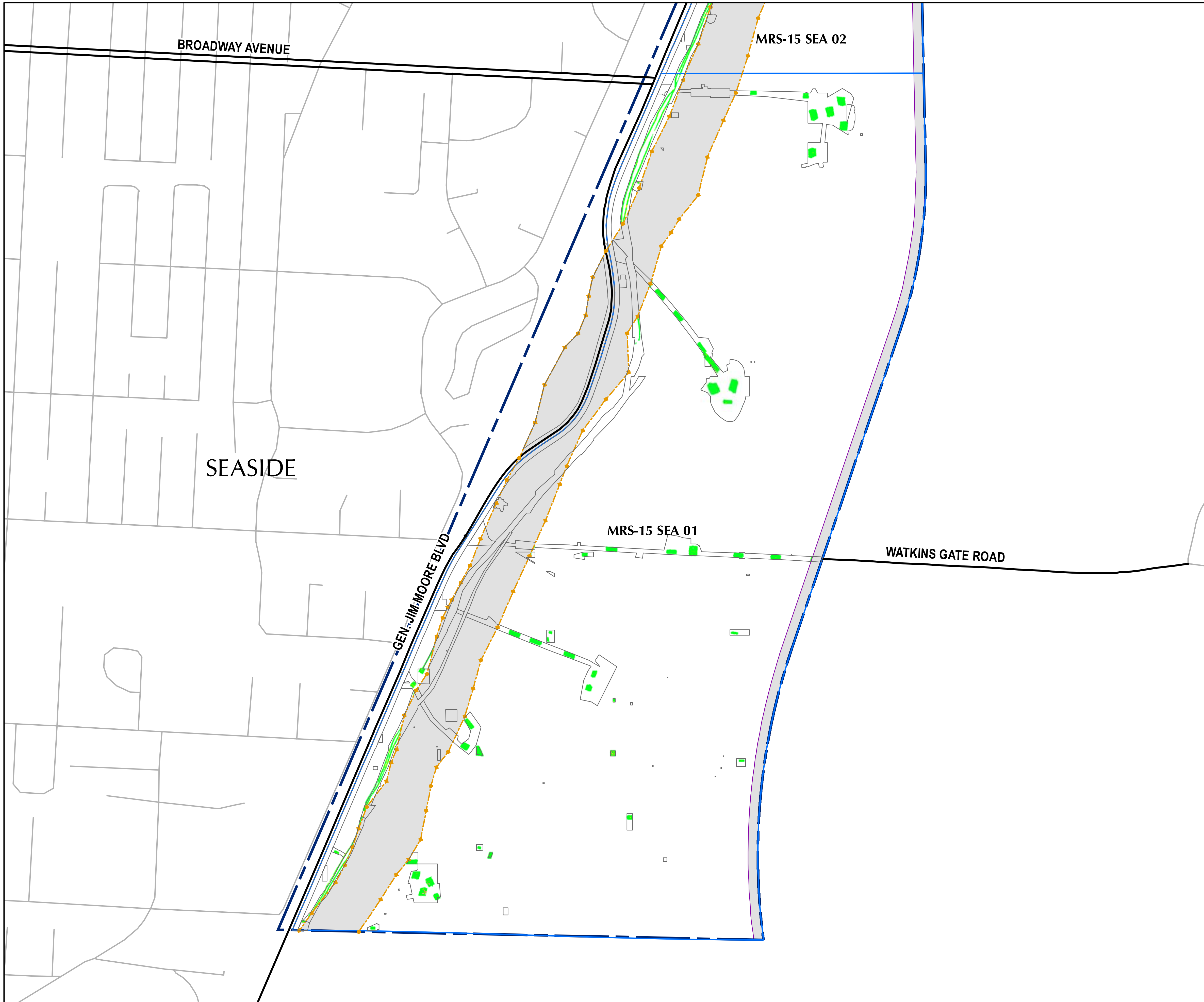
QC Seeding
Outside the Roadway Alignment and Utility Corridor
MRS-15SEA.4
FORA ESCA RP
Monterey County, California

Figure 4-4

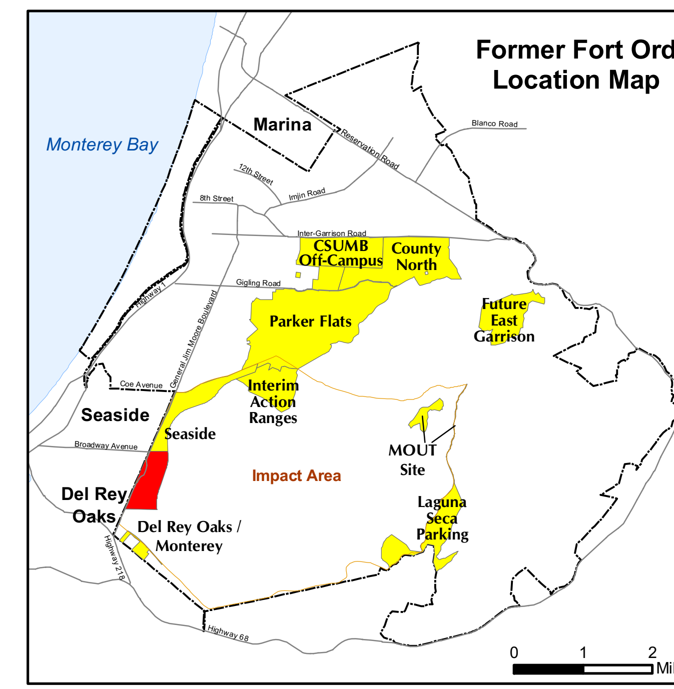


Legend

- Seaside MRA Boundary
- Roadway Alignment
- Paved Primary Road
- Minor or Unpaved Road
- SCA Polygon Boundaries (Investigation Areas)
- Area within Roadway Alignment
- Utility Corridor
- MRS Boundary

Response (Stack)
mV

0.5 2.1 3.6 5.1 6.7 8.2 9.7 11.3 13.3 15.4 17.4 19.5



0 500 1,000 Feet

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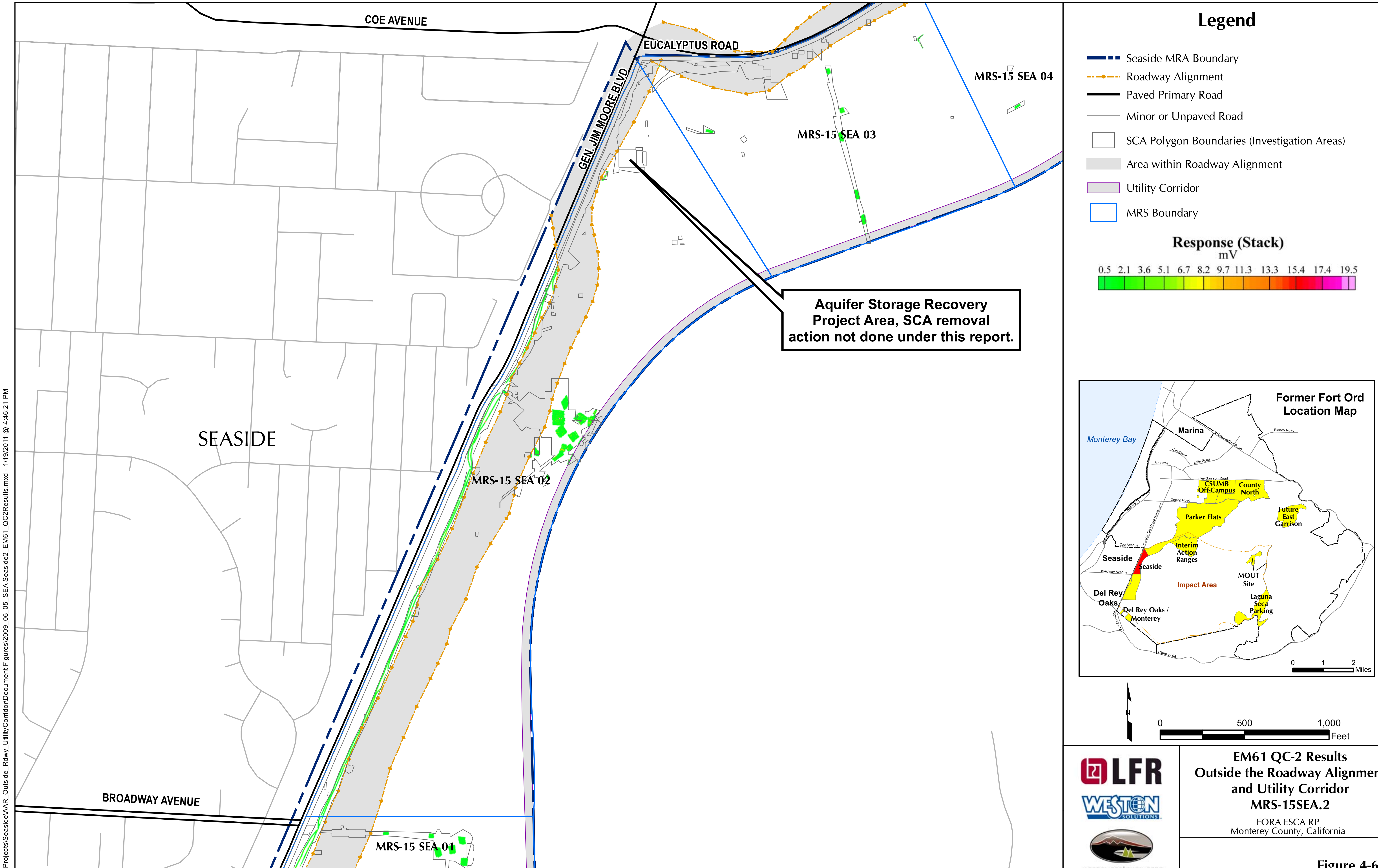
EM61 QC-2 Results Outside the Roadway Alignment and Utility Corridor MRS-15SEA.1

FORA ESCA RP
Monterey County, California

Figure 4-5

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2009_06_05_SEA Seaside1_EM61_QC2Results.mxd - 1/19/2011 @ 4:46:21 PM



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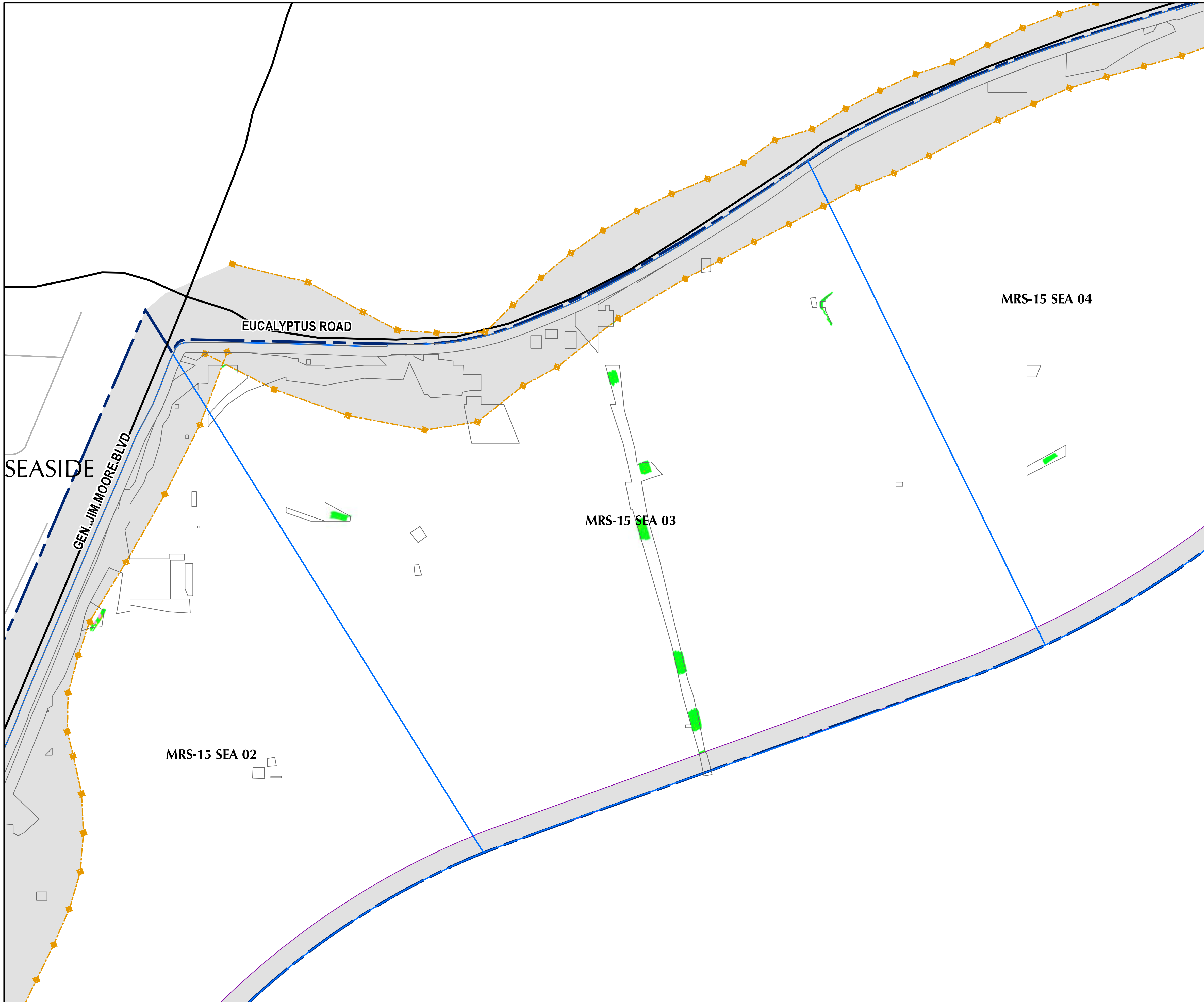
EM61 QC-2 Results Outside the Roadway Alignment and Utility Corridor MRS-15SEA.2

FORA ESCA RP
Monterey County, California

Figure 4-6

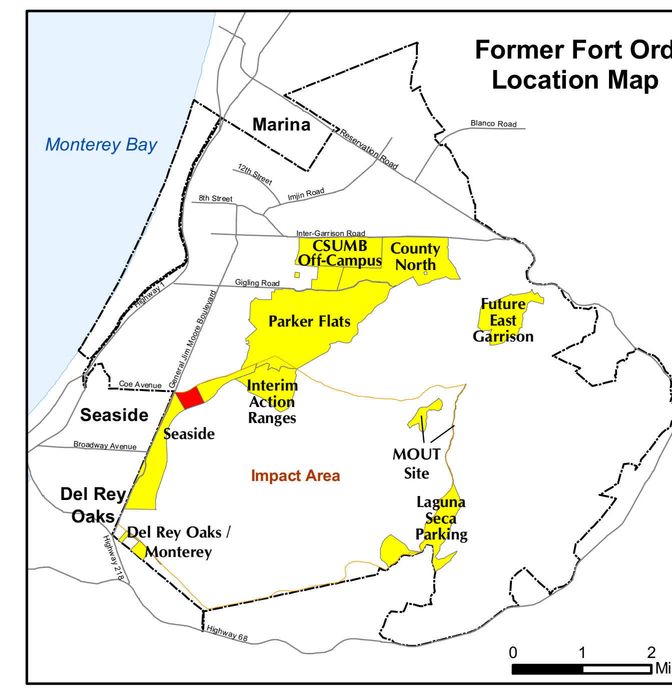


Legend

- Seaside MRA Boundary
- Roadway Alignment
- Paved Primary Road
- Minor or Unpaved Road
- SCA Polygon Boundaries (Investigation Areas)
- Area within Roadway Alignment
- Utility Corridor
- MRS Boundary

Response (Stack)
mV

0.5 2.1 3.6 5.1 6.7 8.2 9.7 11.3 13.3 15.4 17.4 19.5



0 250 500
Feet

EM61 QC-2 Results Outside the Roadway Alignment and Utility Corridor MRS-15SEA.3

FORA ESCA RP
Monterey County, California

Figure 4-7

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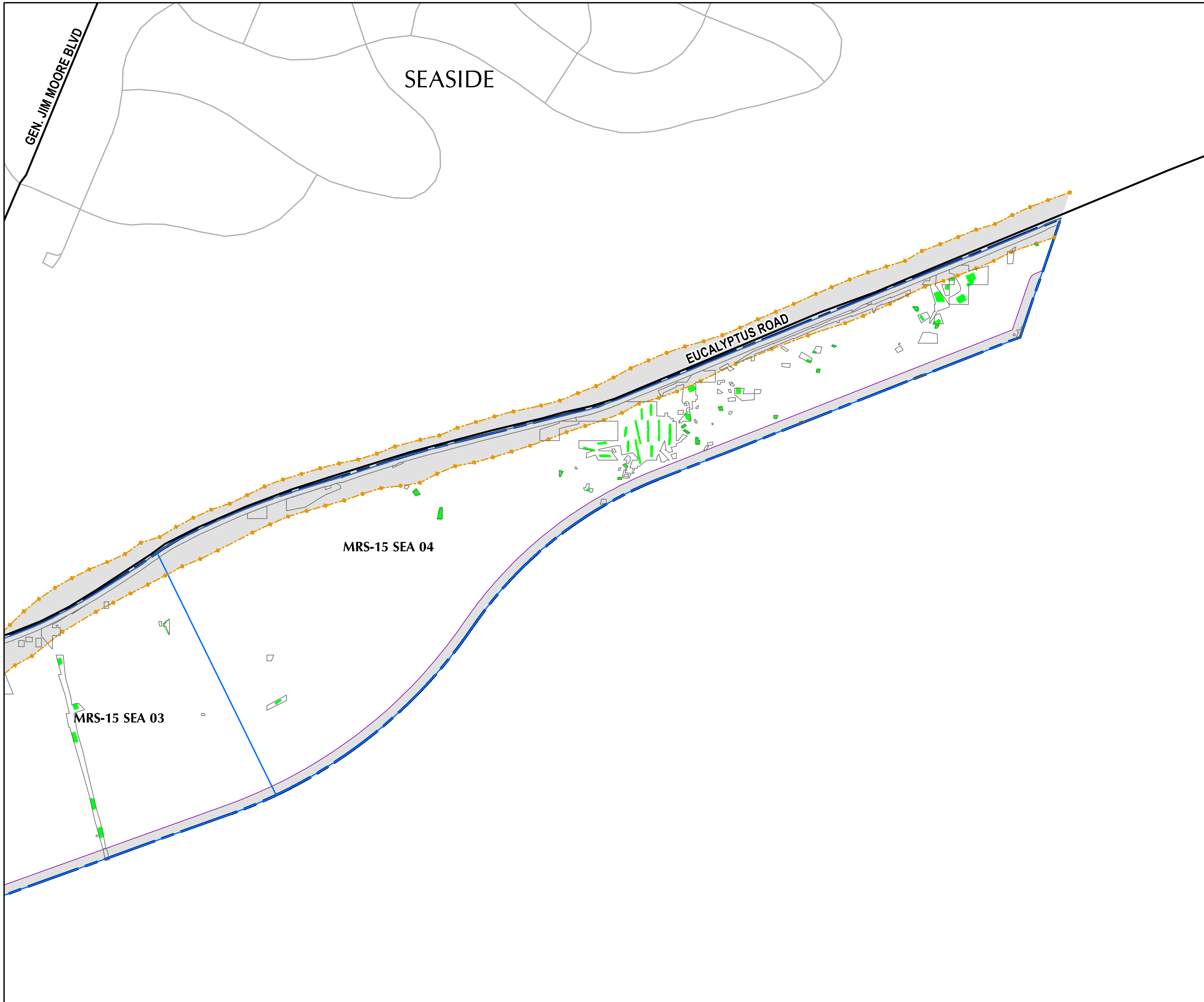
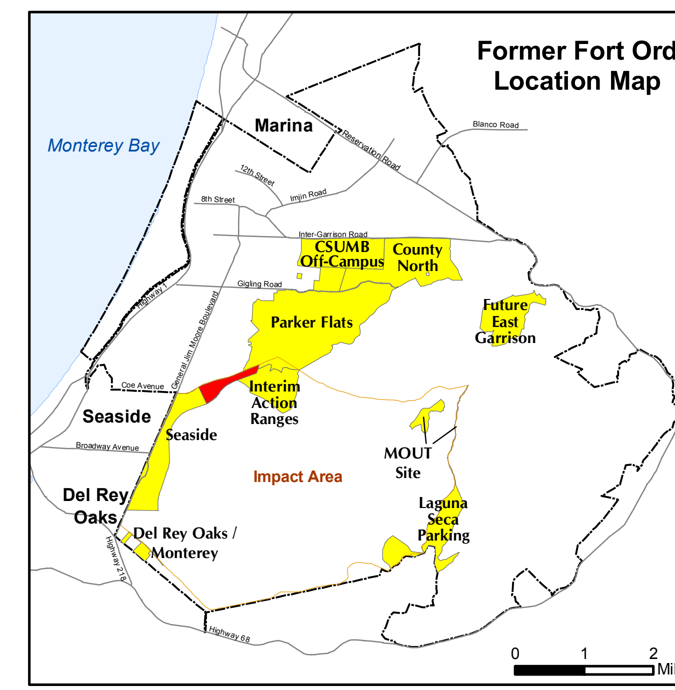


Legend

- Seaside MRA Boundary
- Roadway Alignment
- Paved Primary Road
- Minor or Unpaved Road
- SCA Polygon Boundaries (Investigation Areas)
- Area within Roadway Alignment
- Utility Corridor
- MRS Boundary

Response (Stack)
mV

0.5 2.1 3.6 5.1 6.7 8.2 9.7 11.3 13.3 15.4 17.4 19.5



0 500 1,000
Feet

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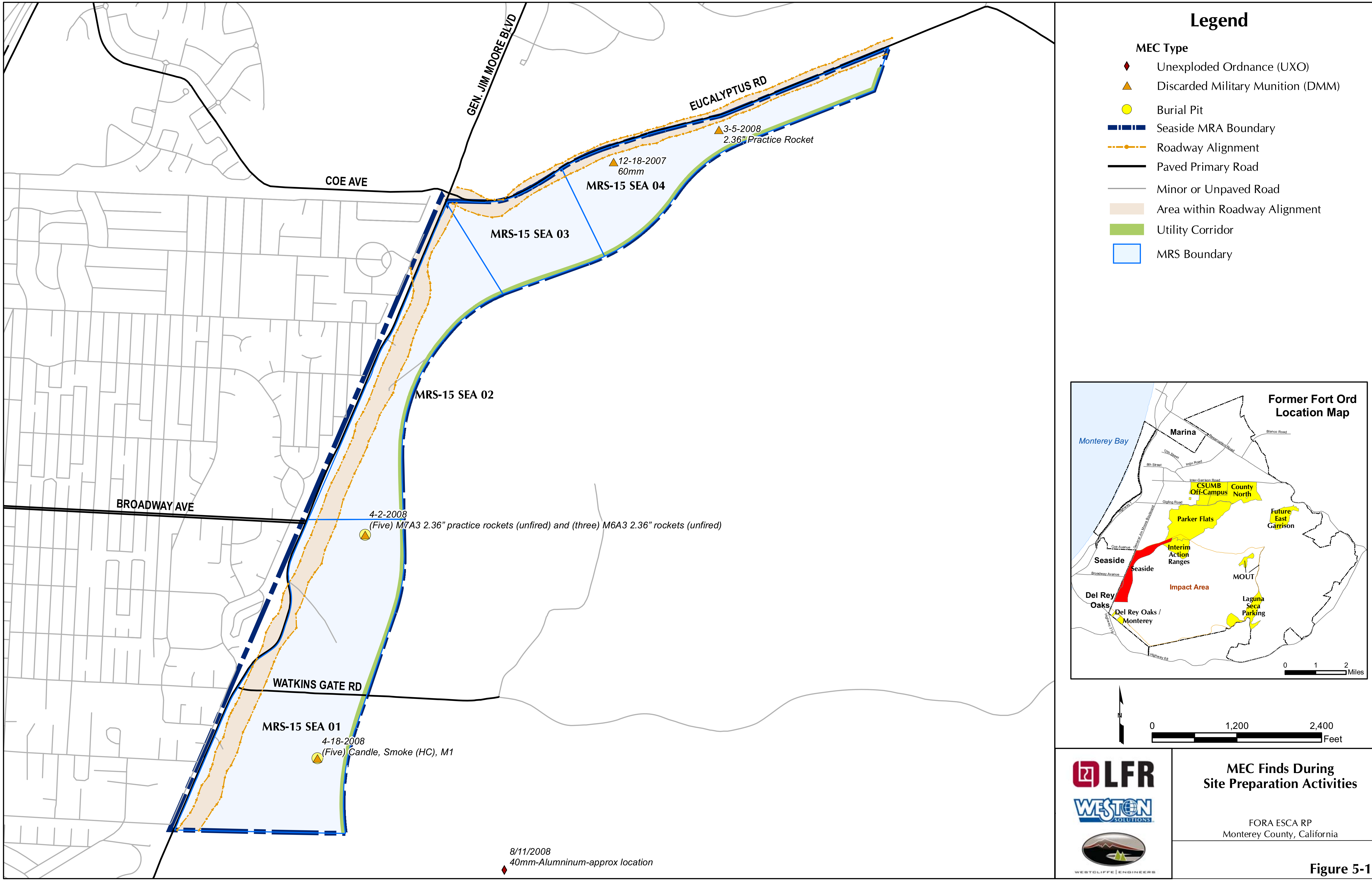
EM61 QC-2 Results
Outside the Roadway Alignment
and Utility Corridor
MRS-15SEA.4

FORA ESCA RP
Monterey County, California

Figure 4-8

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2009_06_04_SEA Seaside4_EM61_QC2Results.mxd - 1/19/2011 @ 5:20:50 PM



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MEC Finds During Site Preparation Activities

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Monterey County, California

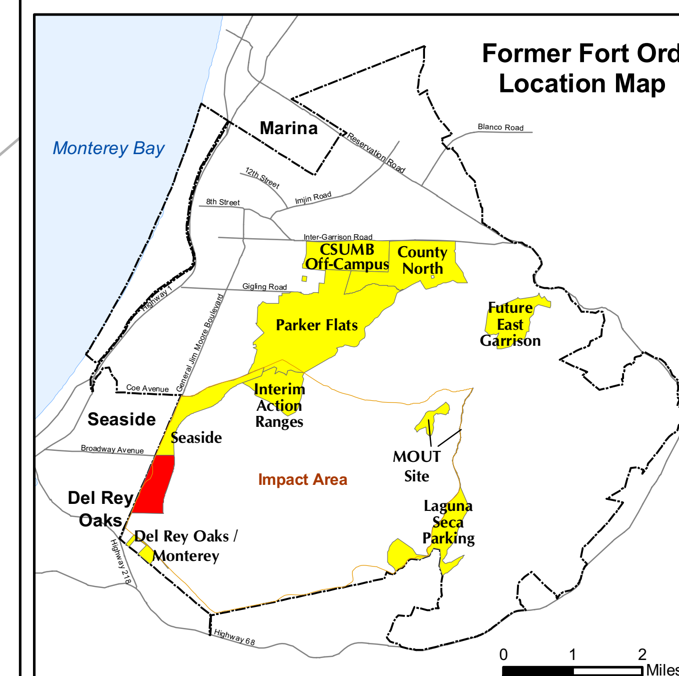
Figure 5-1

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2010_07_06_SEA Seaside MEC Finds Site Prep.mxd - 1/19/2011 @ 5:06:12 PM

Legend

MEC Type

- Munitions Debris (MD)
- Seaside MRA Boundary
- Roadway Alignment
- Paved Primary Road
- Minor or Unpaved Road
- SCA Polygons (Investigation Areas) Outside Roadway Alignment or Utility Corridor
- SCA Polygons (Investigation Areas) Inside of Roadway Alignment or Utility Corridor
- SCA Point Outside of Roadway Alignment or Utility Corridor
- SCA Point Inside of Roadway Alignment or Utility Corridor
- Area within Roadway Alignment
- Utility Corridor
- MRS Boundary



N

0 500 1,000
Feet

Results of SCA Points Outside the Roadway Alignment and Utility Corridor MRS-15SEA.1

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Monterey County, California

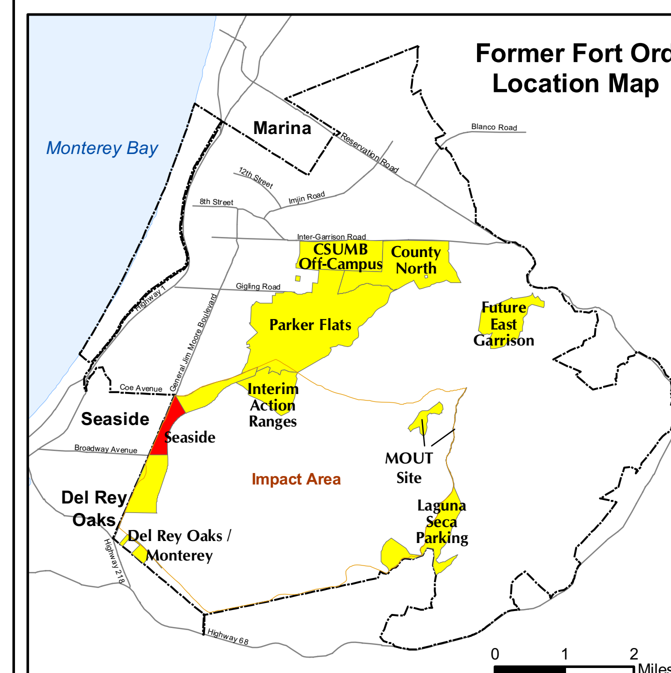
Figure 5-2

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2009_10_20_SEA_Seaside1_SCA_pt_Dig_Results.mxd - 1/19/2011 @ 4:59:33 PM

Legend

MEC Type

- Munitions Debris (MD)
- Seaside MRA Boundary
- Roadway Alignment
- Paved Primary Road
- Minor or Unpaved Road
- SCA Polygons (Investigation Areas) Outside Roadway Alignment or Utility Corridor
- SCA Polygons (Investigation Areas) Inside of Roadway Alignment or Utility Corridor
- SCA Point Outside of Roadway Alignment or Utility Corridor
- SCA Point Inside of Roadway Alignment or Utility Corridor
- Area within Roadway Alignment
- Utility Corridor
- MRS Boundary



0 500 1,000 Feet

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Results of SCA Points Outside the Roadway Alignment and Utility Corridor MRS-15SEA.2

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Monterey County, California

Figure 5-3

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2009_10_20_SEA_Seaside2_SCA_pt_Dig_Results.mxd - 1/19/2011 @ 4:59:33 PM

Results of SCA Points Outside the Roadway Alignment and Utility Corridor MRS-15SEA.3

FORA ESCA RP
Monterey County, California

Figure 5-4

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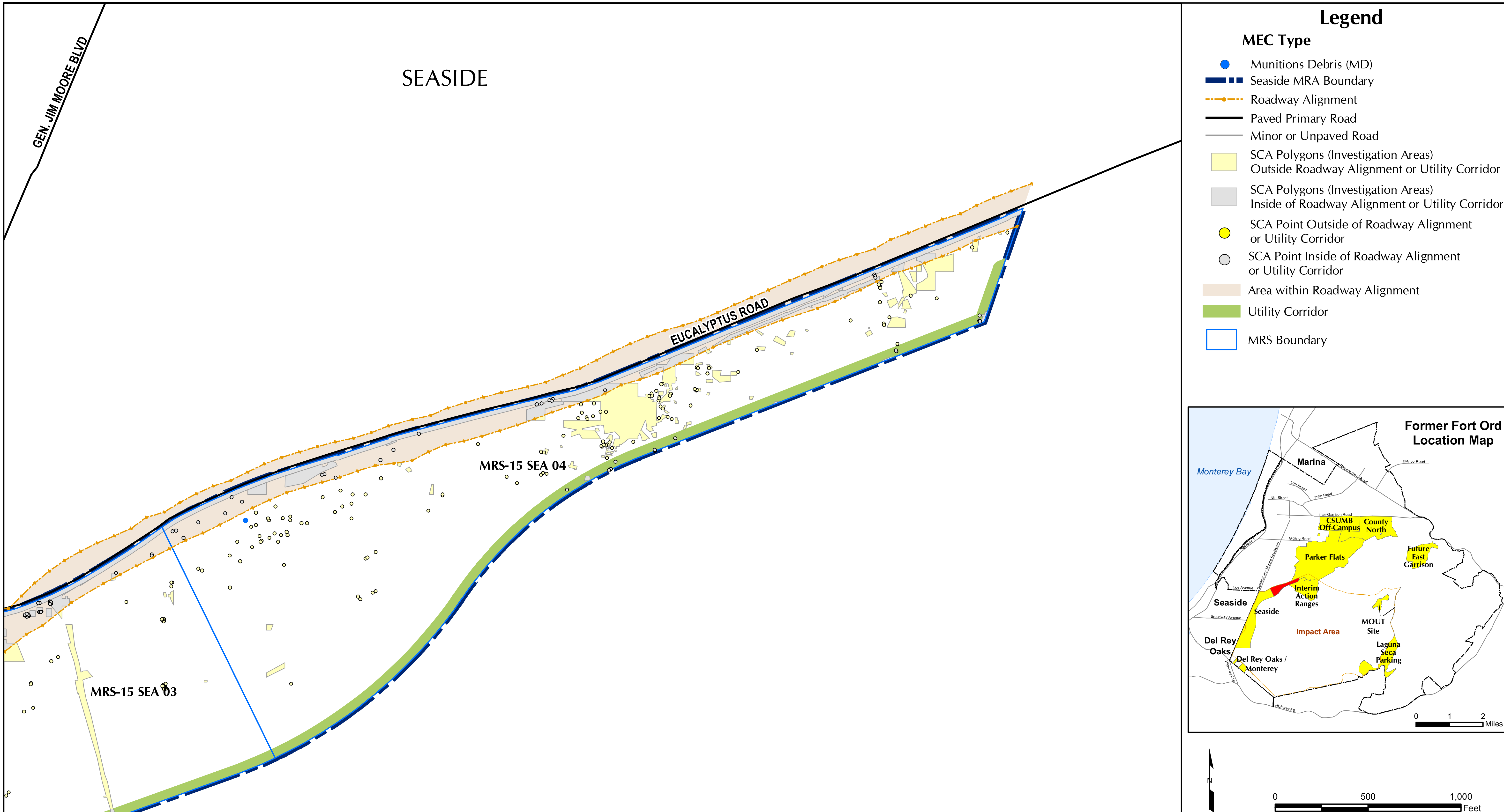
T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2009_10_20_SEA_Seaside3_SCA_pt_Dig_Results.mxd - 1/19/2011 @ 4:59:33 PM

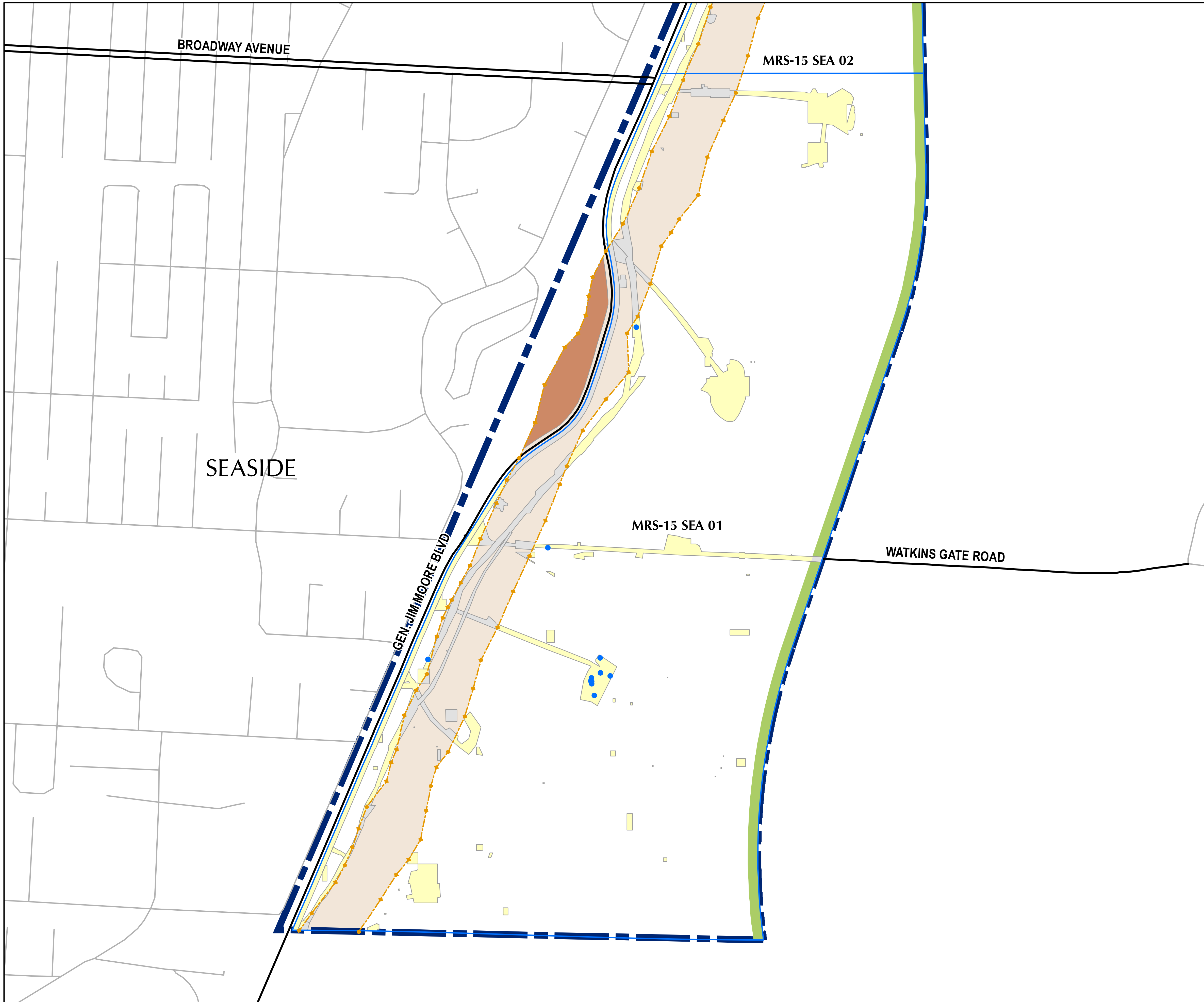


Results of SCA Points Outside the Roadway Alignment and Utility Corridor MRS-15SEA.4

FORA ESCA RP
Monterey County, California

Figure 5-5

T:\Projects\Seaside\AAR_Outside_Rdwy_UtilityCorridor\Document Figures\2009_10_20_SEA_Seaside4_SCA_pt_Dig_Results.mxd - 1/19/2011 @ 4:59:33 PM



Results of SCA Polygons Outside the Roadway Alignment and Utility Corridor MRS-15SEA.1

FORA ESCA RP
Monterey County, California

Figure 5-6

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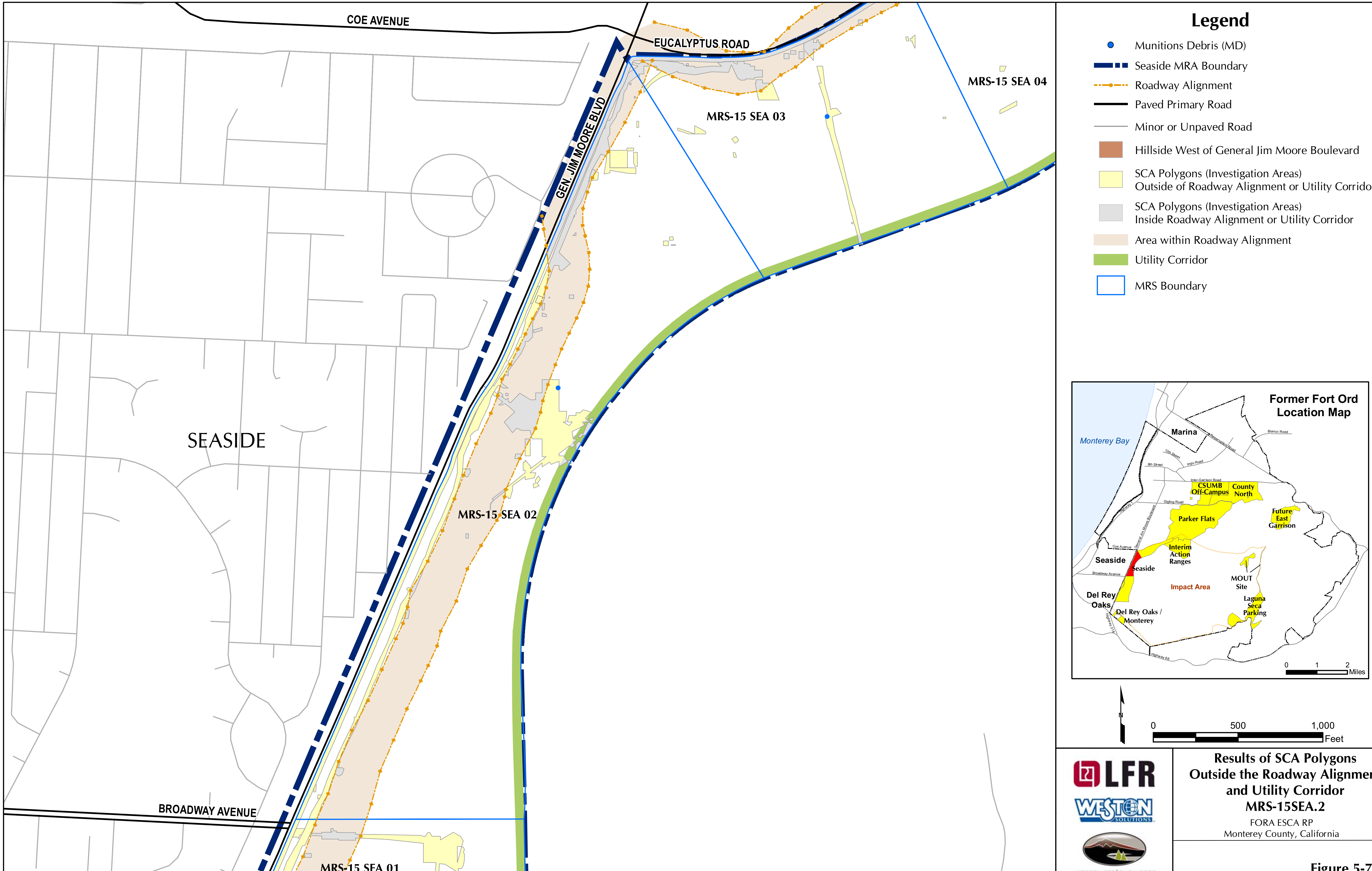

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Results of SCA Polygons Outside the Roadway Alignment and Utility Corridor MRS-15SEA.2

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Monterey County, California

Figure 5-7

Results of SCA Polygons Outside the Roadway Alignment and Utility Corridor MRS-15SEA.3

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Figure 5-8

Results of SCA Polygons Outside the Roadway Alignment and Utility Corridor MRS-15SEA.4

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Monterey County, California

Figure 5-9

APPENDIX A

through

APPENDIX N

(Please see the enclosed CD)