FORA ESCA REMEDIATION PROGRAM

FINAL

Group 3

Remedial Investigation / Feasibility Study

Volume 2: Risk Assessment

Del Rey Oaks / Monterey, Laguna Seca Parking, and Military Operations in Urban Terrain Site Munitions Response Areas

Former Fort Ord
Monterey County, California

July 31, 2012

Prepared for:

FORT ORD REUSE AUTHORITY

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Group 3 Remedial Investigation/Feasibility Study
Volume 2: Risk Assessment
Former Fort Ord
Monterey County, California

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ACRONYMS AND ABBREVIATIONS

ac	acres
ACES	Areas Covered by Environmental Services
AOC	Administrative Order on Consent
ARAR	applicable or relevant and appropriate requirement
Army	United States Department of the Army
bgs	below ground surface
BO	biological opinion
BRA	Basewide Range Assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm^3	cubic centimeters
CSM	Conceptual Site Model
CSUMB	California State University Monterey Bay
CTS	California tiger salamander
DEM	digital elevation model
DMM	discarded military munitions
DOD	United States Department of Defense
DQO	data quality objective
DRO	Del Rey Oaks
DTSC	Department of Toxic Substances Control
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
ESCA	Environmental Services Cooperative Agreement
ESCA RP	Environmental Services Cooperative Agreement Remediation Program
FFA	Federal Facility Agreement
FORA	Fort Ord Reuse Authority
FOSET	Finding of Suitability for Early Transfer
FS	feasibility study
ft	feet
g	grams
GIS	geographic information system
GPS	Global Positioning System
HA	historical area
HFA	Human Factors Applications, Inc.
HMP	Habitat Management Plan
in^2	square inches
in^3	cubic inches
kg	kilograms

MD	munitions debris
MEC	munitions and explosives of concern
MOUT	Military Operations in Urban Terrain
MR	Munitions Response
MRA	Munitions Response Area
MRS	Munitions Response Site
NRMA	natural resources management area
NPL	National Priorities List
ODDS	Ordnance Detection and Discrimination Study
Pd	percent detection
RA	risk assessment
RI	remedial investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SEDR	Summary of Existing Data Report
SS/GS	SiteStats/GridStats
SSURGO	Soil Survey Geographic
TCRA	time-critical removal action
USA	USA Environmental, Inc.
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UXB	UXB International, Inc.
UXO	unexploded ordnance

GLOSSARY

Anomaly
Any item that is seen as a subsurface irregularity after geophysical investigation. This irregularity should deviate from the expected subsurface ferrous and non-ferrous 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.

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 that all remediation has been accomplished prior to transfer. United States 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 United States 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.

ESCA RP Team
ARCADIS U.S., Inc. (formerly LFR Inc.), Weston Solutions, Inc., and Westcliffe Engineers, Inc.

Explosive
A substance or a mixture of substances that is capable by chemical reaction of producing gas at such temperature, pressure, and speed as to cause damage to the surroundings. The term "explosive" includes all substances variously known as high explosives and propellants, together with igniters, primers, initiators, and pyrotechnics (e.g., illuminant, smoke, delay, decoy, flare, and incendiary compositions).

Feasibility Study (FS)
The primary objective of the FS is "to ensure appropriate remedial alternatives are being developed and evaluated and an appropriate remedy selected" [NCP 40 CFR 300.430(e)].

Geophysical Reacquisition
Geophysical Reacquisition involves utilizing both a positioning method (i.e., Global Positioning System [GPS], ultrasonic, or tape from corners) and geophysical instruments to reacquire and pinpoint anomaly locations selected by the geophysical processors. The geophysical instruments include the original instrument used for the digital survey of the grid and the analog instrument being utilized by the UXO teams for intrusive activities. The intended result of this method is to pinpoint the location where the intrusive teams will find the subsurface item causing the anomaly.

Intrusive Activity
An activity that involves or results in the penetration of the ground surface at an area known or suspected to contain MEC. Intrusive activities can be of an investigative or removal action nature.

Mag and dig
Utilizing handheld 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.

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 DOD, 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 of the above. 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)].

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, discarded military munitions, 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).

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)
See MEC.

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.

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.

Remedial Investigation (RI)

The RI is intended to "adequately characterize the site for the purpose of developing and evaluating an effective remedial alternative" [NCP, 40 CFR 300.430(d)]. In addition, the RI provides information to assess the risks to human health, safety, and the environment that were identified during risk screening in the site investigation.

Remedial Actions

Those actions consistent with a permanent remedy taken instead of or in addition to removal actions in the event of a release or threatened release of a hazardous substance into the environment, to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health, welfare, or the environment. The term includes but is not limited to such actions at the location of the release as storage; confinement; perimeter protection using dikes, trenches, or ditches; clay cover; neutralization; cleanup of released hazardous substances and associated contaminated materials; recycling or reuse; diversion; destruction; segregation of reactive wastes; dredging or excavations; repair or replacement of leaking containers; collection of leachate and runoff; on-site treatment or incineration; provision of alternative water supplies; and any monitoring reasonably required to assure that such actions protect the public health, welfare, and the environment. The term includes the costs of permanent relocation of residents and businesses and community facilities where the President of the United States determines that, alone or in combination with other measures, such relocation is more cost-effective and environmentally preferable to the transportation, storage, treatment, destruction, or secure disposition off site of hazardous substances, or may otherwise be necessary to protect the public health or welfare. The term includes off-site transport and off-site storage, treatment, destruction, or secure disposition of hazardous substances and associated contaminated materials.

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.

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.

1.0 INTRODUCTION

The former Fort Ord is located on Monterey Bay in northwestern Monterey County, California (Figure 1). Since 1917, portions of the former Fort Ord were used by the United States Department of the Army (Army) for maneuvers, target ranges, and other purposes. Military munitions were fired into, fired upon, or used on the facility. As a result, a wide variety of conventional munitions and explosives of concern (MEC), consisting of unexploded ordnance (UXO) and discarded military munitions (DMM) items, have been encountered at the former Fort Ord.

This Group 3 Remedial Investigation/Feasibility Study (RI/FS) Report was prepared by the Environmental Services Cooperative Agreement Remediation Program (ESCA RP) Team on behalf of the Fort Ord Reuse Authority (FORA) in accordance with an Administrative Order on Consent (AOC), which addresses cleanup of portions of the former Fort Ord in Monterey County, California. The ESCA RP Team consists of ARCADIS U.S., Inc. (formerly LFR Inc.), Weston Solutions, Inc., and Westcliffe Engineers, Inc.

The AOC was entered into voluntarily by the United States Environmental Protection Agency (EPA) Region 9, the California Department of Toxic Substances Control (DTSC), FORA, and the United States Department of Justice Environment and Natural Resources Division (EPA Region 9 CERCLA Docket No. R9-2007-03). The AOC was issued under the authority vested in the President of the United States by Sections 104, 106, and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, 42 United States Code (U.S.C.) §§ 9604, 9606, and 9622.

As described in the Summary of Existing Data Report (SEDR; ESCA RP Team 2008), Group 3 included the Del Rey Oaks (DRO)/Monterey, Laguna Seca Parking, Military Operations in Urban Terrain (MOUT) Site, and Interim Action Ranges Munitions Response Areas (MRAs; Figure 2). The Interim Action Ranges MRA has been removed from this Group 3 RI/FS report for further evaluation as agreed upon by FORA, the EPA, DTSC, and the Army. The Interim Action Ranges MRA will be presented in a separate RI/FS Report.

This Group 3 RI/FS Report: 1) describes the nature and extent of MEC; 2) assesses explosives safety risk that may be present; and 3) develops, screens, and evaluates alternatives to reduce the potential explosives safety risk to current and future property owners and the general public. The Group 3 RI/FS Report will be used by the Army in developing the Proposed Plan and making a decision on remedial actions. The report is based on the evaluation of work conducted for the MRAs according to the guidance provided in the Group 3 RI/FS Work Plan (ESCA RP Team 2009).

The Group 3 RI/FS is divided into three parts: the Remedial Investigation (RI) is Volume 1, the Risk Assessment (RA) is Volume 2, and the Feasibility Study (FS) is Volume 3. This RA, Volume 2 of the Group 3 RI/FS, presents the results of the MEC RA that addresses the risks associated with MEC in the DRO/Monterey MRA, Laguna Seca Parking MRA, and the MOUT Site MRA.

1.1 Purpose of the Risk Assessment

The CERCLA or Superfund established the RI/FS process to identify the nature and extent of risks at a site and to determine the appropriate remedial methods to address them. The RI/FS is an analytical process designed to support risk management decision-making for Superfund sites and risk assessment plays an essential role. According to CERCLA, the results of the risk assessment should help establish acceptable remediation levels for use in developing remedial alternatives during the FS. Risk due to potential chemical contamination in soil is addressed in the Basewide Range Assessment (BRA; Shaw/MACTEC 2009). Therefore, only MEC are addressed in this risk assessment. The MEC risk assessment does not establish acceptable remediation levels, but is used to develop and evaluate remedial alternatives during the FS. A MEC risk assessment is required as part of Task 4 of the AOC Scope of Work.

The MEC risk assessment is used to describe the qualitative and quantitative factors leading to an encounter between a receptor and a MEC item. Several methods exist for performing risk assessments on munitions response sites (MRSs); however, at the time risk assessments were first performed at the former Fort Ord, no MEC risk assessment methodology had been widely accepted, evaluated, and fully implemented for a variety of MRSs. Therefore, the Fort Ord MEC Risk Assessment Protocol ("the Protocol") was prepared through a combined effort of the Army, the EPA, and the DTSC (Malcolm Pirnie 2002).

This RA focuses on the DRO/Monterey, Laguna Seca Parking, and MOUT Site MRAs. The risk assessment is limited to current intended land use. Land use restrictions are evaluated in Volume 3 of the RI/FS.

1.1.1 Cleanup Program Under the Army

The former Fort Ord was placed on the National Priorities List (NPL) in 1990 primarily because of chemical contamination in soil and groundwater that resulted from past Army use. To oversee the cleanup of the base, the Army, EPA, DTSC, and the Central Coast Regional Water Quality Control Board (RWQCB) entered into a Federal Facility Agreement (FFA). One of the purposes of the FFA was to ensure that the environmental impacts associated with past and present activities at the former Fort Ord were thoroughly investigated and appropriate remedial action taken as necessary to protect public health and the environment. In accordance with the FFA, the Army was designated as the lead agency under CERCLA for conducting environmental investigations, making cleanup decisions, and taking cleanup actions at the former Fort Ord. The EPA was designated as the lead regulatory agency for the cleanup, while the DTSC and RWQCB were designated as supporting agencies.

The Army has conducted a number of MEC survey and clearance activities, including geophysical surveys. The Army has conducted its activities pursuant to the President of the United States' authority under CERCLA Section 104, as delegated to the Army in accordance with Executive Order 12580 and in compliance with CERCLA Section 120.

In November 1998, the Army agreed to evaluate MEC at the former Fort Ord and perform a basewide munitions response (MR) RI/FS consistent with CERCLA. The basewide MR

RI/FS program addressed MEC hazards at the former Fort Ord and evaluated past removal actions as well as recommended future remedial actions deemed necessary to protect human health and the environment under future uses. In April 2000, an agreement was signed between the Army, EPA, and DTSC to evaluate MEC at the former Fort Ord subject to the provisions of the FFA. The signatories agreed that the FFA provided the appropriate framework and process to address the Army's MEC activities. The FFA established schedules for performing RIs and FSs, and required that remedial actions be completed expeditiously.

The basewide MR RI/FS program is described in the Draft Final Ordnance and Explosives RI/FS Work Plan (USACE 2000). Elements of the MR RI/FS program include a literature review, preparation of a Sampling and Analysis Plan for additional MEC characterization activities, evaluation of MEC work by previous contractors, performance of an Ordnance Detection and Discrimination Study (ODDS), identification of applicable or relevant and appropriate requirements (ARARs), evaluation of risks, and development of long-term risk management measures, a community relations plan, and a health and safety plan. The MR RI/FS program only addresses the physical risk from MEC. The potential for soil contamination from munitions constituents at the former Fort Ord is being addressed under the Army's BRA Program (Shaw/MACTEC 2009).

The Army's approach to categorizing areas within the former Fort Ord includes track groupings consisting of Track 0 through Track 3. Specifically, track definitions are as follows:

- Track 0: Areas that contain no evidence of MEC and have never been suspected of having been used for military munitions-related activities. In June 2002, the Army signed a Track 0 Record of Decision (ROD; Army 2002). The Track 0 ROD addresses selected land parcels, and also provides a Plug-In process to address future land parcels that are considered eligible for inclusion in the Track 0 process.
- Track 1: Sites where military munitions were suspected to have been used but, based on results, the sites fall into one of three categories: 1) sites with no evidence to indicate that military munitions were used; 2) sites used for training but military munitions used do not pose an explosive hazard; or 3) sites used for training but military munitions potentially remaining do not pose an unacceptable risk. In April 2005, the Army signed a Track 1 ROD (Army 2005). The Track 1 ROD addresses selected land parcels, and also provides a Plug-In process to address future land parcels that are considered eligible for inclusion in the Track 1 process.
- Track 2: Sites where MEC were present and MEC removal has been conducted.
- Track 3: Sites where MEC are known or suspected but investigations have not been initiated or completed.

In addition, to remain consistent with the federal Endangered Species Act (ESA), the Army has completed consultations with the United States Fish and Wildlife Service (USFWS) on the Army's predisposal actions, including cleanup of MEC. These consultations have resulted in biological opinions (BOs) that include endangered species incidental take statements. These BOs allow impacts to and incidental take of listed species during MEC cleanup

activities, but require mitigation measures to be implemented during the MEC cleanup activities to reduce and minimize impacts to the protected species and their habitats.

1.1.2 Early Transfer Property and Environmental Services Cooperative Agreement

The transfer of a portion of the former Fort Ord, pursuant to CERCLA Section 120(h)(3)(C), was requested by FORA in a letter dated May 18, 2005. Under CERCLA Section 120(h)(3), the United States is required to provide a covenant in deeds conveying the property warranting that all remedial action necessary to protect human health and the environment has been taken before the date of transfer. For a federal facility listed on the NPL, CERCLA Section 120(h)(3)(C) allows the EPA Administrator, with concurrence of the governor of the state, to defer the CERCLA covenant requirement. These types of transfers under CERCLA Section 120(h)(3)(C) are typically called "early transfers," in which the United States provides the warranty after transfer of the property when all of the response actions necessary to protect human health and the environment have been taken. The period between the transfer of title and the making of this final warranty is known as the "deferral period." Early transfers allow productive reuse of the property through access while final remediation work is being conducted. In addition, United States Department of Defense (DOD) and Army policy require that the military department proposing to transfer property prepare a Finding of Suitability for Early Transfer (FOSET).

The Army has completed the final "Finding of Suitability for Early Transfer (FOSET), Former Fort Ord, California, Environmental Services Cooperative Agreement (ESCA) Parcels and Non-ESCA Parcels (Operable Unit Carbon Tetrachloride Plume) (FOSET 5)" (Army 2007). The Army has requested deferral of the CERCLA covenant and EPA has approved, with the concurrence of the Governor of the State of California, the Covenant Deferral Request associated with the early transfer of the property.

On March 31, 2007, the Army and FORA entered into an ESCA to provide MEC remediation services during the deferral period, thereby allowing the Army to transfer approximately 3,340 acres of property and the responsibility of removing MEC to FORA as an Economic Development Conveyance. The former Fort Ord property transferred under the ESCA is collectively referred to as the Areas Covered by Environmental Services (ACES). In accordance with the ESCA, FORA is responsible for addressing response actions for the property except for those responsibilities retained by the Army. The ESCA and the AOC identify the Army-retained conditions for which the Army assumes responsibility. If these conditions are encountered, FORA is required to notify the Army of their presence in accordance with the guidelines set forth in the ESCA and the Army assumes responsibility. Included in the Army-retained conditions are:

- Radiological material
- Chemical or biological warfare agents
- Natural resource injuries or damages occurring as a result of contamination releases that have occurred due to Army ownership or activities except to the extent such injuries are a direct result of FORA's activities

- Unknown uninsured conditions, which include the management and cleanup of non-MEC-related hazardous and toxic wastes above insurance parameters
- Perchlorate contamination in soil or groundwater

To accomplish this effort, FORA entered into an agreement with the ESCA RP Team, to assist in the completion of the MEC cleanup activities in accordance with the ESCA and the AOC. During the ESCA RP, FORA is responsible for administrative and management program elements, while the ESCA RP Team conducts the MEC cleanup work under FORA oversight.

1.1.3 FORA ESCA Remediation Program

The purpose of the ESCA RP is to provide the necessary environmental services to FORA, which include characterization, assessment of explosive risk, FS, remediation alternatives analysis, and performance of remediation of hazardous substances, including but not limited to MEC (excluding the Army-retained conditions described in Section 1.1.2). The primary objective of the ESCA RP is timely cleanup of the property in accordance with the ESCA and AOC. The potential for soil contamination from munitions constituents at the former Fort Ord is being addressed under the Army's BRA Program (Shaw/MACTEC 2009). As stated in FOSET 5, based on the BRA Program, no further action has been recommended for historical areas (HAs) within the Laguna Seca Parking, MOUT Site, and DRO/Monterey MRAs. In addition, Laguna Seca Parking and MOUT Site MRAs are part of Installation Restoration Program (IRP) Site 39 at the former Fort Ord. Previous soil remediation activities were conducted as part of the Site 39 program, which has an existing ROD.

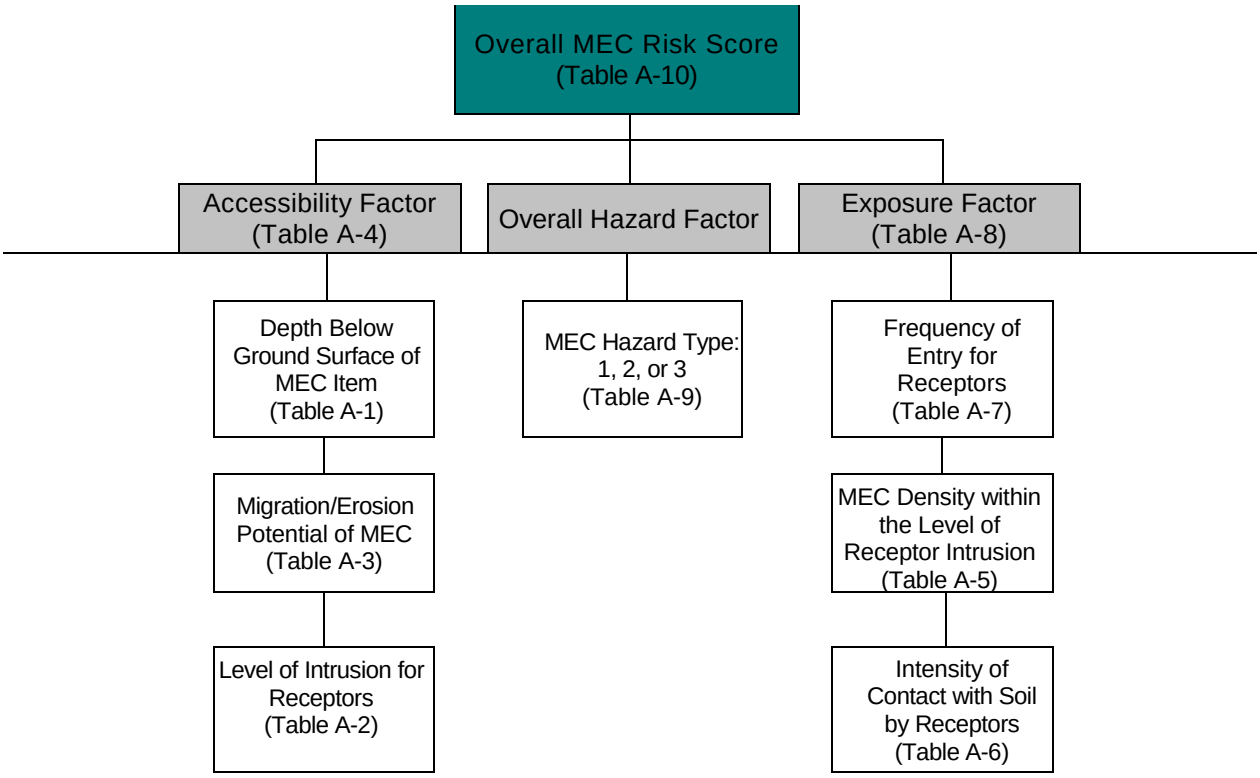
The SEDR was completed for the ACES as required under Task 2 of the AOC Scope of Work (ESCA RP Team 2008). In the SEDR, the ACES were combined into nine MRAs to facilitate the implementation of the AOC. The SEDR provided a site overview, evaluation of existing data, identification of data gaps, a conceptual site model (CSM) including an initial assessment of explosives safety risks, and proposed future use for each MRA. The SEDR also presented conclusions and recommendations for further actions and formed the basis for the RI planning efforts.

The nine MRAs were consolidated into four groups, according to similar pathway-to-closure characteristics (Figure 2). Group 1 consists of the Parker Flats and Seaside MRAs. Group 2 consists of the California State University Monterey Bay (CSUMB) Off-Campus and County North MRAs. Group 3 consists of the Interim Action Ranges, Laguna Seca Parking, MOUT Site, and DRO/Monterey MRAs. Group 4 consists of the Future East Garrison MRA. The Interim Action Ranges MRA was included in the Group 3 RI/FS Work Plan; however, it is not presented in this report. The Interim Action Ranges MRA has been removed from this Group 3 RI/FS report for further evaluation as agreed upon by FORA, the EPA, DTSC, and the Army. With support of the Army, EPA, FORA, and DTSC, the Interim Action Ranges MRA will be presented in a separate RI/FS report.

1.2 Fort Ord MEC Risk Assessment Protocol

The Fort Ord MEC Risk Assessment Protocol (Malcolm Pirnie 2002) was prepared through a combined effort of the Army, the DTSC (representing the Human and Ecological Risk Office), and the EPA. The purpose of the Protocol is to allow for comparative review of MEC risks at sites where MEC was encountered at the former Fort Ord. The Protocol does not calculate the probability of adverse consequences, but instead assumes that encounters with MEC items will result in adverse consequences and, therefore, describes and estimates the MEC risk recognizing that basic assumption. The Protocol is not designed to assess absolute risk, but is rather an approach for understanding risks and comparing the relative risk between remedial alternatives on a site where MEC was encountered at the former Fort Ord.

The Protocol is a qualitative risk assessment approach based on seven input scores used to generate three input factors. These input scores are both qualitative and quantitative. The definitions and correlations between the seven input scores are discussed in Sections 2.0 through 5.0 and Appendix A of this report and are illustrated below:



The Protocol output is an overall MEC risk score designated by the letters A through E, with "A" representing the lowest risk and "E" representing the highest risk. The overall MEC risk score produced by this Protocol should not be compared to risks from other facilities where MEC was encountered, because the Protocol was developed for the former Fort Ord using

site-specific conditions. The overall MEC risk score is supported by a narrative describing the assumptions used to generate the input factors. There are three input factors: the accessibility factor, the overall hazard factor, and the exposure factor. The accessibility factor is composed of three input scores based on information about the depth below ground surface (bgs) of any potentially remaining MEC, the potential for migration or erosion, and the level of intrusion into the soil by a receptor. The overall hazard factor is composed solely of the MEC hazard type input score, which is based on the MEC found in the sector. The exposure factor is composed of three input scores based on the frequency of entry into the sector by a receptor, the density of the remaining MEC, and the intensity of contact with the soil by a receptor. A summary of the Protocol, including input scoring tables, is provided in Appendix A.

1.3 Report Organization

This MEC risk assessment evaluates the current conditions of the DRO/Monterey, Laguna Seca Parking, and MOUT Site MRAs after removal actions have been conducted. Sections 4.0 through 6.0 of Volume 1 of the Group 3 RI/FS Report summarize the history and the sampling, investigations, and removal actions conducted at the MRAs.

The remainder of this risk assessment is organized as follows:

- **Section 2.0: Data Usability and Data.** This section provides an evaluation of the data and data usability to support the RA.
- **Section 3.0: DRO/Monterey MRA Risk Assessment.** Reuse Areas and Future Land Use Receptors, MEC Risk Assessment Results, Uncertainties, and Conclusions
- **Section 4.0: Laguna Seca Parking MRA Risk Assessment.** Reuse Areas and Future Land Use Receptors, MEC Risk Assessment Results, Uncertainties, and Conclusions
- **Section 5.0: MOUT Site MRA Risk Assessment.** Reuse Areas and Future Land Use Receptors, MEC Risk Assessment Results, Uncertainties, and Conclusions
- **Section 6.0: References.** This section provides a list of references for documents cited in the report.

As indicated above, Sections 3.0 through 5.0 of this Volume 2 report discuss the risk assessments for the DRO/Monterey, Laguna Seca Parking, and MOUT Site MRAs, respectively. The first six subsections for each MRA present the development of the input scores, types of future land use, and future land use receptors. The risk assessment findings are presented in the seventh subsection followed by uncertainties in the eighth subsection and conclusions in the ninth subsection for each MRA.

Appendix A provides a summary of the Protocol, including input scoring tables, which were used to develop this risk assessment for the Group 3 MRAs. Appendix B provides summary tables of MEC items found within each of the Group 3 MRAs presented in this report. Appendix C provides the erosion input calculations used to generate the potential for migration or erosion input score as part of the accessibility factor.

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2.0 DATA USABILITY AND DATA

The data used to support these risk assessments for the DRO/Monterey, Laguna Seca Parking, and MOUT Site MRAs are site-condition data and future land use data as presented in Volume 1 of the Group 3 RI/FS Report. Section 2.0 of this risk assessment focuses on the site-condition data. Future land use and identified receptors are discussed within the individual MRA sections (Sections 3.0 through 5.0).

In addition to the information presented in Volume 1 of the Group 3 RI/FS Report, sources of information used to support the risk assessments included:

- The former Fort Ord database of field survey data, including the MEC items identified and removed during the surveys, and either the actual or approximate survey coordinates of each MEC item.
- The Geographical Information System (GIS) data from the former Fort Ord GIS repository, containing general information on the MRAs and base maps.
- The Soil Survey Geographic (SSURGO) database developed by the United States Department of Agriculture (USDA) Natural Resources Conservation Service, containing information on soil structure and type.
- The United States Geological Survey (USGS) Digital Elevation Model (DEM), which provided elevation and slope information used to determine the migration/erosion potential input scores.

The remainder of this section describes the usability of the data and the approach for deriving the information needed to select input scores related to site conditions.

2.1 Data Usability

Data usability is defined as data with sufficient quality for use in the project decision-making process. The evaluation of the usability of data conducted during the RI is presented in Appendix D of Volume 1 of the Group 3 RI/FS Report. Evaluations of the equipment performance are also presented in the individual MRA sections in Volume 1 of the Group 3 RI/FS Report (Sections 4.2.2, 5.2.2, and 6.2.2). The equipment evaluations and the evaluations of work presented in the RI support the conclusions that the data are usable for the risk assessments.

2.2 MEC Hazard Type

The MEC hazard type is the only component of the overall hazard factor and was determined by a team of specialists qualified in recognizing and evaluating military munitions and MEC. The MEC hazard type input scores in the Protocol area as follows:

Score Description

0 Inert, will cause no injury (therefore, the item was not considered MEC and was not evaluated in the risk assessment)

1 Will cause an injury, or in extreme cases could cause major injury or death to an individual if functioned by an individual's activities

2 Will cause major injury or in extreme cases could cause death to an individual if functioned by an individual's activities

3 Will kill an individual if detonated by an individual's activities

The MEC hazard types are not variable and provide reliable input scores for the overall hazard factor of each MRA risk assessment. The MEC hazard types were evaluated for each MRA and are presented in Sections 3.0 through 5.0 of this report.

2.3 MEC Density

The MEC density is a component of the exposure factor. It represents the potential density (items per acre) of MEC remaining on the site at a depth interval that is likely to be accessed by a receptor. The MEC density input scores in the Protocol are as follows:

Score Description

1 100% of detected MEC removed to Level of Intrusion [1]

2 Low MEC Density (<0.1 items per acre)

3 Medium MEC Density (0.1 to 1 item per acre)

4 High MEC Density (>1 item per acre)

[1] Detection and removal procedures meeting the data quality objectives (DQOs) for the sector based on clearly defined investigation objectives including reuse and the detection of designated MEC. If DQOs have not been established for the sector, the quality of data should be reviewed and approved by FORA under the ESCA, and EPA and DTSC to score a '1.'

A MEC density input score was determined for each MRA based on the removal actions, the depth of MEC items found, and the training activities in the area. MEC density input scores for each MRA are presented in Sections 3.0 through 5.0 of this report.

2.4 MEC Depth

The MEC depth is a component of the accessibility factor and represents the potential depth bgs at which an item might remain at the site. The MEC depth input scores in the Protocol are as follows:

Score	Description
1	100% of detected MEC removed considering the data quality for the sector [1]
2	All MEC > 5 feet (ft) bgs
3	All MEC ≥ 4 ft bgs
4	All MEC ≥ 3 ft bgs
5	All MEC ≥ 2 ft bgs
6	All MEC ≥ 1 ft bgs
7	No MEC on the surface and MEC bgs
8	Any MEC on the surface

[1] Detection and removal procedures meeting the DQOs for the sector based on clearly defined investigation objectives including reuse and the detection of designated MEC. If DQOs have not been established for the sector, the quality of data should be reviewed and approved by FORA under the ESCA, and EPA and DTSC to score a '1'.

A MEC depth input score was selected for each of the MRAs based on the depth of items found during removal actions in the MRA. The resulting input scores are presented in Sections 3.0 through 5.0 of this report for each MRA.

2.5 Migration / Erosion Potential

The migration/erosion potential is a component of the accessibility factor and based on an estimate of erosion that occurs at a site. Erosion is estimated using the Universal Soil Loss Equation (7 Code of Federal Regulations 610.12-610.14). The equation is as follows:

$$A = R \times K \times L\ S \times C \times P$$

Where:

A = the estimation of average annual soil loss in tons per acre caused by sheet and rill erosion

R = rainfall erosivity factor

K = soil erodibility factor

LS = slope length and steepness factor

C = cover and management factor

P = support practice factor

The data used to support the erosion estimate calculations are from sources listed in Appendix C. The erosion estimate step-by-step calculation is also provided in Appendix C. The erosion estimates calculated for each MRA are presented in Sections 3.0 through 5.0 of this report for each MRA.

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3.0 DRO / MONTEREY MRA RISK ASSESSMENT

The DRO/Monterey MRA is located in the southwestern portion of the former Fort Ord, along South Boundary Road (Figure 1). As indicated in Table 3-1, the DRO/Monterey MRA contains the following four United States Army Corps of Engineers (USACE) property transfer parcels: E29.1, L6.2, L20.13.1.2, and L20.13.3.1 (Figures 3 and 4). The DRO/Monterey MRA encompasses approximately 29 acres of undeveloped land (Parcels E29.1 and L6.2) and 5.245 acres of the existing South Boundary Road and associated right-of-way (Parcels L20.13.1.2 and L20.13.3.1). Parcel L6.2 is designated as a habitat reuse area (Sector 1) and Parcels E29.1, L20.13.1.2, and L20.13.3.1 are designated as a development reuse area (Sector 2) (Figure 3).

3.1 Summary of MEC Investigations and Removal Actions

Field data were collected during the investigations and removal actions conducted by the Army in the DRO/Monterey MRA. The investigations and removal actions were described in Section 4.2 of Volume 1 of this Group 3 RI/FS Report and summarized as follows:

- SiteStats/GridStats (SS/GS) investigation of MRS-43 by USA in 1998 using Schonstedt GA-52Cx magnetometers (USA 2001e)
- Grid sampling investigation of MRS-43 by USA from December 1999 to March 2000 using Schonstedt GA-52Cx magnetometers (USA 2001b)
- Removal action in MRS-43 by USA in 2000 using Schonstedt GA-52Cx magnetometers (USA 2001b)
- Post-removal action geophysical investigation by USA using digital geophysical instruments in 2000 (USA 2001b)

The grid sampling investigation entailed the survey of entire grids using a Schonstedt GA-52Cx magnetometer, and the anomalies encountered were investigated to a depth of 4 ft (USA 2001b).

The initial removal action was conducted in the Del Rey Oaks Group (comprised of MRS-43 and two areas adjacent to the MRA currently known as MRS-15 DRO 01 and MRS-15 DRO 02) using the Schonstedt GA-52Cx magnetometer. The entire DRO/Monterey MRA was included in the removal action with the exception of a strip of land approximately 50 ft wide along the northwestern edge of Parcel L6.2, which is located outside the boundary for MRS-43, and the south side of South Boundary Road east of Parcel E29.1 (Figure 5).

The second phase of the removal action was conducted to reinvestigate grids completed during the initial removal action. Digital geophysical instruments (G858, EM61, EM61HH [handheld]) and analog instruments (Schonstedt GA-52Cx magnetometers) were used to reinvestigate portions of the Del Rey Oaks Group (comprised of MRS-43 and two areas adjacent to the MRA currently known as MRS-15 DRO 01 and MRS-15 DRO 02). The instrument used for the removal action was selected depending on the vegetation and terrain of the grid (USA 2001b). The entire DRO/Monterey MRA was included in the second phase

of the removal action with the exception of several grids with terrain or vegetation constraints, most of Parcel L6.2, and the south side of South Boundary Road east of Parcel E29.1.

While the two small portions of the MRA (approximately 50 ft wide along the northwestern edge of Parcel L6.2 and the south side of South Boundary Road east of Parcel E29.1) have not been subjected to removal actions, MEC and munitions debris (MD) were not found in the SS/GS grids located partially in Parcel L6.2 or near the south side of South Boundary Road east of Parcel 29.1, and they are bounded by either: approved Track 1 sites, a paved road, or an area of the DRO/Monterey MRA where few MEC or MD items were found. Therefore, it is expected that finding MEC in either of these two small portions of the MRA would not be likely.

The field data identifying the MEC items found on the DRO/Monterey MRA is summarized by reuse area sector in Table B-1 of Appendix B. This data served as the basis for munitions hazard type input for the DRO/Monterey MRA risk assessment. MEC items found during the investigation and removal actions were included in this risk assessment.

3.2 MEC Hazard Type Input

As identified in Section 2.2, the MEC hazard type is not variable and provides reliable input for the DRO/Monterey MRA risk assessment, and corresponds to the MEC risk code categories. MEC items with risk codes corresponding to “1” and “2” were found in the habitat reuse area (Parcel L6.2) of the DRO/Monterey MRA. MEC items with a risk code corresponding to “1” were found in the development reuse area (Parcel L20.13.3.1) of the DRO/Monterey MRA; therefore, a risk code of “1” was used for the entire development reuse area even though no MEC items were found in Parcels E29.1 and L20.13.1.2. The risk codes for the MEC items found in the DRO/Monterey MRA are summarized in Appendix B (Table B-1).

3.3 MEC Density Input

As identified in Section 2.3, the MEC density is a component of the exposure factor and represents the potential density (items per acre) of MEC remaining on the site at a depth interval that is likely to be accessed by a receptor. The potential MEC density is estimated by depth interval (surface, 0 to 1 foot, 0 to 2 foot, etc). According to the referenced investigations and removal actions summarized in Section 3.1, the DRO/Monterey MRA was subjected to two removal actions. The first removal action was conducted using Schonstedt instruments and 100% of the items detected were removed to the depth of detection except for an area approximately 50 ft wide along the northwestern edge of Parcel L6.2 and the south side of South Boundary Road east of Parcel E29.1. A subsequent removal action was conducted over the DRO/Monterey MRA using digital instruments and 100% of the items detected were removed to the depth of detection with the exception of the following areas: grids with terrain or vegetation constraints; most of Parcel L6.2; and the south side of South Boundary Road east of Parcel E29.1. Although the removal actions did not cover the approximately 50 ft wide strip along the northwestern edge of Parcel L6.2, a portion of one sampling grid from the SS/GS investigation was located within the area (Volume 1, Figure 4-

2). No MEC or MD items were recovered within this grid during the SS/GS investigations. In addition, although the removal actions did not cover the south side of South Boundary Road east of Parcel E29.1, no MEC or MD items were recovered from the SS/GS sampling grids located in MRS-43A, immediately adjacent to the south side of South Boundary Road (Volume 1; Appendix A). MRS-43A is a Track 1 Site (Army 2006).

According to the after action reports, the MEC items that were found during the removal actions were removed, which corresponds to an input score of "1" for MEC density, if the DQOs were met during the sampling and removal actions or if the quality of the data was reviewed and approved in the absence of established DQOs. The quality of the data was evaluated using the Munitions Response Activity Evaluation Checklists (Appendix D in Volume 1 of the Group 3 RI/FS Report). In the Munitions Response Activity Evaluation Checklist, Part 2: Removal Evaluation, Question "A", it was concluded that the data can be used for performance of the risk assessment. For the portions of the MRA that were not subjected to removal actions, the data from the SS/GS investigations conducted within or adjacent to the uninvestigated portions were used. No MEC or MD items were found in these sampling grids. For these reasons, a MEC density input score of “1” was selected for the entire DRO/Monterey MRA for all depths. Additionally, the MEC items evaluated in the risk assessment were non-penetrating and, therefore, would not be expected at depth unless they were deposited in burial pits. Since no anomalies were left uninvestigated within the depth of detection and the recovered MEC items were not identified as having been in burial pits, the MEC density input score of “1” is appropriate for all depths. In accordance with the RI, the distribution of MEC and MD at the DRO/Monterey MRA did not exhibit a pattern of use characteristic of a target range with identifiable and consistently used targets. The distribution did show patterns of use characteristic of weapons and troop training, although the MRA was not indicated on historical training maps as being a training site. There was no indication in any of the information reviewed that the MRA was used as an impact area.

3.4 MEC Depth Input

As identified in Section 2.4, the MEC depth is a component of the accessibility factor and represents the potential depth bgs at which an item might remain at the site. The MEC depth bgs input score of “1” was selected for the DRO/Monterey MRA indicating that 100% of detected MEC was removed to the depth of detection. This input score reflects the performance of the investigations and removal actions at the DRO/Monterey MRA, which were conducted until anomalies were resolved. The use of this input score is considered valid for the DRO/Monterey MRA because two removal actions were conducted over the entire MRA (with the exception of an approximately 50 ft wide portion along the northwestern edge of Parcel L6.2, which is located outside the boundary for MRS-43, and the south side of South Boundary Road east of Parcel E29.1). For the portions of the MRA that were not subjected to the removal actions, the SS/GS sampling data collected within or adjacent to these areas indicated that no MEC or MD was found.

3.5 Migration/Erosion Potential Input

The erosion estimate step-by-step calculation is provided in Appendix C. The erosion estimate for the DRO/Monterey MRA was calculated as 0.0000067 inch, which equates to a

migration/erosion potential input score of "1" (Appendix A, Table A-3). A score of "1" indicates: "Very stable: MEC will not migrate. Annual erosion is equal to or less than the site-wide average of 3/100 inch per year". Erosion may have occurred on the MRA, but it is expected to be associated mostly with gullies, roads, firebreaks, and trails.

3.6 DRO/Monterey MRA Reuse Areas and Future Land Use Receptors

This section identifies the two reuse areas by parcel (sectors) and the general representative receptors considered in the MEC risk assessment for the DRO/Monterey MRA. The future land use for each parcel in the MRA is described in Table 3-1. A description of the receptors and the inputs scores for level of intrusion, frequency of entry, and intensity of contact with soil for the MEC risk assessment are provided in Table 3-2 for the habitat reuse area and Table 3-3 for the development reuse area.

3.6.1 Description of Reuse Areas

The DRO/Monterey MRA is located in the southwestern portion of the former Fort Ord, along South Boundary Road (Figure 1). The DRO/Monterey MRA is contained within the jurisdictional boundaries of the City of Del Rey Oaks and the City of Monterey. Access to the DRO/Monterey MRA is partially restricted by four-strand barbed-wire fencing, which is not complete around the entire MRA, allowing access to the MRA. South Boundary road is an active roadway with vehicle traffic on a daily basis. This is a major roadway of the FORA transportation network and is scheduled for upgrade and improvement in the FORA Capital Improvement Program. A number of dirt trails are located throughout the MRA. The DRO/Monterey MRA contains no existing buildings or structures and is not currently served by major utilities.

The Habitat Management Plan (HMP) identifies the DRO/Monterey MRA as development and habitat reserve (USACE 1997b). Habitat reserve areas support plant and animal species that require implementation of mitigation measures identified in the HMP to ensure compliance with the ESA and to minimize impacts to listed species. The Monterey spineflower is a threatened plant species and has been identified as having possible occurrence in the DRO/Monterey MRA. It is possible the California tiger salamander (CTS) may be found in the DRO/Monterey MRA as the MRA is within the 2-kilometer distance from an aquatic feature that may provide breeding habitat for the CTS.

The DRO/Monterey MRA is proposed for habitat management and business park/light industrial and office/Research & Development reuse in the Base Reuse Plan (Figure 3). As described in the SEDR, the reuses being considered as part of the redevelopment for the DRO/Monterey MRA include:

- Habitat Management Reuse Area, Parcel L6.2 (Sector 1) – the westernmost portion of the MRA is designated for habitat reserve as a development buffer (Table 3-1). The area is approximately 6 acres and is predominantly maritime chaparral. The area is expected to be used by the public for recreation. Vegetated areas and hiking trails may require biological monitoring and maintenance, such as planting, weeding, and trail repair.

Recreational hiking and bicycling/horseback riding on dirt paths are also expected to occur.

- Business Park/Light Industrial and Office/Research & Development Reuse Area, Parcels E29.1, L20.13.3.1, and L20.13.1.2 (Sector 2) – the easternmost portion of the MRA and the South Boundary Road portion of the MRA are designated for development (Table 3-1). The area totals approximately 28 acres and is predominantly maritime chaparral. Development encompassing infrastructure activities, such as roadway and utility construction as well as commercial/retail, is expected to occur. Roadway expansion and utility construction will constitute the major development along a portion of South Boundary Road.

Current land use restrictions for contiguous property transfer parcels along South Boundary Road are prohibition of:

- any uses other than investigation/remediation of MEC and installation of utilities/roadways until specified remedial action completion certification has occurred;
- the use of the property for residence, hospital, school (for persons under the age of 21, except for post-secondary schools), and a day care center for children; and
- activities (including soil disturbance) in violation of the local jurisdiction Excavation Ordinance, as modified.

Additionally, the current land use restrictions as defined in the land use covenant require:

- the buyer, lessee, or sub-lessee be given written notice that there is the potential for the presence of MEC in the soil of the property; and
- DTSC, the United States acting through the Army, and their contractors/agents shall have reasonable right-of-entry and access to the property for inspection, monitoring, testing, sampling, and other activities consistent with the covenant as deemed necessary by the DTSC in order to protect the public health and safety or the environment and oversee any required activities.

3.6.2 Description of Receptors

Given the proposed reuses discussed in the previous section, general representative receptors will be slightly different for the habitat reuse area (Sector 1) than the development reuse area (Sector 2). The representative receptors chosen for analysis in the MEC risk assessment for the habitat reuse area (Sector 1) are:

- Trespasser
- Habitat Monitor
- Recreational User
- Maintenance Worker (such as a habitat worker, utility worker, firefighter, emergency response worker, and ancillary worker)

The representative receptors chosen for analysis in the MEC risk assessment for the development reuse area (Sector 2) are:

- trespasser
- office worker (not expected for the roadway parcel)
- maintenance worker (such as a utility worker, firefighter, emergency response worker, and ancillary worker)
- construction worker

These receptors represent a range of uses, levels of intrusion into the soil, frequency of entry, and intensity of contact with the soil at the DRO/Monterey MRA. A description of each receptor and associated input scores for level of intrusion, frequency of entry, and intensity of contact with soil for Sectors 1 and 2 are provided in Tables 3-2 and 3-3, respectively, for the after-action MEC risk assessment.

3.7 DRO/Monterey MRA MEC Risk Assessment Results

After-action receptor scenarios were analyzed to evaluate the overall MEC risk at the DRO/Monterey MRA. The following sections describe the results of the MEC risk assessment for the habitat and development reuse areas. Figure 3 shows the reuse areas in the DRO/Monterey MRA.

3.7.1 Input Scores

The after-action receptor scenario analysis considers the MEC risk at the site following the removal actions performed on DRO/Monterey MRA and represents the current state of the DRO/Monterey MRA. The removal work performed in the DRO/Monterey MRA included MEC investigations and removal actions, as discussed in Volume 1 of the Group 3 RI/FS Report (Section 4.2) and summarized in Section 3.1 of this RA. The MEC risk assessment is composed of the exposure factor, the accessibility factor, and the overall hazard factor, which are based on seven input scores. Tables 3-4 and 3-5 provide summaries of the input scores, the resulting factors, and the overall MEC risk score for the habitat reuse area (Sector 1) and the development reuse area (Sector 2), respectively.

The exposure factor components for the two reuse areas included: input scores for frequency of entry and intensity of contact with soil, which were provided for each receptor by sector in Tables 3-2 and 3-3; and input scores for MEC density, which were discussed in Section 3.3. The input scores for MEC density in Sectors 1 and 2 by MEC hazard type were “1” (100% of detected MEC removed to level of intrusion) due to the completed removal actions and the fact that the MEC found was predominantly non-penetrating, with the exception of miscellaneous items for which a historical use in the area was not identified and did not show a pattern of use, as documented in the RI. The input scores for frequency of entry and intensity of contact with soil varied depending on the receptor. This assessment has also been applied to the 50 ft wide portion of the MRA that was not part of the removal action because no MEC was found near the area or in the adjacent parcel to the northwest (Track 1 Site).

The accessibility factor component for Sectors 1 and 2 included: input scores for level of receptor intrusion, which were provided by sector in Tables 3-2 and 3-3; input scores for MEC depth, which were discussed in Section 3.4; and input scores for migration/erosion potential, which were calculated in Appendix C and discussed in Section 3.5. The input scores for MEC depth in Sectors 1 and 2 were "1" due to the completed removal actions and the fact that the MEC found was predominantly non-penetrating, with the exception of miscellaneous items for which a historical use in the area was not identified and did not show a pattern of use, as documented in the RI. The input scores for migration/erosion potential were "1", representing very stable soil for the MRA. The input scores for level of receptor intrusion varied depending on the receptor.

The overall hazard factor component consists only of input scores based on the MEC hazard types found within the MRA, which were discussed in Section 3.2. The input scores for the MEC hazard types found within Sector 1, the habitat reuse area, were "1" and "2" and within Sector 2, the development reuse area, was "1" (Appendix B, Table B-1).

3.7.2 Description of Overall MEC Risk

The overall MEC risk score was determined by considering the accessibility of the sector (accessibility factor), the potential for exposure at the sector (exposure factor), and the overall hazard of the MEC type in the sector (overall hazard factor). The input scores were applied to the Protocol to determine the overall MEC risk. Appendix A provides the summary of the risk assessment Protocol and includes input scoring tables.

Tables 3-4 and 3-5 provide summaries of the input scores and resulting factors and the overall MEC risk assessment results for the habitat reuse area (Sector 1) and the development reuse area (Sector 2), respectively. For each receptor, the risk posed by each MEC hazard type is scored separately.

Overall MEC Risk Score for Habitat Reuse Area (Sector 1)

For the proposed habitat reuse area (Sector 1), the identified receptors included:

- trespasser (who is occasionally in the area and may intrude 12 inches bgs)
- habitat monitor (who is frequently in the area and does not intrude bgs)
- recreational user (who is frequently in the area and may intrude 6 inches bgs)
- maintenance worker (who is frequently in the area and intrudes 24 inches bgs)

Since erosion was not expected to affect the potential for exposure to MEC and the depth and density of the MEC was scored as "1" (because removal actions were conducted over the entire MRA and MEC items found were non-penetrating), the accessibility factor and exposure factor for Sector 1 resulted in scores of "1". The overall hazard factor varied in score from "1" to "2" because of the MEC hazard types found within this portion of the MRA.

Therefore, the overall MEC risk score for each receptor in the habitat reuse area (Sector 1) of the DRO/Monterey MRA was "A", the lowest risk (Table 3-4).

Overall MEC Risk Score for Development Reuse Area (Sector 2)

For the proposed development reuse area (Sector 2), the identified receptors included:

- trespasser (who is rarely in the area and does not intrude bgs)
- office worker (who is frequently in the area and does not intrude bgs)
- maintenance worker (who is frequently in the area and intrudes 24 inches bgs)
- construction worker (who is frequently in the area and intrudes 60 inches bgs)

Since erosion was not expected to affect the potential for exposure to MEC and the depth and density of the MEC was scored as "1" (because removal actions were conducted over the entire MRA and MEC items found were non-penetrating), the accessibility factor and exposure factor for Sector 2 resulted in scores of "1". The overall hazard factor was scored a "1" because of the MEC hazard types found within this portion of the MRA.

Therefore, the overall MEC risk score for each receptor in the development reuse area (Sector 2) of the DRO/Monterey MRA was "A", the lowest risk (Table 3-5).

3.8 DRO/Monterey MRA Uncertainty

This section discusses the potential uncertainties related to the Protocol inputs and the resulting change in the overall MEC risk score determined for the DRO/Monterey MRA.

3.8.1 Depth Below Ground Surface Uncertainties

In general, the depth bgs input of the MEC items found at the MRA was a simple score for the analysis of the MEC risk. Depth bgs input scores of "1" for all receptors were used in performing the DRO/Monterey MRA risk assessment. As specified in the Protocol, the score of "1" is technically appropriate where "100 percent of detected MEC was removed considering the data quality for the site." Data quality is further defined as having detection and removal procedures meeting the DQOs for the site based on clearly identified investigational objectives. The removal actions within the DRO/Monterey MRA did meet the investigational objectives. However, meeting the investigational objectives does not eliminate the possibility that MEC could still be present below the surface because the removal efficiencies of the equipment used have not been shown to be 100%. The potential for MEC to remain below ground surface, even though a score of "1" is used, results in uncertainty in the "A" score. This score would underestimate the likely depth of any potential MEC items, if any remained, and therefore, underestimate the overall MEC risk.

There are two small areas that were not investigated: the 50 ft strip of land on the western side of Parcel L6.2 and the south side of South Boundary Road to the east of Parcel E29.1. Both of these areas are adjacent to Track 1 sites and no MEC was found near either area. In

addition, no historical training map or aerial photograph indicated that training occurred at either area. Therefore, it is unlikely that MEC would remain bgs in either area. In the unlikely event that MEC was in either place then the use of "1" for depth bgs would underestimate the overall MEC risk. Therefore, to address the uncertainty in these areas, additional measures will be considered for this MRA or portion of the MRA during the FS.

3.8.2 Migration/Erosion Potential Uncertainties

The Universal Soil Loss Equation was used to derive the number of inches per year of erosion anticipated to occur at the DRO/Monterey MRA. The uncertainty in using this calculation to determine the level of erosion involves the changes in land surface due to human activities at the MRA. It is possible that the erosion potential in specific areas of the DRO/Monterey MRA is higher than this estimate, which could increase the overall MEC risk. However, migration/erosion potential was found to be only a modifying factor in the development of the Protocol, so it is assumed that the change in the risk score would be minor.

3.8.3 Level of Intrusion Uncertainties

The level of intrusion and the depth bgs input scores are closely related in the accessibility score and subsequently in the scoring of the overall MEC risk. Specifically, the accessibility factor depends on the depth between the level of intrusion and the shallowest MEC item expected on the MRA. As the interval between the level of intrusion and MEC depth bgs decreases to less than 1 ft, the accessibility score increases. However, the MEC depth bgs has been scored as "1" (100% of detected MEC removed considering data quality for the sector); therefore, the contribution to the overall MEC risk score is negated. If the MEC depth bgs input score indicates that there is no MEC to encounter, it does not matter how deep the receptor intrudes into the ground. The uncertainty is that despite efforts to detect and remove 100% of the MEC at the MRA, MEC may remain bgs. Therefore, the level of intrusion input score, being negated because of a MEC depth input score of "1", may underestimate the overall MEC risk score depending on the receptor.

Again, considering the two areas that were not investigated (the 50 ft strip of land on the western edge of Parcel L6.2 and the south side of South Boundary Road to the east of Parcel E29.1), if they contain MEC, then the use of "1" for depth bgs would underestimate the overall MEC risk.

3.8.4 Frequency of Entry Uncertainties

The frequency of entry and the MEC density input factors are related in the exposure score and subsequently in the scoring of the overall MEC risk. Receptors are more likely to come in contact with a MEC item if they are at the site frequently than if they rarely go to the site. This input is a measure of the number of times per year that the receptor will be in an area potentially containing MEC. It is difficult to estimate how often individual receptors will be in the DRO/Monterey MRA. The overall MEC risk score increases with the frequency of entry. However, the density has been scored as a "1" (100% of detected MEC removed to the level of intrusion); therefore, the contribution to the overall MEC risk score by frequency of

entry input scores is negated. The uncertainty is that despite efforts to detect and remove 100% of the MEC at the site, MEC may remain bgs. Therefore, the frequency of entry input score, being negated because of a MEC density input score of "1", may underestimate the overall MEC risk score depending on the receptor.

3.8.5 Intensity of Contact with Soil Uncertainties

The intensity of contact with soil and MEC density input scores are related to the exposure score and subsequently in the scoring of the overall MEC risk. For an individual receptor to come in contact with a MEC item, the individual will need to be in contact with the medium where the MEC is located. This input is a measure of the length of time the receptor will have in contact with the soil. Receptors are more likely to come in contact with a MEC item if they are at the site for a longer period of time. However, the density has been scored as a "1" (100% of detected MEC removed to the level of intrusion); therefore, the contribution to the overall MEC risk score by the intensity of contact with soil input score is negated. If the MEC density input score indicates there is no MEC to encounter, it does not matter how long the receptor is in contact with the soil. The uncertainty is that despite efforts to detect and remove 100% of the MEC at the site, MEC may remain bgs. Therefore, the intensity of contact with soil input score, being negated because of the MEC density input score of "1", may underestimate the overall MEC risk score depending on the receptor.

3.8.6 Overall MEC Risk Score Uncertainties

The uncertainties for the input factors discussed in Sections 3.8.1 through 3.8.5 may underestimate the overall MEC risk score depending on the receptor scenario. Input scores to the Protocol do not reflect the uncertainty related to the depth and density of MEC items potentially remaining at the site. If 100% of the MEC at the DRO/Monterey MRA was not removed during the removal actions, or if there was a MEC item in the two areas that were not 100% investigated, then the overall MEC risk would be underestimated.

3.9 DRO/Monterey MRA Conclusions

Tables 3-6 and 3-7 provide summaries of the overall MEC risk results for the after-action receptor analysis of the DRO/Monterey MRA. The overall MEC risk score for each receptor for each of the MEC hazard types was "A" lowest risk. It is recognized that although the detected anomalies may have been removed during the previous removal actions conducted on the DRO/Monterey MRA, the potential exists that some MEC may remain in the subsurface at the MRA. Therefore, the risks associated with intrusive receptors (maintenance workers, construction workers) are assumed to remain at the DRO/Monterey MRA at a level that requires mitigation. This is a qualitative assessment of the risk, and therefore uncertainties associated with the determination. The Protocol was not designed to assess absolute risk. The overall MEC risk score is an approach for comparing the relative risk between remedial alternative where MEC has been encountered on sites at the former Fort Ord.

4.0 LAGUNA SECA PARKING MRA RISK ASSESSMENT

The Laguna Seca Parking MRA is located in the south-central portion of the former Fort Ord adjacent to the Laguna Seca Raceway (Figure 1). As indicated in Table 4-1, the MRA contains four MRSs (MRS-14A, MRS-29, MRS-30, and MRS-47) and the following six USACE property transfer parcels: L20.3.1, L20.3.2, L20.5.1, L20.5.2, L20.5.3, and L20.5.4 (Figures 6, 7, and 8). The Laguna Seca Parking MRA encompasses approximately 276 acres of undeveloped land, which is designated as a development with reserve areas or with restrictions and used for parking during Laguna Seca Raceway events.

4.1 Summary of MEC Investigations and Removal Actions

Field data were collected during investigations and removal actions conducted by the Army in the Laguna Seca Parking MRA. The investigations and removal actions are described in Section 5.2 of Volume 1 of this Group 3 RI/FS Report and summarized as follows:

MRS-14A:

- During 1994, a 3-ft removal action was conducted on 50 acres by Human Factors Application, Inc. (HFA) to support the proposed Laguna Seca Raceway parking area (HFA 1994).
- From 1994 to 1995, approximately 86 randomly placed 100-ft by 100-ft grids were sampled to a depth of 4 ft by UXB International, Inc. (UXB 1995a).
- From September 1996 through January 1997, a 4-ft removal action was performed in the northernmost tip of MRS-14A, included in Site OE 14D (USA 2001a).
- From June 1997 to April 1998, a removal action to depth of detection was conducted on 98 acres and a 1-ft removal action was conducted on 95 acres by USA (USA 2001c). The 1-ft removal action was conducted on steep slopes in areas planned for use as habitat reserves at the time (steep hillsides). The removal action to depth of detection was conducted in areas planned for development (parking). The area where the removal to depth was performed included the area previously cleared to 3 ft in 1994. Six grids (two complete grids and portions of four grids) were not cleared during the removal action (the two complete grids were located on a steep grade and covered with dense brush and the four partially cleared grids were located on a very steep grade and partially in a deep ravine).

MRS-29:

- A random sampling investigation of the MRS-29 (also known as Laguna Seca Bus Turnaround) was started by UXB in June 1995. In July 1995, the sampling investigation was converted to a surface and subsurface removal action. In August 1995, the removal action was stopped after 53% of the action was completed (UXB 1995b).
- From June to July 1997, a removal action to depth of detection was completed by USA on two of the original acres planned for removal action in 1995. From February to July 1998, a removal action to depth of detection was performed over the remaining acres in

the MRS. Areas included in the 1995 removal actions were also included in this effort (USA 2000b).

MRS-30:

- From June to August 1995, a removal action to depth of detection was conducted on MRS-30 (also known as Laguna Seca Turn 11 Expansion or LST11) by UXB (UXB 1995c).
- Following completion of the munitions response, approximately 30 to 40 ft of fill material was placed over most of MRS-30 in support of construction activities associated with the expansion of the Laguna Seca Raceway Turn 11 (Army 2007).

MRS-47:

- In 1994, the area underwent a prescribed burn to enable crews to access the area and conduct MEC sampling (USACE 1997a and USA 2000a).
- In January 1994, three grids were sampled within MRS-47 (also known as OE-47 or Wolf Hill) by HFA (HFA 1994).
- From July 1994 to July 1995, a 3-ft removal action was conducted on roads and fire breaks to provide safe access for the fire department on the southern and western perimeters of the MRS by UXB (USA 2000a).
- From July to September 1996, a sampling investigation was conducted on 32 grids to a depth of 4 ft by CMS Environmental, Inc. (USA 2000a).
- From February to June 1997, a removal action to depth was conducted over the entire 79-acre MRS by USA, including areas where 3-ft removals were previously conducted (USA 2000a).

4.1.1 Data Used for Laguna Seca Parking MRA Risk Assessment

The field data identifying the MEC items found on the Laguna Seca Parking MRA are summarized in Table B-2 of Appendix B. This data served as the basis for munitions type input for the Laguna Seca Parking MRA risk assessment. MEC items found during the survey and removal activities were included in this risk assessment.

4.1.2 Detection Efficiency

For the purposes of the risk assessment for the Laguna Seca Parking MRA, the detection efficiency demonstrated with the Schonstedt GA-52Cx served as the basis for estimating the potential depth below ground surface and density of MEC potentially remaining on site because this was the instrument used during the Laguna Seca Parking MRA investigations and removal actions. The detection efficiency for the Schonstedt surveys at the former Fort Ord was evaluated in the ODDS (Parsons 2002). The results of the ODDS seeded test are further discussed in the RI equipment evaluation for the Laguna Seca Parking MRA in Section 5.2.2.2 of the RI (Volume 1).

Because the risk assessment is based on the potential hazard remaining at the site, the percent detection (Pd) is used to back-calculate an estimate of MEC potentially remaining at the site. This calculated density estimate is a theoretical number used to determine the score of the MEC density input factor in the Protocol. This theoretical number is not and should not be interpreted as an actual number of potentially remaining MEC items. Because there is no established way to determine the actual number of items that may be at a site (that is, there is no way to know the source term), it is impossible to determine if any items remain at the site or provide an accurate count of items remaining.

As presented in Section 5.2.2.2 of the RI (Volume 1), detection efficiencies were calculated for the types of MEC items found at the Laguna Seca Parking MRA by combining the information gathered in seeded studies conducted in the ODDS and during the DRO removal action. Detection efficiencies were developed by depth interval to account for differences in detection capability at various depths. For the purposes of the risk assessment, Pds were used for each MEC type and depth interval with seed results. MEC types with no items seeded in a specific depth interval were applied an overall Pd for that depth interval. For MEC types not included in the ODDS or DRO study, the overall Pd was used. A Pd was developed for the 0-6 inch, 7-12 inch, and greater than 12-inch depth intervals. Because the actual Pd for the removal action a the Laguna Seca Parking MRA is unknown and the Pd values used to determine density are based on a small number of seeded items, the efficiency used to calculate density could be higher or lower than the actual field efficiency and is considered a best estimate based on available data.

Information presented in Section 5.2.2.2 of the RI (Volume I) was used as the basis for determining Pd for the risk assessment. The Pds based on consolidating the data from the ODDS and DRO study seeded items for the types of MEC items found at the Laguna Seca MRA are summarized in Table 4-2 of this RA.

4.2 MEC Hazard Type Input

As identified in Section 2.2, the MEC hazard type is not variable and provides reliable input for the Laguna Seca Parking MRA risk assessment and corresponds to the MEC risk code categories. The only MEC item found in MRS-29 corresponded to a risk code of “1”. The only MEC item found in MRS-30 corresponded to a risk code of “3”. MEC items with risk codes corresponding to “1”, “2”, and “3” were found in MRS-47. In MRS-14A, items corresponding to risk codes of “1” and “2” were found. The risk codes for the MEC items found in the Laguna Seca Parking MRA are summarized in Appendix B (Table B-2).

4.3 MEC Density Input

As identified in Section 2.3, the MEC density is a component of the exposure factor and represents the potential density (items per acre) of MEC remaining on the site at a depth interval that is likely to be accessed by a receptor. The potential MEC density is estimated by depth interval (surface, 0 to 1 foot, 0 to 2 foot, etc). According to the referenced investigations and removal actions summarized in Section 4.1, the grids within MRS-29, MRS-30, MRS-47, and a portion of MRS-14A of the Laguna Seca Parking MRA were investigated and 100% of the items detected with Schonstedt instruments were removed to

the depth of detection. The after-action reports indicate that no MEC was identified deeper than 4 feet in these MRSs. The remainder of MRS-14A was designated for habitat at the time and received a 1-ft removal action. The quality of the data was evaluated using the Munitions Response Activity Evaluation Checklists (Appendix D in Volume 1 of the Group 3 RI/FS Report). In the Munitions Response Activity Evaluation Checklist, Part 2: Removal Evaluation, Question "A", it was concluded that the data can be used for performance of the risk assessment. Given the limitations on the detection efficiency of the equipment used during the removal actions, it is presumed that there is a potential for MEC items to remain on site. The number of items remaining on site is unknown. However, a theoretical estimate can be deduced based on the performance profile of the detection instrument and the distribution of the MEC items at the site.

The following formula is used to estimate the potential residual density of MEC items by depth interval for use in estimating changes in potential exposure for a receptor. For the risk assessment purposes:

$$\text{Potential Residual Density (number/acre)} = \frac{\left(\frac{1}{Pd} - 1\right) \times \left(\text{Number of items found} - \text{Number of Items found in Pits}\right)}{\text{Acres Surveyed}}$$

Where:

Potential Residual Density	=	the potential number of MEC items remaining at the site in number per acre
Pd	=	the detection efficiency of the survey equipment based on the equipment evaluation. Percent detection efficiencies are applied separately for each type of item with a Pd in each depth interval of interest. The total count of items is then summed by MEC type to provide the density by MEC type.
Number of items found	=	the number of MEC items found in the survey area
Number of items in pits	=	the number of MEC items found in the survey area and recorded as being in a pit.

Given the demonstrated performance of the instruments to detect items within the top 6 to 12 inches of soil and based upon previous risk assessments performed by the Army (MACTEC 2006), a MEC density input of “1” is assumed for the top 12 inches. Table 4-3 provides the after-action analysis of the potential residual density and the MEC density input for each of the MRSs by MEC Hazard Type and by depth bgs.

4.4 MEC Depth Input

As identified in Section 2.4, the MEC depth is a component of the accessibility factor and represents the potential depth bgs at which an item might remain at the site. Although removal actions have been conducted and MEC items removed to the depth of detection in MRS-29, MRS-30, MRS-47, and a portion of MRS-14A of the Laguna Seca Parking MRA, a

MEC depth bgs score of "6" (any MEC items remaining at the site are at a depth of 1 foot or greater) has been conservatively selected for input to the MEC risk assessment. This score means that the removal activities were considered to be of a sufficient quality within the top one foot of soil based on the performance and equipment evaluations. The MEC depth bgs score of "6" was selected for the remaining portion of MRS-14A because the removal action was to 1 ft bgs; therefore, MEC may remain at a depth deeper than 1 ft over this portion of the MRA. These input scores reflect the performance of the investigations and removal actions in these MRSs at the Laguna Seca Parking MRA, which were conducted until anomalies were resolved to the two specified depths. The use of these input scores is considered valid because removal actions were conducted over the MRA (with the exception of the six grids in MRS-14A because of terrain and vegetation constraints).

4.5 Migration/Erosion Potential Input

The erosion estimate step-by-step calculation is provided in Appendix C. The erosion estimate for MRS-30 of the Laguna Seca Parking MRA was calculated as 0.0000086 inch, which equates to a migration/erosion potential score of "1" (Appendix A, Table A-3). A score of "1" indicates: "Very stable: MEC will not migrate. Annual erosion is equal to or less than the site-wide average of 3/100 inch per year". The erosion potential input score of "1" was only applied to MRS-30 as it is relatively flat. The remainder of the MRSs in the Laguna Seca Parking MRA was scored as a worst-case of "3" indicating significant migration because the MRA has steep hillsides and valleys, and vegetation has been removed to create parking areas.

4.6 Laguna Seca parking MRA Reuse Areas and Future Land Use Receptors

This section identifies the reuse area by MRS and the general representative receptors considered in the MEC risk assessment for the Laguna Seca Parking MRA. The future land use, corresponding parcel, and corresponding MRS in the MRA are described in Table 4-1. A description of the receptors and the input scores for level of intrusion, frequency of entry, and intensity of contact with soil for the MEC risk assessment are provided in Table 4-4.

4.6.1 Description of Reuse Areas

The Laguna Seca Parking MRA is located in the south-central portion of the former Fort Ord adjacent to the Laguna Seca Raceway (Figure 1). The Laguna Seca Parking MRA is wholly contained within the jurisdictional boundaries of Monterey County. Access into Laguna Seca Parking MRA is currently restricted by fencing, barricades, locked gates, and warning signs across South Boundary Road to the south and Barloy Canyon Road to the north. The western side of the Laguna Seca Parking MRA, along Barloy Canyon Road, is bounded by barbed-wire fencing. The eastern boundary of the MRA is not restricted by fencing. South Boundary Road and Barloy Canyon Road are not usually open to vehicle traffic; however, the roadways are opened to controlled vehicle traffic during events at the Laguna Seca Raceway.

The Laguna Seca Parking MRA contains few structures (Figure 7). The southwestern portion of the MRA (Parcels L20.3.1 and L20.3.2), which is used as an overflow parking lot for

raceway events, contains structures related to raceway activities. The Laguna Seca Parking MRA is not served by water, sewer, or storm drain utility systems. An overhead electrical line runs through the Laguna Seca Parking MRA along Barloy Canyon Road and South Boundary Road. There are also several dirt roads and trails throughout the Laguna Seca Parking MRA.

The HMP identifies the Laguna Seca Parking MRA as development with reserve or development with restrictions. Nearby natural resources management area (NRMA) and habitat reserve areas support plant and animal species that require implementation of mitigation measures identified in the HMP to ensure compliance with the ESA and to minimize impacts to listed species. Threatened or endangered plant species identified as having possible occurrence in the Laguna Seca Parking MRA include Monterey gilia (formerly sand gilia; endangered) and Monterey spineflower (threatened). A portion of the Laguna Seca Parking MRA has been designated as critical habitat for the Monterey spineflower. It is possible CTS may be found in the Laguna Seca Parking MRA as the MRA is within the 2-kilometer distance from an aquatic feature that may provide breeding habitat for the CTS.

The Laguna Seca Parking MRA is proposed for open space/recreation reuse in the Base Reuse Plan (Figure 6). The area is used for overflow parking during Laguna Seca Raceway events and includes parking, staging, and event-related roadway access along Barloy Canyon Road and South Boundary Road. A roadway easement for a future bypass of Highway 68 is also a possible future use. Table 4-1 describes the future land use by parcel.

Current land use restrictions for contiguous property transfer parcels along South Boundary Road are prohibition of:

- [for transfer parcel L20.5.3 only] any uses other than investigation/remediation of MEC and installation of utilities/roadways until specified remedial action completion certification has occurred;
- [for transfer parcels L20.3.1, L20.3.2, L20.5.1, and L20.5.2 only] any uses other than investigation/remediation of MEC, parking, staging, and on-site portable/temporary toilets for events associated with the Mazda Raceway Laguna Seca, and installation of utilities/roadways until specified remedial action completion certification has occurred;
- the use of the property for residence, hospital, school (for persons under the age of 21, except for post-secondary schools), and a day care center for children; and
- activities (including soil disturbance) in violation of the Excavation Ordinance, as modified.

Additionally, the current land use restrictions require:

- the buyer, lessee, or sub-lessee be given written notice that there is the potential for the presence of MEC in the soil of the property; and
- DTSC, the United States working through the Army, and their contractors/agents shall have reasonable right-of-entry and access to the property for inspection, monitoring,

testing, sampling, and other activities consistent with the covenant as deemed necessary by the DTSC in order to protect the public health and safety or the environment and oversee any required activities.

The restrictions are not intended to limit use of existing public access roadways except during MEC response actions and prescribed burns.

4.6.2 Description of Receptors

Given the proposed development reuse discussed in the previous section, four general representative receptors were chosen for analysis in the MEC risk assessment:

- trespasser
- recreational user
- maintenance worker (such as a utility worker, firefighter, emergency response worker, and ancillary worker)
- construction worker

These receptors represent a range of uses, levels of intrusion into the soil, frequency of entry, and intensity of contact with the soil at the Laguna Seca Parking MRA. A description of each receptor and associated input scores for level of intrusion, frequency of entry, and intensity of contact with soil for the development area are provided in Table 4-4 for the after-action MEC risk assessment.

4.7 Laguna Seca Parking MRA MEC Risk Assessment Results

After-action receptor scenarios were analyzed to evaluate the overall MEC risk at the Laguna Seca Parking MRA. The following sections describe the results of the MEC risk assessment for the development reuse area. Figure 6 shows the reuse areas in the Laguna Seca Parking MRA.

4.7.1 Input Scores

The after-action receptor scenario analysis considers the MEC risk at the site following the removal actions performed on Laguna Seca Parking MRA and represents the current state of the Laguna Seca Parking MRA. The removal work performed in the Laguna Seca Parking MRA included MEC investigations and removal actions, as discussed in Volume 1 of the Group 3 RI/FS Report (Section 5.2) and summarized in Section 4.1 of this RA. The MEC risk assessment is composed of the exposure factor, the accessibility factor, and the overall hazard factor, which are based on seven input scores. Tables 4-5 through 4-9 provide summaries of the input scores, the resulting factors, and the overall MEC risk score for MRS-29, MRS-30, MRS-47, MRS-14A (depth of detection removal action area), and MRS-14A (1-ft removal action area), respectively, in the development reuse area.

The exposure factor components for the development reuse areas (where the removal to depth of detection) included: input scores for frequency of entry and intensity of contact with soil, which were provided for each receptor in Table 4-4; and input scores for MEC density, which were provided in Table 4-3 for each of the MRSs by MEC Hazard Type and by depth bgs. . The input scores for frequency of entry and intensity of contact with soil varied depending on the receptor. This assessment has also been applied to the six grids (two complete grids and portions of four grids) in the MRA that were not completely cleared as part of the 1-ft and 4-ft removal actions because no MEC were found within or near these grids (Volume 1; Appendix B).

The accessibility factor component for the development reuse areas included: input scores for level of receptor intrusion, which were provided in Table 4-4; input scores for MEC depth, which were discussed in Section 4.4; and input scores for migration/erosion potential, which were calculated in Appendix C and discussed in Section 4.5. The MEC depth input scores for the MRSs in the development areas where the removal to depth of detection were "6" due to limitations in the detection instruments used. The MEC depth input score for the MRS in the development area where the removal was to 1 ft was "6" due to the scope of the completed removal actions. The input scores for migration/erosion potential was "1", representing very stable soil, for MRS-30 because of the level ground surface. The other MRSs were given a migration/erosion potential input score of "3", representing significant migration, as a worst-case scenario because of the topography of those MRSs. The input scores for level of receptor intrusion varied depending on the receptor.

The overall hazard factor component consists only of input scores based on the MEC hazard types found within the MRA, which were discussed in Section 4.2. The only MEC item found in MRS-29 corresponded to a risk code of "1". The only MEC item found in MRS-30 corresponded to a risk code of "3". MEC items with risk codes corresponding to "1", "2", and "3" were found in MRS-47. In MRS-14A, items corresponding to risk codes "1" and "2" were found. The risk codes for the MEC items found in the Laguna Seca Parking MRA are summarized in Appendix B (Table B-2).

4.7.2 Description of Overall MEC Risk

The overall MEC risk score was determined by considering the accessibility of the sector (accessibility factor), the potential for exposure at the sector (exposure factor), and the overall hazard of the MEC type in the sector (overall hazard factor). The input scores were applied to the Protocol to determine the overall MEC risk. Appendix A provides the summary of the risk assessment Protocol and includes input scoring tables.

Tables 4-5 through 4-9 provide summaries of the input scores and resulting factors and the overall MEC risk assessment results for the MRSs in the development reuse area. For each receptor, the risk posed by each MEC hazard type is scored separately.

Overall MEC Risk Score for Development Reuse Area (Removal to Depth of Detection)

The proposed land use for the removal to depth of detection areas is development. The identified receptors include:

- trespasser (who is rarely in the area and does not intrude bgs)
- recreational user (who is frequently in the area for events at the raceway and does not intrude bgs)
- maintenance worker (who is frequently in the area and intrudes 24 inches bgs)
- construction worker (who is frequently in the area and intrudes 60 inches bgs)

Erosion was expected to affect the potential for exposure to MEC in MRS-29 and was scored a "3" for the MRS. A MEC density input of "1" was assumed for the depth intervals in MRS-29, as presented in Section 4.3. A MEC depth input of "6" (any MEC items remaining at the site are at a depth of 1 foot or greater) were conservatively selected for the MRS to account for limitations in the detection instruments used. Based upon these input scores, the accessibility factor and exposure factor for MRS-29 resulted in scores of "3" and "1", respectively, for surface receptors. For subsurface receptors, the accessibility factor and exposure factor resulted in scores of "5" and "1", respectively, for the MRS (due to the increased potential for contact with subsurface soil). The overall hazard factor was scored a "1" for MRS-29 because of the MEC hazard types found within this portion of the MRA.

Since erosion was not expected to affect the potential for exposure to MEC in MRS-30, the erosion input was scored a "1" for the MRS. A MEC density input of "1" was assumed for the depth intervals in MRS-30, as presented in Section 4.3. A MEC depth input of "6" (any MEC items remaining at the site are at a depth of 1 foot or greater) was conservatively selected for the MRS to account for limitations in the detection instruments used. Based upon these input scores, the accessibility factor and exposure factor for MRS-30 resulted in scores of "1" for surface receptors. For subsurface receptors, the accessibility factor and exposure factor resulted in scores of "5" and "1" respectively for the MRS (due to the increased potential for contact with subsurface soil). The overall hazard factor was scored a "3" for MRS-30 because of the MEC hazard types found within this portion of the MRA.

Erosion was expected to affect the potential for exposure to MEC in MRS-47 and a portion of MRS-14A and was scored a "3" for the MRSs. MEC density inputs ranged from "1" to "3" (deeper depth intervals), as presented in Section 4.3. A MEC depth input of "6" was conservatively selected (any MEC items remaining at the site are at a depth of 1 foot or greater) to account for limitations in the detection instruments used. The accessibility factor and exposure factor for MRS-47 and a portion of MRS-14A resulted in scores of "3" and "1", respectively, for surface receptors. For subsurface receptors, the accessibility factor in MRS-47 and a portion of MRS-14A was "5" and the exposure factor was either "4" or "5" depending on the receptor. The overall hazard factor varied in score from "1" to "3" because of the MEC hazard types found within these portion of the MRA.

Therefore, the overall MEC risk scores for surface receptors in MRS-29, MRS-30, MRS-47, and a portion of MRS-14A of the Laguna Seca Parking MRA were "A", lowest risk, and "B", low risk (Tables 4-5 through 4-8). Overall MEC risk scores for subsurface receptors ranged from "B", medium risk to "E", highest risk (Tables 4-5 through 4-8).

Overall MEC Risk Score for Development Reuse Area (Removal to Depth of 1 Foot)

Considering the steep hillside terrain, the only viable receptors for the 1-ft removal action area of MRS-14A included:

- trespasser (who is rarely in the area and does not intrude bgs)
- maintenance worker (who is frequently in the area and intrudes 24 inches bgs)

Erosion was expected to affect the potential for exposure to MEC in this portion of MRS-14A and was scored a "3" for the MRS. MEC density inputs ranged from "1" to "3" (deeper depth intervals), as presented in Section 4.3. A MEC depth input of "6" was conservatively selected (any MEC items remaining at the site are at a depth of 1 foot or greater) to account for limitations in the detection instruments used. Based upon these input scores, the accessibility factor for this MRS resulted in scores of "3" for the trespasser (surface receptor) and "5" for the maintenance worker (subsurface receptor). The exposure factor for this MRS resulted in scores of "1" for the trespasser (surface receptor) and "4" and "5" for the maintenance worker (subsurface receptor). The overall hazard factor was scored a "1" and "2" because of the MEC hazard types found within these portions of the MRA.

Therefore, the overall MEC risk scores in MRS-14A where the 1-ft removal action was conducted were "A", lowest risk, for the surface receptor (trespasser; Table 4-9) and "D", high risk, to "E", highest risk, for the subsurface receptor (maintenance worker; Table 4-9).

4.8 Laguna Seca Parking MRA Uncertainty

This section discusses the potential uncertainties related to the Protocol inputs and the resulting change in the overall MEC risk determined for the Laguna Seca Parking MRA.

4.8.1 Calculation of MEC Density Uncertainties

The determination of MEC density is an estimate of the items potentially not detected by the detection equipment. The back calculation of the potential MEC present after the removal action using a percent detection is not a definitive method for precisely determining MEC density. The purpose of calculating a potential residual density is to estimate a MEC Density input factor of high, medium, or low, as it relates to risk of exposure, not to conclude the actual number of items which may or may not remain at the site.

The Pd values were developed from available and relevant equipment performance data. However, the equipment performance data available do not provide a statistically sound basis for determining a Pd. The number of data points is limited, increasing the variance of the data set. Developing a data set sufficient for statistical application would require an extensive study of equipment performance for each type of MEC item found at the site at each depth interval. The value of such a study is questionable given that only two numbers of MEC density have an effect on the risk score (i.e., less than 0.1 items per acre gives a low score and greater than 1 items per acre give a high score). The purpose of the risk score is to characterize and estimate the potential risk sufficiently for the evaluation of feasibility study alternatives, such as the selection of institutional controls. Therefore, although not statistically defensible, the mathematical calculation of potential residual MEC density is

considered adequate to provide a theoretical estimate of the number of MEC items for use in assessing exposure and the potential change in exposure.

The estimate of MEC density in deeper intervals is likely overestimated. This is caused by using equipment performance data collected on items seeded at depths exceeding the depths at which that item would be anticipated. For example, the maximum penetration depth for a 2.36-inch rocket is 4.8 inches. Thirteen 2.36-inch rockets were seeded at depths greater than 6 inches as a conservative test of the equipment performance. This equipment performance data was consolidated with the other detection results to produce an aggregate Pd for the greater than 12-inch depth interval. The risk assessment approach currently applies this aggregate Pd to all MEC types for which a unique Pd is unavailable. When used in the back-calculation of MEC, the result is a higher estimate of residual MEC density.

The exclusion of items found in burial pits adds to the uncertainty in the potential residual density calculation. The data used to calculate detection efficiency is not applicable to burial pits in the estimation of potential residual density because the ability to detect multiple items in a single location is higher than the ability to detect one seeded item. The field procedure was to continue using the detection instruments as excavations proceeded for all detected items, resulting in better performance than demonstrated in the controlled studies for single seeded items. The increased amount of metal items at burial pit locations would increase detection ability above what was determined from seeded tests; therefore, potential for residual burial pits is significantly lower than the potential for residual single items. Because of the factors addressed above, the removal of items detected in burial pits from the calculation of potential residual densities is considered appropriate.

4.8.2 Depth Below Ground Surface Uncertainties

The depth bgs score of “6”, indicating potential MEC remaining at 1 ft and deeper was chosen for the analysis of the MRA. This input score was conservatively chosen for MRS-29, MRS-30, MRS-47, and the portion of MRS-14A that underwent a 4-foot removal action to reflect the limitations of the instruments used during the investigation and removal activities. This input score is also relevant for the portion of MRS-14A area that underwent a 1-ft removal action and the six grids that were not completely cleared during the 1-ft and 4-ft removal actions. Generally the 1-ft removal action area is steep hillside. Only 13 MEC items were found on these hillsides. Since the MEC items found during both the removal action to depth and 1-ft removal action areas are generally non-penetrating items, it may be an overestimation of the risk determined for the 1-ft removal action area to assume that there are residual MEC items deeper than 1 ft bgs. Because the MEC depth bgs score of “6” assumes that all MEC in the top foot has been removed, the score may underestimate the MEC potentially remaining in the top foot of the six grids not completely cleared.

The MEC depth bgs score of “6” selected for MRS-29, MRS-30, MRS-47, and the 4-ft removal action portion of MRS-14A indicates that 100% of detected MEC was removed from the top foot. After-action reports stated that no anomalies were left uninvestigated within the depth of detection (USA 2001c, USA 2000a, UXB 1995a, UXB 1995b, UXB1995c, and USA 2000b). The score of “6” would overestimate the likely depth of any potential MEC items, if any remained, and therefore, would overestimate the overall MEC risk.

4.8.3 Migration/Erosion Potential Uncertainties

The Universal Soil Loss Equation was not used to derive the number of inches per year of erosion expected at MRS-29, MRS-47, and MRS-14A of the Laguna Seca Parking MRA. Because of the steep hillsides, vegetation clearance for parking, and the disturbance of soil by vehicles, the worst case of "3" or "significant migration" was estimated for MRS-29, MRS-47, and MRS-14A. This assumption may overestimate the actual erosion. While the score of "3" did not affect the accessibility factor and subsequently the overall MEC risk for subsurface receptors in MRS-29, MRS-14A (the removal action to depth sector), and MRS-47, it did affect the accessibility factor for surface receptors for these MRSs. The accessibility factor and overall MEC risk was recalculated for the MRS-29, MRS-14A, and MRS-47 surface receptors. Using a score of "2", minor migration, the accessibility factor scores for the trespasser and recreational user dropped from "3" to "2". That change did not affect the overall MEC risk to the recreational user for the MEC hazard types found in the MRSs. Therefore, using the assumption of significant migration for MRS-29, MRS-14A, and MRS-47 does not likely overestimate the risk to the recreational user.

4.8.4 Level of Intrusion Uncertainties

The level of intrusion and the depth bgs inputs are related in the accessibility score and subsequently in the scoring of the overall MEC risk. Specifically, the accessibility factor depends on the depth between the level of intrusion and the shallowest MEC item expected on the MRA. As the interval between the level of intrusion and MEC depth bgs decreases to less than 1 ft, the accessibility factor score increases. For MRS-29, MRS-30, MRS-47, and MRS-14A, the MEC depth bgs has been scored as "6" (any MEC items remaining at the site are at a depth of 1 foot or greater). Given that removal actions to depth have been performed in the majority of the MRA, it is unlikely that MEC to a depth of 4 ft bgs remain in these areas. Consequently, the MEC depth bgs score of "6", which directly affects the accessibility factor, may result in an overestimation of the overall MEC risk. The uncertainty is that despite efforts to detect and remove 100% of the MEC at the MRA, MEC may remain bgs. For the MRSs in the Laguna Seca Parking MRA, the level of receptor intrusion contributes significantly to the accessibility factor, which in turn, contributes to the overall MEC risk. However, the 1-ft removal action areas of MRS-14A are steep hillsides and it is improbable that a maintenance worker would be conducting intrusive activities down to 2 ft bgs on the hillsides. Therefore, the level of intrusion for the maintenance worker in this area most likely leads to an overestimation of the overall MEC risk.

4.8.5 Frequency of Entry Uncertainties

The frequency of entry and the MEC density input factors are related in the exposure score and subsequently in the scoring of the overall MEC risk. Receptors are more likely to come in contact with a MEC item if they are at the site often than if they rarely go to the site. This input is a measure of the number of times per year that the receptor will be in an area potentially containing MEC. It is difficult to estimate how often individual receptors will be in the Laguna Seca Parking MRA. The overall MEC risk score increases with the frequency of entry. However, for the MRSs in the Laguna Seca MRA, the density has been scored as a "1" (100% of detected MEC removed to the level of intrusion) for residual MEC to a depth of

1-ft bgs; therefore, the contribution to the overall MEC risk score by frequency of entry for receptors potentially intruding to 1-ft bgs is negated. It did not contribute to the risk because there is no MEC to encounter regardless of the number of times a receptor enters the area. The uncertainty is that despite efforts to detect and remove 100% of the MEC at the site, MEC may remain bgs. Therefore, the frequency of entry input score, being negated because of a MEC density input score of "1", may underestimate the overall MEC risk score depending on the receptor.

For the MRSs in the Laguna Seca MRA, including the 1-ft removal action area of MRS-14A, where residual MEC was assumed to be at 1-ft bgs or deeper, the frequency of entry contributes significantly to the exposure factor, which in turn, contributes to the overall MEC risk. In the 1-ft removal action areas of MRS-14A it is improbable that a maintenance worker would be on these hillsides once a week to more than once a week. Therefore, the frequency of entry for the maintenance workers most likely leads to an overestimation of the overall MEC risk.

4.8.6 Intensity of Contact with Soil Uncertainties

The intensity of contact with soil and MEC density inputs are related to the exposure score and subsequently in the scoring of the overall MEC risk. For an individual receptor to come in contact with a MEC item, the individual will need to be in contact with the medium where the MEC is located. This input is a measure of the length of time the receptor will have in contact with the soil. Receptors are more likely to come in contact with a MEC item if they are at the site for a longer period of time. However, for receptors potentially intruding to 1-ft bgs in MRS-29, MRS-30, MRS-47, and all of MRS-14A, the density has been scored as a "1": 100% of detected MEC was removed to the level of intrusion; therefore, the intensity of contact with soil does not contribute to the risk because there is no MEC to encounter regardless of the length of time a receptor is in the area. If any MEC does remain in the MRA, then the overall MEC risk for receptors would underestimate the actual risk. For the 1-ft removal action area of MRS-14A, the intensity of contact with soil, scored as a "1", "Very Low: less than or equal to 1 hour/day for the trespasser, and "4", "High: less than or equal to 9 hours/day" for the maintenance worker, may be improbable on the steep hillsides, and therefore contribute to an overestimation of the exposure factor and subsequently the overall MEC risk.

4.8.7 Overall MEC Risk Score Uncertainties

The uncertainties for the input factors discussed in Sections 4.8.1 through 4.8.6 may overestimate or underestimate the overall MEC Risk score on an individual basis. Inputs to the Protocol reflect the uncertainty regarding the depth and density of MEC items potentially remaining at the site, as well as the actions of the receptors. If 100% of the MEC at the Laguna Seca Parking MRA was not removed during the removal actions, or if there was a MEC item in the two areas that were not 100% investigated, then the overall MEC risk would be underestimated. In addition, the estimate of MEC density in deeper intervals is likely overestimated because the equipment performance data included items seeded at depths exceeding the depths at which that item would be anticipated.

4.9 Laguna Seca Parking MRA Conclusions

Tables 4-10 through 4-14 provide summaries of the overall MEC risk results for the after-action receptor analysis of the Laguna Seca Parking MRA. As indicated in Tables 4-10 through 4-14, the overall MEC risk score for each surface receptor at MRS-29, MRS-30, MRS-47, and MRS-14A for each MEC hazard type ranged from "A", lowest risk to "B", low risk. The overall MEC risk score for each subsurface receptor at MRS-29, MRS-30, MRS-47, and MRS-14A for each MEC hazard type ranged from "B", low risk, to "E", highest risk.

It is recognized that 1 ft and 4 ft subsurface MEC removal actions were completed in a manner that met work plan requirements and quality objectives during the previous removal actions conducted on the Laguna Seca Parking MRA, the potential exists that some MEC may remain in the subsurface at the MRA. Therefore, the risks associated with intrusive receptors (maintenance workers, construction workers) are assumed to remain at the Laguna Seca Parking MRA at a level that requires mitigation. This is a qualitative assessment of the risk, and therefore, uncertainties are associated with the determination. The Protocol was not designed to assess absolute risk. The overall MEC risk score is an approach for comparing the relative risk between remedial alternative where MEC has been encountered on sites at the former Fort Ord.

5.0 MOUT SITE MRA RISK ASSESSMENT

The MOUT Site MRA is located in the central portion of the former Fort Ord within the northeastern portion of the historical impact area (Figure 1). As indicated in Table 5-1, the MRA includes the MOUT training area and a portion of Barloy Canyon Road located along the eastern boundary of the historical impact area and contains the following two USACE property transfer parcels: F1.7.2 and L20.8 (Figures 9, 10, and 11). The MOUT Site MRA encompasses approximately 54 acres of partially developed land constituting the MOUT training area (Parcel F1.7.2), which is a mock city training area, and approximately 7 acres of the existing Barloy Canyon Road and associated right-of-way (Parcel L20.8). Parcel F1.7.2 is designated as a development area for training (Sector 1) and Parcel L20.8 is designated as a development area for a roadway (Sector 2).

5.1 Summary of MEC Investigations and Removal Actions

Field data were collected during the investigations and action removals conducted by the Army within the boundaries of the MOUT Site MRA. The investigations and removal actions are described in Section 6.2 of Volume 1 of the Group 3 RI/FS Report and summarized as follows:

- Grid Sampling investigation in MRS-28 by USA in 1998 using the Schonstedt GA-52Cx magnetometer (USA 2001d)
- SS/GS Sampling investigation in MRS-28 by USA in 1998 using the Schonstedt GA-52Cx magnetometer (USA 2001d)
- Removal Action in MRS-14D, adjacent to the east side of Barloy Canyon Road, by USA from 1995 to 1997 using Schonstedt GA-52Cx magnetometers (USA 2001a)
- Time-critical removal action (TCRA) (Visual Surface) in the Eucalyptus Fire Area, which encompassed MRS-27O, MRS-28, and most of Barloy Canyon Road, in 2003 (Shaw 2005).
- Field verification survey in MRS-28, along the southwestern border of the MOUT training facility area, by the ESCA RP Team in 2012 using the Schonstedt GA-52Cx magnetometer (Appendix E of Volume 1, Remedial Investigation)

Selected grids were investigated to depth during the grid sampling and the SS/GS investigations (Figure 6-1 of Volume 1). During these investigations, two burial pits containing a total of 56 MEC items (DMM) were discovered in the MOUT training area; therefore, other burial pits may exist in the MRA. In addition to the investigations, the entire MOUT Site MRA was visually inspected during the visual surface TCRA and field verification survey with the exception of the southern portion of Barloy Canyon Road (Parcel L20.8) along the eastern side of the roadway A portion of the eastern side of Barloy Canyon Road in Parcel L20.8 was included in a removal action to depth at MRS-14D, leaving an approximately 600-ft section of the eastern side of the roadway uninvestigated (Figure 6-2 of Volume 1). This 600-ft section of Parcel L20.8 is not located within an MRS and, based on the removal action reporting, is not likely to have MEC.

Therefore, MEC may potentially remain below the surface at the MOUT Site MRA. MEC items found at the MOUT Site MRA were penetrating items (e.g., rockets and projectiles) and could be expected below ground surface.

5.1.1 Data Used for MOUT Site MRA Risk Assessment

The field data identifying the MEC items found on the MOUT Site MRA are summarized in Appendix B (Table B-3). These data served as the basis for munitions type input for the MOUT Site MRA risk assessment. The MEC items found within the boundaries of the MOUT Site MRA during the investigations and removal actions were included in this risk assessment.

5.1.2 Detection Efficiency

For the purposes of the risk assessment for the MOUT Site MRA, the detection efficiency demonstrated with the Schonstedt GA-52Cx served as the basis for estimating the potential depth below ground surface and density of MEC potentially remaining on site because this was the instrument used during the MOUT Site MRA investigations and removal actions. The detection efficiency for the Schonstedt surveys at Fort Ord was evaluated in the ODDS (Parsons 2002). The results of the ODDS seeded test are further discussed in the RI equipment evaluation for the MOUT Site MRA in Section 6.2.2.2 of the RI (Volume 1).

Because the risk assessment is based on the potential hazard remaining at the site, the Pd is used to back-calculate an estimate of MEC potentially remaining at the site. This calculated density estimate is a theoretical number used to determine the score of the MEC density input factor in the Protocol. This theoretical number is not and should not be interpreted as an actual number of potentially remaining MEC items. Because there is no established way to determine the actual number of items that may be at a site (that is, there is no way to know the source term), it is impossible to determine if any items remain at the site or provide an accurate count of items remaining.

As presented in Section 6.2.2.2 of the RI (Volume 1), detection efficiencies were calculated for the types of MEC items found at the MOUT Site MRA by combining the information gathered in seeded studies conducted in the ODDS and during the DRO removal action. Detection efficiencies were developed by depth interval to account for differences in detection capability at various depths. For the purposes of the risk assessment, Pds were used for each MEC type and depth interval with seed results. MEC types with no items seeded in a specific depth interval were applied an overall Pd for that depth interval. For MEC types not included in the ODDS or DRO study, the overall Pd was used. A Pd was developed for the 0-6 inch, 7-12 inch, and greater than 12-inch depth intervals. Because the actual Pd for the removal action at the MOUT Site MRA is unknown and the Pd values used to determine density are based on a small number of seeded items, the efficiency used to calculate density could be higher or lower than the actual field efficiency and is considered a best estimate based on available data.

Information presented in Section 6.2.2.2 of the RI (Volume 1) was used as the basis for determining Pd for the risk assessment. The Pds based on consolidating the data from the

ODDS and DRO study seeded items for the types of munitions found at the MOUT Site MRA are summarized in Table 5-2 of this RA.

5.2 MEC Hazard Type Input

As identified in Section 2.2, the MEC hazard type is not variable and provides reliable input for the MOUT Site MRA risk assessment, and corresponds to the MEC risk code categories. MEC items with risk codes corresponding to "1", "2", and "3" were found in the MOUT training area (Parcel F1.7.2) of the MOUT Site MRA. One item was found in the roadway portion (Parcel L20.8) of the MRA, which had a risk code of "1". The risk codes for the MEC items found in the MOUT Site MRA are summarized in Appendix B (Table B-3).

5.3 MEC Density Input

As identified in Section 2.3, the MEC density is a component of the exposure factor and represents the potential density (items per acre) of MEC remaining on the site at a depth interval that is likely to be accessed by a receptor. The potential MEC density is estimated by depth interval (surface, 0 to 1 foot, 0 to 2 foot, etc). According to the referenced investigations and removal actions summarized in Section 5.1, selected grids were investigated to depth during the grid sampling and the SS/GS investigations (Figure 6-1 of Volume 1). In addition to the investigations, the MOUT Site MRA was visually inspected during the visual surface TCRA and field verification survey with the exception of the southern portion of Barloy Canyon Road (Parcel L20.8) along the eastern side of the roadway. A portion of the eastern side of Barloy Canyon Road in Parcel L20.8 was included in a removal action to depth at MRS-14D, leaving an approximately 600-ft section of the eastern side of the roadway uninvestigated (Figure 6-2 of Volume 1). This 600-ft section of Parcel L20.8 is not located within an MRS and, based on the removal action reporting, is not likely to have MEC. MEC items may potentially remain in the subsurface within the portions of the MOUT Site MRA where subsurface removal actions have not been conducted.

Given the demonstrated performance of the instruments used during the investigations and removal actions to detect items within the top 6 to 12 inches of soil and that the majority of the MOUT Site MRA was subjected to a surface clearance, a MEC density input of "1" is assumed for the surface of the removal action portion of the MRA. This assumption is consistent with assumptions made in previous risk assessments performed by the Army (MACTEC 2006). Given that a subsurface removal action has not been completed across the entire MOUT Site MRA, it is presumed that there is a potential for MEC items to remain in the subsurface. The number of items remaining on site is unknown. However, a theoretical estimate can be deduced based on the performance profile of the detection instrument and the distribution of the MEC items at the site.

The following formula is used to estimate the potential residual density of MEC items by depth interval for use in estimating changes in potential exposure for a receptor. For the risk assessment purposes:

$$\text{Potential Residual Density (number/acre)} = \frac{\left(\frac{1}{Pd} - 1\right) \times \left(\text{Number of items found} - \text{Number of Items found in Pits}\right)}{\text{Acres Surveyed}}$$

Where:

Potential Residual Density	=	the potential number of MEC items remaining at the site in number per acre
Pd	=	the detection efficiency of the survey equipment based on the equipment evaluation. Percent detection efficiencies are applied separately for each type of item with a Pd in each depth interval of interest. The total count of items is then summed by MEC type to provide the density by MEC type.
Number of items found	=	the number of MEC items found in the survey area
Number of items in pits	=	the number of MEC items found in the survey area and recorded as being in a pit.

Table 5-3 provides the after-action analysis of the potential residual density and the MEC density input for each of the MRSs by MEC Hazard Type and by depth below ground surface. The subsurface data collected within the MOUT Site MRA during the grid sampling and SS/GS investigations were used to estimate the potential subsurface residual density for the entire MOUT training area. For the Barloy Canyon Road area (Parcel L20.8), the data collected during the removal action in MRS-14D were used to estimate the potential residual density. Parcel L20.8 includes Barloy Canyon Road which is a paved road. Surface MEC items would not be expected within the paved road area.

5.4 MEC Depth Input

As identified in Section 2.4, the MEC depth is a component of the accessibility factor and represents the potential depth bgs at which an item might remain at the site. The MEC depth bgs input score of “7,” (no MEC on the surface and MEC below ground surface), was selected for the MOUT training area (MRS-28). This input score was selected because a surface removal action was completed across the MRS and MEC items would not be expected to remain on the surface. A MEC depth score of “7” (no MEC on the surface and MEC below ground surface) has been conservatively selected for input into the risk assessment for the Barloy Canyon Road portion of the MRA (Parcel L20.8). Although an approximately 600 ft section of the eastern side of Barloy Canyon Road (Parcel L20.8) was not subjected to a removal action, the 600-ft section of Parcel L20.8 is not located within an MRS and, based on the removal action reporting, is not likely to have MEC. Also, Parcel L20.8 contains Barloy Canyon Road which is a paved road. Surface MEC items would not be expected within the paved area of the road. The quality of the data was evaluated using the Munitions Response Activity Evaluation Checklists (Appendix D in Volume 1 of the Group 3 RI/FS Report). In the Munitions Response Activity Evaluation Checklist, Part 2: Removal Evaluation, Question "A", it was concluded that the data can be used for performance of the

risk assessment. Although grids within the MOUT Site MRA were not investigated, the completed grids throughout the MRA were used as representative of the MRA.

5.5 Migration/Erosion Potential Input

The erosion estimate calculation is provided in Appendix C. The erosion estimate for the MOUT Site MRA was calculated as 0.0000086 inch, which equates to a migration/erosion potential score of "1" (Appendix A, Table A-3). A score of "1" indicates: "Very stable: MEC will not migrate. Annual erosion is equal to or less than the site-wide average of 3/100 inch per year". Erosion may have occurred on the relatively flat MOUT Site MRA, but it is expected to be associated mostly with gullies, roads, firebreaks, trails, and surrounding hillsides outside of the MRA.

5.6 MOUT Site MRA Reuse Areas and Future Land Use Receptors

This section identifies the two reuse areas by parcel (sectors) and the general representative receptors considered in the MEC risk assessment for the MOUT Site MRA (Figure 9). The future land uses for each parcel in the MRA are described in Table 5-1. Descriptions of the receptors and the input scores for level of intrusion, frequency of entry, and intensity of contact with soil are provided in Table 5-4 for the MOUT training area (Sector 1) and in Table 5-5 for the roadway area (Sector 2).

5.6.1 Description of Reuse Areas

The MOUT Site MRA is located in the central portion of the former Fort Ord within the northeastern portion of the historical impact area (Figure 1). As indicated in Table 5-1, the MOUT Site MRA contains the following two USACE property transfer parcels: F1.7.2 (the MOUT training area portion of the MRA) and L20.8 (the Barloy Canyon Road portion of the MOUT Site MRA (Figures 9and 10). The MOUT Site MRA is wholly contained within the jurisdictional boundaries of Monterey County. Access to the MOUT Site MRA is currently restricted to the public by four-strand barbed-wire fencing with concertina along Eucalyptus Road to the north, and locked gates/barricades with concertina and warning signs across Barloy Canyon Road at the intersection with Eucalyptus Road. There is no fencing immediately surrounding the MOUT training area portion of the MRA. The MOUT training area portion of the MRA (Parcel F1.7.2) includes 42 buildings and structures and a pistol range currently being used for tactical training of military, federal, and local law enforcement agencies (Figure 10). The MOUT training area is not served by water, sewer, storm, gas, or electrical utility systems; however, a telephone line enters the MOUT training area at the northwestern boundary (Figure 10). The Barloy Canyon Road portion of the MOUT Site MRA (Parcel L20.8) does not have utilities. East of the Barloy Canyon Road, an electrical line runs in a north to south direction (Figure 10).

The HMP identifies the MOUT Site MRA as development. Nearby NRMA and habitat reserve areas support plant and animal species that require implementation of mitigation measures identified in the HMP to ensure compliance with the ESA and to minimize impacts to listed species. Threatened or endangered plant species identified as having possible

occurrence in the MOUT Site MRA include Monterey gilia (formerly sand gilia; endangered) and Monterey spineflower (threatened). It is possible CTS may be found in the MOUT Site MRA as the MRA is within the 2-kilometer distance from two aquatic features that may provide breeding habitat for the CTS. One feature was identified as suitable breeding habitat and the other feature was identified as a known CTS breeding site in 2004 (USFWS 2005).

The MOUT Site MRA is proposed for school/university reuse in the Base Reuse Plan (Figure 9). As described in the SEDR, the uses being considered as part of the redevelopment for the MOUT Site MRA include:

- School/University Reuse Area, MOUT Training Area, Parcel F1.7.2 (Sector 1) – the western portion of the MRA is designated as a training facility for law enforcement tactical training. The parcel is approximately 54 acres. The MOUT trainees are not expected to conduct intrusive activities during training activities. It is also anticipated that old buildings may be destroyed, new buildings may be constructed, or underground utilities may be brought into the area.
- Development Reuse Area, Roadway, Parcel L20.8 (Sector 2) – the roadway parcel will continue to be used as a roadway for recreation and for transportation during raceway events, and will require maintenance and possibly utilities. The parcel is approximately 7 acres. The Barloy Canyon portion of the MOUT Site MRA is likely to be improved and opened as a transportation corridor. To facilitate reuse, infrastructure improvements, such as utilities and roadways, are required.

Current land use restrictions for property transfer parcels are prohibition of:

- any uses other than investigation/remediation of MEC and installation of utilities/roadways until specified remedial action completion certification has occurred;
- the use of the property for residence, hospital, school (for persons under the age of 21, except for post-secondary schools), and a day care center for children;
- activities (including soil disturbance) in violation of the Excavation Ordinance, as modified; and
- for the School/University Reuse Area, MOUT Training Area, Parcel F1.7.2 (Sector 1), any purposes other than activities associated with law enforcement tactical training.

Additionally, the current land use restrictions require:

- the buyer, lessee, or sub-lessee be given written notice that there is the potential for the presence of MEC in the soil of the property; and
- DTSC, the United States working through the Army, and their contractors/agents shall have reasonable right-of-entry and access to the property for inspection, monitoring, testing, sampling, and other activities consistent with the covenant as deemed necessary by the DTSC in order to protect the public health and safety or the environment and oversee any required activities.

5.6.2 Description of Receptors

Given the proposed reuses discussed in the previous section, general representative receptors will be slightly different for the reuse areas. The representative receptors chosen for analysis in the MEC risk assessment for the MOUT training area (Sector 1) are:

- trespasser
- trainee user
- maintenance worker (such as a utility worker, firefighter, emergency response worker, and ancillary worker)
- construction worker

The representative receptors chosen for analysis in the MEC risk assessment for the roadway area (Sector 2) are:

- recreational user
- maintenance worker (such as a utility worker, firefighter, emergency response worker, and ancillary worker)
- construction worker

These receptors represent a range of uses, levels of intrusion into the soil, frequency of entry, and intensity of contact with the soil at the MOUT Site MRA. A description of each receptor and associated input scores for level of intrusion, frequency of entry, and intensity of contact with soil for Sectors 1 and 2 are provided in Tables 5-4 and 5-5, respectively.

5.7 MOUT Site MRA MEC Risk Assessment Results

After-action receptor scenarios were analyzed to evaluate the overall MEC risk at the MOUT Site MRA. The following sections describe the results of the MEC risk assessment for the development reuse area. Figure 9 shows the reuse areas in the MOUT Site MRA.

5.7.1 Input Scores

The after-action receptor scenario analysis considers the MEC risk at the site following the removal actions performed on the MOUT Site MRA and represents the current state of the MOUT Site MRA. The removal work performed in the MOUT Site MRA included MEC investigations and removal actions, as discussed in Volume 1 of the Group 3 RI/FS Report (Section 6.2) and summarized in Section 5.1 of this RA. The MEC risk assessment is composed of the exposure factor, the accessibility factor, and the overall hazard factor, which are based on seven input scores. Tables 5-6, and 5-7 provide summaries of the input scores, the resulting factors, and the overall MEC risk score for the MOUT training area (Sector 1) and the roadway area (Sector 2).

The exposure factor components for the two reuse areas included: input scores for frequency of entry and intensity of contact with soil, which were provided for each receptor by sector in Tables 5-4 and 5-5; and input scores for MEC density, which were discussed in Section 5.3. The input scores for frequency of entry and intensity of contact with soil varied depending on the receptor. The input scores for MEC density varied with depth interval and MEC hazard type.

The accessibility factor component for Sectors 1 and 2 included: input scores for level of receptor intrusion, which were provided by sector in Tables 5-4 and 5-5; input scores for MEC depth, which were discussed in Section 5.4; and input scores for migration/erosion potential, which were calculated in Appendix C and discussed in Section 5.5. The input score for MEC depth in Sectors 1 and 2 was "7" since MEC may potentially remain in the subsurface at the MOUT Site MRA. The input score for migration/erosion was "1", representing very stable soil for the MRA. The input scores for level of receptor intrusion varied depending on the receptor.

The overall hazard factor component consists only of input scores based on the MEC hazard types found within the MRA, which were discussed in Section 5.2. The input scores for Sector 1 ranged from "1" to "3" based for the MEC hazard types found within that portion of the MRA and the input score for Sector 2 was "1" (Appendix B, Table B-3).

5.7.2 Description of Overall MEC Risk

The overall MEC risk score was determined by considering the accessibility of the sector (accessibility factor), the potential for exposure at the sector (exposure factor), and the overall hazard of the MEC type in the sector (overall hazard factor). The input scores were applied to the Protocol to determine the overall MEC risk. Appendix A provides the summary of the risk assessment Protocol and includes input scoring tables.

Tables 5-6 and 5-7 provide summaries of the input scores and resulting factors and the overall MEC risk assessment results for the development reuse areas (Sectors 1 and 2), respectively. For each receptor, the risk posed by each MEC hazard type is scored separately.

Overall MEC Risk Score for MOUT Training Area (Sector 1)

For the proposed development land use related to the MOUT training area (Sector 1), the identified receptors included:

- trespasser (who is rarely in the area and does not intrude bgs)
- MOUT trainee (who is frequently in the area and does not intrude bgs)
- maintenance worker (who is frequently in the area and intrudes 24 inches bgs)
- construction worker (who is frequently in the area and intrudes more than 60 inches bgs).

Since erosion was not expected to affect the potential for exposure to MEC, the accessibility factor for Sector 1 resulted in scores of "4" for the surface receptors and "5" for the

subsurface receptors, and the exposure factor resulted in scores of "1" for the surface receptors and "1" and "5" for the subsurface receptors (Table 5-6). The overall hazard factor varied in score from "1" to "3" because of the MEC hazard types found within this portion of the MRA. The overall hazard factor varied in score from "1" to "3" because of the MEC hazard types found within this portion of the MRA.

Therefore, the overall MEC risk score for each receptor in the MOUT training area (Sector 1) of the MOUT Site MRA ranged from "B", low risk, to "C", medium risk, for surface receptors (Table 5-6). The overall MEC risk score for subsurface receptors in the MOUT training area (Sector 1) of the MOUT Site MRA ranged from "B", low risk, to "D", high risk (Table 5-6).

Overall MEC Risk Score for the Roadway Area (Sector 2)

For the proposed development land use related to the roadway (Sector 2), the identified receptors included:

- recreational user (who is frequently in the area and does not intrude bgs)
- maintenance worker (who is frequently in the area and intrudes 24 inches bgs)
- construction worker (who is frequently in the area and intrudes more than 60 inches bgs).

Since erosion was not expected to affect the potential for exposure to MEC, the accessibility factor for Sector 2 resulted in scores of "4" for surface receptors and "5" for subsurface receptors, and the exposure factor for Sector 2 resulted in scores of "1" for surface receptors and "5" for subsurface receptors (Table 5-8). The overall hazard factor resulted in a score of "1" because of the MEC hazard types found within this portion of the MRA.

Therefore, the overall MEC risk score for each receptor in the roadway area (Sector 2) was "B", low risk, for surface receptors and "D", high risk, for subsurface receptors (Table 5-7).

5.8 MOUT Site MRA Uncertainty

This section discusses the potential uncertainties related to the Protocol inputs and the resulting change in the overall MEC risk score determine for the MOUT Site MRA.

5.8.1 Calculation of MEC Density Uncertainties

The determination of MEC density is an estimate of the items potentially not detected by the detection equipment. The back calculation of the potential MEC present after the removal action using a percent detection is not a definitive method for precisely determining MEC density. The purpose of calculating a potential residual density is to estimate a MEC Density input factor of high, medium, or low, as it relates to risk of exposure, not to conclude the actual number of items which may or may not remain at the site.

The Pd values were developed from available and relevant equipment performance data. However, the equipment performance data available do not provide a statistically sound basis

for determining a Pd. The number of data points is limited, increasing the variance of the data set. Developing a data set sufficient for statistical application would require an extensive study of equipment performance for each type of MEC item found at the site at each depth interval. The value of such a study is questionable given that only two numbers of MEC density have an effect on the risk score (i.e., less than 0.1 items per acre gives a low score and greater than 1 items per acre give a high score). The purpose of the risk score is to characterize and estimate the potential risk sufficiently for the evaluation of feasibility study alternatives, such as the selection of institutional controls. Therefore, although not statistically defensible, the mathematical calculation of potential residual MEC density is considered adequate to provide a theoretical estimate of the number of MEC items for use in assessing exposure and the potential change in exposure.

The estimate of MEC density in deeper intervals is likely overestimated. This is caused by using equipment performance data collected on items seeded at depths exceeding the depths at which that item would be anticipated. For example, the maximum penetration depth for a 2.36-inch rocket is 4.8 inches. Thirteen 2.36-inch rockets were seeded at depths greater than 6 inches as a conservative test of the equipment performance. This equipment performance data was consolidated with the other detection results to produce an aggregate Pd for the greater than 12-inch depth interval. The risk assessment approach currently applies this aggregate Pd to all MEC types for which a unique Pd is unavailable. When used in the back-calculation of MEC, the result is a higher estimate of residual MEC density.

The exclusion of items found in burial pits adds to the uncertainty in the potential residual density calculation. The data used to calculate detection efficiency is not applicable to burial pits in the estimation of potential residual density because the ability to detect multiple items in a single location is higher than the ability to detect one seeded item. The field procedure was to continue using the detection instruments as excavations proceeded for all detected items, resulting in better performance than demonstrated in the controlled studies for single seeded items. The increased amount of metal items at burial pit locations would increase detection ability above what was determined from seeded tests; therefore, potential for residual burial pits is significantly lower than the potential for residual single items. Because of the factors addressed above, the removal of items detected in burial pits from the calculation of potential residual densities is considered appropriate.

Estimates of residual subsurface MEC density for the MOUT training area were calculated using the subsurface data collected during the SS/GS and grid sampling investigations. Approximately 8 acres of sampling grids were located within the boundaries of the MOUT training area. The density for the 8 acres was then applied to the remainder of the MOUT training area to determine an appropriate input score. Use of the limited data set is applicable, but may under- or over-estimate the subsurface density at the MOUT Site MRA.

Similarly, estimates of residual subsurface MEC density for the Barloy Canyon Road parcel were calculated using the subsurface data collected during the removal action that occurred in a portion of the roadway parcel. As stated in other sections of the report, the roadway is a paved road and a portion of the road is not contained within an MRS. Use of the limited data set is applicable, but may over-estimate the subsurface density within the Barloy Canyon Road parcel particularly the portions of the roadway that are not part of an MRS.

5.8.2 Depth Below Ground Surface Uncertainties

The MEC depth bgs score of "7", indicating no MEC on the surface and MEC in the subsurface, was chosen for this analysis because the MRA has undergone a surface removal action. The score of "7" would overestimate the accessibility factor if no MEC remained in the subsurface.

The area of the roadway where a surface clearance was not conducted is approximately 600 feet in the southern portion of Parcel L20.8. Most of the area on the eastern side of the road was within MRS-14D where a removal action to the depth of detection was conducted in 1995 (USA 2001a). Therefore, the only part of the Barloy Road portion of the MRA that has not undergone a surface clearance is approximately 600 ft of the east side of the road, which is not within an MRS, just north of MRS-14D. The score of "7" overestimates the MEC for the roadway and subsequently overestimates the overall MEC risk score.

5.8.3 Migration/Erosion Potential Uncertainties

The Universal Soil Loss Equation was used to derive the number of inches per year of erosion expected at the MOUT Site MRA. The uncertainty in using this calculation to determine the level of erosion is that the MOUT Site MRA is in a valley and erosion from the adjacent hillsides could have, over time, buried surface MEC. Therefore, non-penetrating MEC items, which should have been on the surface, may have been buried, and therefore not removed during the surface clearance. The migration/erosion potential calculation does not take into account the area surrounding the site, and therefore, may lead to an underestimation of the overall MEC risk score.

5.8.4 Level of Intrusion Uncertainties

The level of intrusion and the depth bgs inputs are related in the accessibility score and subsequently in the scoring of the overall MEC risk. Specifically, the accessibility factor depends on the depth between the level of intrusion and the shallowest MEC item expected on the MRA. As the interval between the level of intrusion and depth bgs decreases to less than 1 ft, the accessibility factor score increases. This implicit one-foot buffer may overestimate the actual risk at the site because, in practice, the activities of a receptor may not contact a MEC item even if the buffer is less than one-foot. If a receptor intrudes more than is assumed in this analysis, the Overall MEC Risk Score may or may not be underestimated. However, if a receptor does not intrude to the level assumed in the analysis, the Overall MEC Risk Score is overestimated.

5.8.5 Frequency of Entry Uncertainties

The frequency of entry and the MEC density input factors are related in the exposure score and subsequently in the scoring of the overall MEC risk. Receptors are more likely to come in contact with a MEC item if they are at the site frequently than if they rarely go to the site. This input is a measure of the number of times per year that the receptor will be in an area potentially containing MEC. It is difficult to estimate how often individual receptors will be in the MOUT Site MRA. The overall MEC risk score increases with the frequency of entry.

If the actual frequency of entry into the MRA by receptors is more than that assumed, then the overall MEC risk would be underestimated, and overestimated if less than that assumed.

5.8.6 Intensity of Contact with Soil Uncertainties

The intensity of contact with soil and MEC density inputs are related to the exposure score and subsequently in the scoring of the overall MEC risk. For a receptor to come in contact with a MEC item, the individual will need to be in contact with the medium where the MEC is located. This input is a measure of the length of time the receptor will have in contact with the soil. An individual receptor is more likely to come in contact with a MEC item if they are at the site for a longer period of time. The MOUT trainee has been assumed to spend over 9 hours per day in contact with the soil. While there are buildings where the trainees may spend most of their time, it is entirely possible that the trainees exposure would be less. The maintenance worker has been assumed to spend up to 9 hours per day, in contact with the soil. It is possible that very little maintenance may be performed at the MOUT training area and the worker's exposure would be less. If the length of time each receptor would be in contact with the soil has been overestimated, then the exposure factor and subsequently the overall MEC risk score would be overestimated as well.

5.8.7 Overall MEC Risk Score Uncertainties

The uncertainties for the input factors discussed in Sections 5.8.1 through 5.8.6 may overestimate the overall MEC risk score in some scenarios and also underestimate the overall MEC risk score in other scenarios. Inputs to the risk protocol reflect the uncertainty regarding the depth and density of MEC items potentially remaining at the site. If the MEC at the MOUT Site MRA was not removed during the removal actions, then the overall MEC risk score would be underestimated.

5.9 MOUT Site MRA Conclusions

Tables 5-8 and 5-9 provide summaries of the overall MEC risk results for the after-action receptor analysis of the MOUT training area and the roadway area of MOUT Site MRA, respectively. The overall MEC risk score for the MOUT training area ranged from "B", low risk, to "C", medium risk, for surface receptors (Table 5-8). The overall MEC risk score for subsurface receptors in the MOUT training area ranged from "B", low risk, to "D", high risk (Table 5-8). The overall MEC risk score for the roadway area was "B", low risk, for the surface receptor (roadway recreational user) and "D", high risk, for the subsurface receptors (construction and maintenance workers; Table 5-9). This is a qualitative assessment of the risk, and therefore uncertainties are associated with the determination. The Protocol was not designed to assess absolute risk. The overall MEC risk score is an approach for comparing the relative risk between remedial alternative where MEC has been encountered on sites at the former Fort Ord.

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Table 3-1
DRO/Monterey MRA Future Land Use

USACE Parcel Number	MRS Number	Land Use Category	Description	Acreage
L6.2	MRS-43	Habitat	Reserve – Development Buffer	6
L20.13.1.2	No related MRS	Development	Roadway	0.245
L20.13.3.1	No related MRS	Development	Roadway	5
E29.1	MRS-43	Development	Light Industrial – Business Park	23
MRA TOTAL				**34.2**

Table 3-2
After-Action Receptors for Habitat Reuse Area (Parcel L6.2) of the DRO/Monterey MRA MEC Risk Assessment

Receptor	Reuse Area	Description	Level of Intrusion[1]	Frequency of Entry[2]	Intensity of Contact with Soil[3]
Trespasser (down to 12 inches bgs)	Habitat (Sector 1)	Likely receptor. Expected individual would be taking a short cut through the area on foot and the area would not be fenced.	2 May intrude to a depth of 12 inches below the surface.	3 Occasional	3 ≤ 6 hrs/day in contact with the soil
Habitat Monitor	Habitat (Sector 1)	Likely receptor for potentially one week per year. Expected to perform plant counts and monitoring of animal species and invasive weed control through spraying.	1 Not expected to intrude below the surface	4 Frequent	4 ≤ 9 hrs/ day in contact with the soil
Recreational User (down to 6 inches bgs)	Habitat (Sector 1)	Likely receptor. Expected recreational uses include bicycling and hiking on dirt paths.	2 Not expected to intrude below the surface. However, due to the impact of bicycles on dirt, the recreational user may be in contact with the first 6 inches of soil.	4 Frequent	2 ≤ 3 hrs/day in contact with the soil

Receptor	Reuse Area	Description	Level of Intrusion[1]	Frequency of Entry[2]	Intensity of Contact with Soil[3]
Maintenance Worker (down to 24 inches bgs)	Habitat (Sector 1)	Likely receptor. Expected to perform intrusive activities for planting and defoliating the area, installing signage, and trail maintenance.	3 Below the surface to a depth of 24 inches	4 Frequent	4 ≤ 9 hrs/day in contact with the soil

Notes:

[1]Level of Intrusion Scores

1 = Non-intrusive. Activity on the ground surface only.

2 = Minor Intrusions. Activity on ground surface and ground disturbances to a depth of 12 inches bgs

3 = Moderate Intrusions. Ground disturbances to a depth of 24 inches bgs

4 = Significant Intrusions. Ground disturbances to a depth of 48 inches bgs

5 = Highly Intrusive. Ground disturbances greater than 48 inches bgs

[2]Frequency of Entry Scores

1 = Rare. Not likely to occur (less than 1 time per year

2 = Infrequent. Seldom occurs (less than 1 time per season to 1 time per month)

3 = Occasional. Likely to occur from time to time (more than 1 time per month)

4 = Frequent. Will occur frequently (1 time per week to more than 1 time per week)

[3]Intensity of Contact with Soil Scores

1 = Very low: ≤ 1 hr/day

2 = Low: ≤ 3 hrs/day

3 = Moderate: ≤ 6 hrs/day

4 = High: ≤ 9 hrs/day

5 = Very high: > 9 hrs/day

Table 3-3
After-Action Receptors for Development Reuse Area (Parcels E29.1, L20.13.3.1, L20.13.1.2) of the DRO/Monterey MRA MEC Risk Assessment

Receptor	Reuse Area	Description	Level of Intrusion[1]	Frequency of Entry[2]	Intensity of Contact with Soil[3]
Trespasser	Development (Sector 2)	Likely receptor. Expected individual would be taking a short cut through the area on foot and the area would not be fenced.	1 Not expected to intrude below the surface	1 Rare	1 ≤ 1 hr/day in contact with the soil
Office Worker	Development (Sector 2)	Likely receptor. Receptor would likely include an office worker, retail worker, or janitorial worker.	1 Not expected to intrude below the surface	4 Frequent	1 ≤ 1 hr/day in contact with the soil
Maintenance Worker (down to 24 inches bgs)	Development (Sector 2)	Likely receptor. Expected to perform intrusive activities for planting and defoliating the area, installing signage.	3 Below the surface to a depth of 24 inches	4 Frequent	4 ≤ 9 hrs/ day in contact with the soil

Receptor	Reuse Area	Description	Level of Intrusion[1]	Frequency of Entry[2]	Intensity of Contact with Soil[3]
Construction Worker (down to 60 inches bgs)	Development (Sector 2)	Likely receptor. The area is currently undeveloped. Buildings and utilities could be installed in the future. Construction workers are expected to perform excavations for foundations and utilities and build structures.	5 Below the surface to a depth of 60 inches	4 Frequent	4 ≤ 9 hrs/day in contact with the soil

Notes:

[1]Level of Intrusion Scores

1 = Non-intrusive. Activity on the ground surface only.

2 = Minor Intrusions. Activity on ground surface and ground disturbances to a depth of 12 inches bgs

3 = Moderate Intrusions. Ground disturbances to a depth of 48 inches bgs

4 = Significant Intrusions. Ground disturbances to a depth of 48 inches bgs

5 = Highly Intrusive. Ground disturbances greater than 48 inches bgs

[2]Frequency of Entry Scores

1 = Rare. Not likely to occur (less than 1 time per year

2 = Infrequent. Seldom occurs (less than 1 time per season to 1 time per month)

3 = Occasional. Likely to occur from time to time (more than 1 time per month)

4 = Frequent. Will occur frequently (1 time per week to more than 1 time per week)

[3]Intensity of Contact with Soil Scores

1 = Very low: ≤ 1 hr/day

2 = Low: ≤ 3 hrs/day

3 = Moderate: ≤ 6 hrs/day

4 = High: ≤ 9 hrs/day

5 = Very high: > 9 hrs/day

Table 3-4
After-Action Analysis Results for Habitat Reuse Area (Parcel L6.2) of the DRO/Monterey MRA

Receptor	MEC Hazard Type [1]	MEC Depth bgs [2]	Migration/ Erosion Potential [3]	Level of Receptor Intrusion [4]	Accessibility Factor [5]	Frequency of Receptor Entry [6]	MEC Density [7]	Intensity of Receptor Contact with Soil [8]	Exposure Factor [9]	Overall MEC Risk [10]
Trespasser (down to 12 inches bgs)	1	1	1	2	1	3	1	3	1	A
	2	1	1	2	1	3	1	3	1	A
	3	-	-	-	-	-	-	-	-	-
Habitat Monitor	1	1	1	1	1	4	1	4	1	A
	2	1	1	1	1	4	1	4	1	A
	3	-	-	-	-	-	-	-	-	-
Recreational User (down to 6 inches bgs)	1	1	1	2	1	4	1	2	1	A
	2	1	1	2	1	4	1	2	1	A
	3	-	-	-	-	-	-	-	-	-
Maintenance Worker (down to 24 inches bgs)	1	1	1	3	1	4	1	4	1	A
	2	1	1	3	1	4	1	4	1	A
	3	-	-	-	-	-	-	-	-	-

Notes:
MEC = munitions and explosives of concern
bgs = below ground surface
"-" = not applicable because no MEC of this particular hazard type was found at the site

[1]**MEC Hazard Type**:
1=Will cause an injury, or in extreme cases, could cause major injury or death if functioned by an individual's actions
2=Will cause major injury, or in extreme cases, could cause death if functioned by an individual's actions
3=Will kill if detonated by an individual's actions

[2]**MEC Depth bgs**:
1=100% of detected MEC removed considering data quality for the sector

[3]**Migration/Erosion Potential**:
1=Very Stable, MEC will not migrate

[4]**Level of Receptor Intrusion**:
1=Non-intrusive - activity on the ground surface only

2=Minor Intrusions - activity on ground surface and ground disturbances to a depth of 1 ft bgs
3=Moderate Intrusions - ground disturbances to a depth of 2 ft bgs

[5]**Accessibility Factor** combines MEC bgs, Migration/Erosion Potential, and Level of Receptor Intrusion (Appendix A, Table A-4).

[6]**Frequency of Receptor Entry**:
3=Occasional – will likely occur from time to time (>1 time/month)
4=Frequent – will occur frequently (1 time/week to >1 time/week)

[7]**MEC Density**:
1=100% of detected MEC removed to level of Intrusion

[8]**Intensity of Receptor Contact with Soil**:
2=Low: ≤ 3 hours/day
3=Moderate: ≤ 6 hours/day
4=High: ≤ 9 hours/day

[9]**Exposure Factor**=Combines Frequency of Receptor Entry, MEC Density, and Intensity of Receptor Contact with Soil (Appendix A, Table A-8).

[10]**Overall MEC Risk**=Combines MEC Hazard Type, Accessibility Factor, and Exposure Factor (Appendix A, Table A-10):
A=Lowest Risk

Table 3-5
After-Action Analysis Results for Development Reuse Area (Parcels E29.1, L20.13.3.1, L20.13.1.2) of the DRO/Monterey MRA

Receptor	MEC Hazard Type [1]	MEC Depth bgs [2]	Migration/ Erosion Potential [3]	Level of Receptor Intrusion [4]	Accessibility Factor [5]	Frequency of Receptor Entry [6]	MEC Density [7]	Intensity of Receptor Contact with Soil [8]	Exposure Factor [9]	Overall MEC Risk [10]
Trespasser	1	1	1	1	1	1	1	1	1	A
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
Office Worker	1	1	1	1	1	4	1	1	1	A
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
Maintenance Worker (down to 24 inches bgs)	1	1	1	3	1	4	1	4	1	A
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
Construction Worker (down to 60 inches bgs)	1	1	1	5	1	4	1	4	1	A
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-

Notes:
MEC = munitions and explosives of concern
bgs = below ground surface
"-" = not applicable because no MEC of this particular hazard type was found at the site

[1]**MEC Hazard Type**:
1=Will cause an injury, or in extreme cases, could cause major injury or death if functioned by an individual's actions
2=Will cause major injury, or in extreme cases, could cause death if functioned by an individual's actions
3=Will kill if detonated by an individual's actions

[2]**MEC Depth bgs**:
1=100% of detected MEC removed considering data quality for the sector

[3]**Migration/Erosion Potential**:
1=Very Stable, MEC will not migrate

[4]**Level of Receptor Intrusion**:
1=Non-intrusive - activity on the ground surface only
3=Moderate Intrusions - ground disturbances to a depth of 2 ft bgs
5=Highly Intrusive - ground disturbances greater than 4 ft bgs
[5]**Accessibility Factor** combines MEC bgs, Migration/Erosion Potential, and Level of Receptor Intrusion (Appendix A, Table A-4).
[6]**Frequency of Receptor Entry**:
1=Rare – is not likely to occur (<1 time/year)
4=Frequent – will occur frequently (1 time/week to >1 time/week)
[7]**MEC Density**:
1=100% of detected MEC removed to level of Intrusion
[8]**Intensity of Receptor Contact with Soil**:
1=Very Low: ≤1 hour/day
4=High: ≤ 9 hours/day
[9]**Exposure Factor**=Combines Frequency of Receptor Entry, MEC Density, and Intensity of Receptor Contact with Soil (Appendix A, Table A-8).
[10]**Overall MEC Risk**=Combines MEC Hazard Type, Accessibility Factor, and Exposure Factor (Appendix A, Table A-10):
A=Lowest Risk

Table 3-6
Analysis Summary for Habitat Reuse Area of the DRO/Monterey MRA

Receptor	MEC Hazard Type[1]	Overall MEC Risk[2]
Trespasser (down to 12 inches bgs)	1	A
	2	A
	3	n/a
Habitat Monitor	1	A
	2	A
	3	n/a
Recreational User (down to 6 inches bgs)	1	A
	2	A
	3	n/a
Maintenance Worker (down to 24 inches bgs)	1	A
	2	A
	3	n/a

Notes:
MEC = munitions and explosives of concern
bgs = below ground surface
[1]**MEC Hazard Type:**
1=Will cause an injury, or in extreme cases, could cause major injury or death if functioned by an individual's actions
2=Will cause major injury, or in extreme cases, could cause death if functioned by an individual's actions
3=Will kill if detonated by an individual's actions
[2]**Overall MEC Hazard:**
A=Lowest Risk
n/a = not applicable because MEC Hazard Type 3 was not found in this sector

Table 3-7
Analysis Summary for Development Reuse Area of the DRO/Monterey MRA

Receptor	MEC Hazard Type[1]	Overall MEC Risk[2]
Trespasser	1	A
	2	n/a
	3	n/a
Office Worker	1	A
	2	n/a
	3	n/a
Maintenance Worker (down to 24 inches bgs)	1	A
	2	n/a
	3	n/a
Construction Worker (down to 60 inches bgs)	1	A
	2	n/a
	3	n/a

Notes:
MEC = munitions and explosives of concern
bgs = below ground surface
[1]**MEC Hazard Type:**
1=Will cause an injury, or in extreme cases, could cause major injury or death if functioned by an individual's actions
2=Will cause major injury, or in extreme cases, could cause death if functioned by an individual's actions
3=Will kill if detonated by an individual's actions
[2]**Overall MEC Hazard:**
A=Lowest Risk
n/a = not applicable because MEC Hazard Types 2 and 3 were not found in this sector.

Table 4-1
Laguna Seca Parking MRA Future Land Use

USACE Parcel Number	MRS Number	Land Use Category	Description	Acreage
L20.3.1	MRS-47	Development with Reserve Areas or Development with Restrictions	Restricted – Parking/Easement for Highway Bypass	44
L20.3.2	MRS-30	Development with Reserve Areas or Development with Restrictions	Restricted – Parking/Expansion of Laguna Seca, Track and/or Parking	36
L20.5.1	MRS-14A	Development with Reserve Areas or Development with Restrictions	Restricted – Parking	131
L20.5.2	MRS-14A, MRS-29	Development with Reserve Areas or Development with Restrictions	Restricted – Parking/Easement for Highway Bypass	55
L20.5.3	MRS-29	Development with Reserve Areas or Development with Restrictions	Restricted – Parking/Expansion of Laguna Seca, Track and/or Parking	1.7
L20.5.4	MRS-30	Development with Reserve Areas or Development with Restrictions	Restricted – Parking/Expansion of Laguna Seca, Track and/or Parking	0.5
MRA TOTAL				**276.2**

Table 4-2
Laguna Seca Parking MRA Percent Detection

MEC Type	Maximum Penetrating Depth bgs[1] (inches)	Pd for Depth Interval bgs[2] (inches)		
		0-6	7-12	>12
Hand Grenade	NP	100% (4)	43% (7)	- -
Rifle Grenade	1.2	100% [3]	100% (2)	25% (4)
Illumination, 81mm, Mortar, Target Practice, M43	NP	100% [3]	100% [4]	33% (6)
Rocket, 2.36-inch	4.8	100% (1)	67% (3)	40% (10)
Projectile, 3-inch, Stokes Mortar	39.6	100% (1)	100% (1)	40% (15)
Projectile, 37mm, AP-T, M-51	46.8	100% (3)	0% (1)	14% (7)
Projectile, 75mm, Shrapnel, MK I, Cases Only	58.8	100% [3]	100% (3)	20% (5)
Projectile, 81mm, Mortar, Target Practice, M43	32.4	100% [3]	100% [5]	20% (5)
Signals, Illumination, M125, M126, M127	NP	67% (3)	100% (2)	50% (2)
Totals	**- -**	**92% (12)**	**68% (19)**	**31% (54)**

Notes:
MEC = munitions and explosives of concern
Pd = percent detection
bgs = below ground surface
mm = millimeter
AP-T = armor piercing tracer
NP = non-penetrating (items expected on the surface only)
- - = not applicable or not evaluated
1. = maximum penetration depths are from the penetration study conducted as part of the Phase II Engineering Evaluation/Cost Analysis (USACE 1998)
2. = number of items seeded in the depth interval is included in parentheses.
3. = 100% Pd is assumed in depth intervals with no seed items when the next deeper depth interval has 100% Pd.
4. = 100% Pd is assumed in depth interval with no seed items when the next deeper depth interval has 100% Pd based on an item detected at 24 inches bgs.
5. = 100% Pd is assumed in depth interval with no seed items when the next deeper depth interval has 100% Pd based on an item detected at 18 inches bgs.

Source data provided in Section 5.2.2.2 of the Remedial Investigation (Volume 1).

Table 4-3
Laguna Seca Parking MRA MEC Density

Depth (feet)	MRS	MEC Density (number per acre calculated) MEC Hazard Type 1	2	3	MEC Density Input Factor Score MEC Hazard Type 1	2	3
0	MRS-14A 4-foot removal action area (excluding six grids)	NC [1]	NC [1]	NC [1]	1	1	NC [2]
0-1		0.04	0.00	NC [2]	2	2	NC [2]
0-2		0.12	0.00	NC [2]	3	2	NC [2]
0-3		0.12	0.00	NC [2]	3	2	NC [2]
0-4		0.38	0.00	NC [2]	3	2	NC [2]
0-5 [a]		0.38	0.00	NC [2]	3 [b]	2 [b]	NC [2]
0	MRS-14A 1-foot removal action area (excluding six grids)	NC [1]	NC [1]	NC [1]	1	1	NC [2]
0-1		0.04	0.00	NC [2]	2	2	NC [2]
0-2		0.14	0.00	NC [2]	3	2	NC [2]
0-3		0.14	0.00	NC [2]	3	2	NC [2]
0-4		0.57	0.00	NC [2]	3	2	NC [2]
0-5 [a]		0.57	0.00	NC [2]	3 [b]	2 [b]	NC [2]
0	MRS-47	NC [1]	NC [1]	NC [1]	1	1	1
0-1		0.00	ND [2]	0.02	2	2 [b]	2
0-2		0.00	ND [2]	0.32	2	2 [b]	3
0-3		0.02	ND [2]	0.35	2	2 [b]	3
0-4 [a]		0.02	ND [2]	0.35	2 [b]	2 [b]	3 [b]
0-5 [a]		0.02	ND [2]	0.35	2 [b]	2 [b]	3 [b]
0	MRS-30	NC [1]	NC [1]	NC [1]	NC [2]	NC [2]	1
0-1 [a]		NC [2]	NC [2]	ND [1]	NC [2]	NC [2]	1 [b]
0-2 [a]		NC [2]	NC [2]	ND [1]	NC [2]	NC [2]	1 [b]
0-3 [a]		NC [2]	NC [2]	ND [1]	NC [2]	NC [2]	1 [b]
0-4 [a]		NC [2]	NC [2]	ND [1]	NC [2]	NC [2]	1 [b]
0-5 [a]		NC [2]	NC [2]	ND [1]	NC [2]	NC [2]	1 [b]
0	MRS-29	NC [1]	NC [1]	NC [1]	1	NC [2]	NC [2]
0-1 [a]		ND [3]	NC [2]	NC [2]	1 [b]	NC [2]	NC [2]
0-2 [a]		ND [3]	NC [2]	NC [2]	1 [b]	NC [2]	NC [2]
0-3 [a]		ND [3]	NC [2]	NC [2]	1 [b]	NC [2]	NC [2]
0-4 [a]		ND [3]	NC [2]	NC [2]	1 [b]	NC [2]	NC [2]
0-5 [a]		ND [3]	NC [2]	NC [2]	1 [b]	NC [2]	NC [2]

Notes:
MRS = Munitions Response Site
MEC = munitions and explosives of concern
NC [1] = not calculated; assumed all surface MEC items were removed during removal actions.
NC [2] = not calculated; no MEC items with this hazard classification were found on the MRS.
ND [1] = no Hazard Type 3 MEC items were found at this depth interval.
ND [2] = no Hazard Type 2 MEC items were found at this depth interval.
ND [3] = no Hazard Type 1 MEC items were found at this depth interval.
a = no additional MEC items were found at subsequent depth intervals.
b = all MEC items found in previous depth interval(s).

Table 4-4
After-Action Receptors for Laguna Seca Parking MRA MEC Risk Assessment

Receptor	Reuse Area	Description	Level of Intrusion[1]	Frequency of Entry[2]	Intensity of Contact with Soil[3]
Trespasser	Development	Possible receptor during non-event times.	1 Not expected to intrude below the surface	1 Rare	1 ≤ 1 hr/day in contact with the soil
Recreational User	Development	Likely receptor. Expected recreational uses includes parking a vehicle and walking from the parking lot to events.	1 Not expected to intrude below the surface	4 Frequent	1 ≤ 1 hr/day in contact with the soil
Maintenance Worker (down to 24 inches bgs)	Development	Likely receptor. Expected to perform intrusive activities for planting and defoliating the area, installing signage.	3 Below the surface to a depth of 24 inches	4 Frequent	4 ≤ 9 hrs/day in contact with the soil

Receptor	Reuse Area	Description	Level of Intrusion[1]	Frequency of Entry[2]	Intensity of Contact with Soil[3]
Construction Worker (down to 60 inches bgs)	Development	Potential receptor. The area is currently used as parking for the Laguna Seca Raceway. Buildings and utilities could be installed in the future. Construction workers are expected to perform excavations for foundations and utilities and build structures.	5 Below the surface to a depth of 60 inches	4 Frequent	4 ≤ 9 hrs/day in contact with the soil

Notes:

[1]Level of Intrusion Scores

1 = Non-intrusive. Activity on the ground surface only.

2 = Minor Intrusions. Activity on ground surface and ground disturbances to a depth of 12 inches bgs

3 = Moderate Intrusions. Ground disturbances to a depth of 24 inches bgs

4 = Significant Intrusions. Ground disturbances to a depth of 48 inches bgs

5 = Highly Intrusive. Ground disturbances greater than 48 inches bgs

[2]Frequency of Entry Scores

1 = Rare. Not likely to occur (less than 1 time per year

2 = Infrequent. Seldom occurs (less than 1 time per season to 1 time per month)

3 = Occasional. Likely to occur from time to time (more than 1 time per month)

4 = Frequent. Will occur frequently (1 time per week to more than 1 time per week)

[3]Intensity of Contact with Soil Scores

1 = Very low: ≤ 1 hr/day

2 = Low: ≤ 3 hrs/day

3 = Moderate: ≤ 6 hrs/day

4 = High: ≤ 9 hrs/day

5 = Very high: > 9 hrs/day

Table 4-5
After-Action Analysis Results for MRS-29 of the Laguna Seca Parking MRA

Receptor	MEC Hazard Type [1]	MEC Depth bgs [2]	Migration/ Erosion Potential [3]	Level of Receptor Intrusion [4]	Accessibility Factor [5]	Frequency of Receptor Entry [6]	MEC Density [7]	Intensity of Receptor Contact with Soil [8]	Exposure Factor [9]	Overall MEC Risk [10]
Trespasser	1	6	3	1	3	1	1	1	1	A
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
Recreational User	1	6	3	1	3	4	1	1	1	A
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
Maintenance Worker (down to 24 inches bgs)	1	6	3	3	5	4	1	4	1	B
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
Construction Worker (down to 60 inches bgs)	1	6	3	5	5	4	1	4	1	B
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-

Notes:
MEC = munitions and explosives of concern
bgs = below ground surface
"**-**" = not applicable because no MEC of this particular hazard type was found at the site
[1]**MEC Hazard Type**:
1=Will cause an injury, or in extreme cases, could cause major injury or death if functioned by an individual's actions
2=Will cause major injury, or in extreme cases, could cause death if functioned by an individual's actions
3=Will kill if detonated by an individual's actions
[2]**MEC Depth bgs**:
6=MEC ≥ 1 ft bgs
[3]**Migration/Erosion Potential**:
3 = Significant Migration, MEC may come to the surface within 5 years

[4]**Level of Receptor Intrusion**:
1=Non-intrusive - activity on the ground surface only
3=Moderate Intrusions - ground disturbances to a depth of 2 ft bgs
5=Highly Intrusive - ground disturbances greater than 4 ft bgs
[5]**Accessibility Factor** combines MEC bgs, Migration/Erosion Potential, and Level of Receptor Intrusion (Appendix A, Table A-4).
[6]**Frequency of Receptor Entry**:
1=Rare – is not likely to occur (<1 time/year)
4=Frequent – will occur frequently (1 time/week to >1 time/week)
[7]**MEC Density**:
1=100% of detected MEC removed to level of Intrusion
[8]**Intensity of Receptor Contact with Soil**:
1=Very Low: ≤1 hour/day
4=High: ≤ 9 hours/day
[9]**Exposure Factor**=Combines Frequency of Receptor Entry, MEC Density, and Intensity of Receptor Contact with Soil (Appendix A, Table A-8).
[10]**Overall MEC Risk**=Combines MEC Hazard Type, Accessibility Factor, and Exposure Factor (Appendix A, Table A-10):
A=Lowest Risk
B=Low Risk

Table 4-6
After-Action Analysis Results for MRS-30 of the Laguna Seca Parking MRA

Receptor	MEC Hazard Type [1]	MEC Depth bgs [2]	Migration/ Erosion Potential [3]	Level of Receptor Intrusion [4]	Accessibility Factor [5]	Frequency of Receptor Entry [6]	MEC Density [7]	Intensity of Receptor Contact with Soil [8]	Exposure Factor [9]	Overall MEC Risk [10]
Trespasser	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	6	1	1	1	1	1	1	1	A
Recreational User	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	6	1	1	1	4	1	1	1	A
Maintenance Worker (down to 24 inches bgs)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	6	1	3	5	4	1	4	1	C
Construction Worker (down to 60 inches bgs)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	6	1	5	5	4	1	4	1	C

Notes:
MEC = munitions and explosives of concern
bgs = below ground surface
"**-**" = not applicable because no MEC of this particular hazard type was found at the site
[1]**MEC Hazard Type**:
1=Will cause an injury, or in extreme cases, could cause major injury or death if functioned by an individual's actions
2=Will cause major injury, or in extreme cases, could cause death if functioned by an individual's actions
3=Will kill if detonated by an individual's actions
[2]**MEC Depth bgs**:
6=MEC ≥ 1 ft bgs
[3]**Migration/Erosion Potential**:
1=Very Stable, MEC will not migrate

[4]**Level of Receptor Intrusion**:
1=Non-intrusive - activity on the ground surface only
3=Moderate Intrusions - ground disturbances to a depth of 2 ft bgs
5=Highly Intrusive - ground disturbances greater than 4 ft bgs
[5]**Accessibility Factor** combines MEC bgs, Migration/Erosion Potential, and Level of Receptor Intrusion (Appendix A, Table A-4).
[6]**Frequency of Receptor Entry**:
1=Rare – is not likely to occur (<1 time/year)
4=Frequent – will occur frequently (1 time/week to >1 time/week)
[7]**MEC Density**:
1=100% of detected MEC removed to level of Intrusion
[8]**Intensity of Receptor Contact with Soil**:
1=Very Low: ≤1 hour/day
4=High: ≤ 9 hours/day
[9]**Exposure Factor**=Combines Frequency of Receptor Entry, MEC Density, and Intensity of Receptor Contact with Soil (Appendix A, Table A-8).
[10]**Overall MEC Risk**=Combines MEC Hazard Type, Accessibility Factor, and Exposure Factor (Appendix A, Table A-10):
A=Lowest Risk
C=Medium Risk

Table 4-7
After-Action Analysis Results for MRS-47 of the Laguna Seca Parking MRA

Receptor	MEC Hazard Type [1]	MEC Depth bgs [2]	Migration/ Erosion Potential [3]	Level of Receptor Intrusion [4]	Accessibility Factor [5]	Frequency of Receptor Entry [6]	MEC Density [7]	Intensity of Receptor Contact with Soil [8]	Exposure Factor [9]	Overall MEC Risk [10]
Trespasser	1	6	3	1	3	1	1	1	1	A
	2	6	3	1	3	1	1	1	1	A
	3	6	3	1	3	1	1	1	1	B
Recreational User	1	6	3	1	3	4	1	1	1	A
	2	6	3	1	3	4	1	1	1	A
	3	6	3	1	3	4	1	1	1	B
Maintenance Worker (down to 24 inches bgs)	1	6	3	3	5	4	2	4	4	D
	2	6	3	3	5	4	2	4	4	E
	3	6	3	3	5	4	3	4	5	E
Construction Worker (down to 60 inches bgs)	1	6	3	5	5	4	2	4	4	D
	2	6	3	5	5	4	2	4	4	E
	3	6	3	5	5	4	3	4	5	E

Notes:
MEC = munitions and explosives of concern
bgs = below ground surface
[1]**MEC Hazard Type**:
1=Will cause an injury, or in extreme cases, could cause major injury or death if functioned by an individual's actions
2=Will cause major injury, or in extreme cases, could cause death if functioned by an individual's actions
3=Will kill if detonated by an individual's actions
[2]**MEC Depth bgs**:
6=MEC ≥ 1 ft bgs
[3]**Migration/Erosion Potential**:
3=Significant Migration, MEC may come to the surface within 5 years

[4]**Level of Receptor Intrusion**:
1=Non-intrusive - activity on the ground surface only
3=Moderate Intrusions - ground disturbances to a depth of 2 ft bgs
5=Highly Intrusive - ground disturbances greater than 4 ft bgs
[5]**Accessibility Factor** combines MEC bgs, Migration/Erosion Potential, and Level of Receptor Intrusion (Appendix A, Table A-4).
[6]**Frequency of Receptor Entry**:
1=Rare – is not likely to occur (<1 time/year)
4=Frequent – will occur frequently (1 time/week to >1 time/week)
[7]**MEC Density**:
1=100% of detected MEC removed to level of Intrusion
2=Low (<0.1 items per acre)
3=Medium (0.1 to 1 item per acre)
[8]**Intensity of Receptor Contact with Soil**:
1=Very Low: ≤1 hour/day
4=High: ≤ 9 hours/day
[9]**Exposure Factor**=Combines Frequency of Receptor Entry, MEC Density, and Intensity of Receptor Contact with Soil (Appendix A, Table A-8).
[10]**Overall MEC Risk**=Combines MEC Hazard Type, Accessibility Factor, and Exposure Factor (Appendix A, Table A-10):
A=Lowest Risk
B=Low Risk
D=High Risk
E=Highest Risk

Table 4-8
After-Action Analysis Results for MRS-14A 4-ft Removal Action of the Laguna Seca Parking MRA

Receptor	MEC Hazard Type [1]	MEC Depth bgs [2]	Migration/ Erosion Potential [3]	Level of Receptor Intrusion [4]	Accessibility Factor [5]	Frequency of Receptor Entry [6]	MEC Density [7]	Intensity of Receptor Contact with Soil [8]	Exposure Factor [9]	Overall MEC Risk [10]
Trespasser	1	6	3	1	3	1	1	1	1	A
	2	6	3	1	3	1	1	1	1	A
	3	-	-	-	-	-	-	-	-	-
Recreational User	1	6	3	1	3	4	1	1	1	A
	2	6	3	1	3	4	1	1	1	A
	3	-	-	-	-	-	-	-	-	-
Maintenance Worker (down to 24 inches bgs)	1	6	3	3	5	4	3	4	5	D
	2	6	3	3	5	4	2	4	4	E
	3	-	-	-	-	-	-	-	-	-
Construction Worker (down to 60 inches bgs)	1	6	3	5	5	4	3	4	5	D
	2	6	3	5	5	4	2	4	4	E
	3	-	-	-	-	-	-	-	-	-

Notes:
MEC = munitions and explosives of concern
bgs = below ground surface
"-" = not applicable because no MEC of this particular hazard type was found at the site
[1]**MEC Hazard Type**:
1=Will cause an injury, or in extreme cases, could cause major injury or death if functioned by an individual's actions
2=Will cause major injury, or in extreme cases, could cause death if functioned by an individual's actions
3=Will kill if detonated by an individual's actions
[2]**MEC Depth bgs**:
6=MEC ≥ 1 ft bgs
[3]**Migration/Erosion Potential**:
3=Significant Migration, MEC may come to the surface within 5 years
[4]**Level of Receptor Intrusion**:

1=Non-intrusive - activity on the ground surface only
3=Moderate Intrusions - ground disturbances to a depth of 2 ft bgs
5=Highly Intrusive - ground disturbances greater than 4 ft bgs

[5]**Accessibility Factor** combines MEC bgs, Migration/Erosion Potential, and Level of Receptor Intrusion (Appendix A, Table A-4).

[6]**Frequency of Receptor Entry**:
1=Rare – is not likely to occur (<1 time/year)
4=Frequent – will occur frequently (1 time/week to >1 time/week)

[7]**MEC Density**:
1=100% of detected MEC removed to level of Intrusion
2=Low (<0.1 items per acre)
3=Medium (0.1 to 1 item per acre)

[8]**Intensity of Receptor Contact with Soil**:
1=Very Low: ≤1 hour/day
4=High: ≤ 9 hours/day

[9]**Exposure Factor**=Combines Frequency of Receptor Entry, MEC Density, and Intensity of Receptor Contact with Soil (Appendix A, Table A-8).

[10]**Overall MEC Risk**=Combines MEC Hazard Type, Accessibility Factor, and Exposure Factor (Appendix A, Table A-10):
A=Lowest Risk
D=High Risk
E=Highest Risk

Table 4-9

After-Action Analysis Results for MRS-14A 1-ft Removal Action of the Laguna Seca Parking MRA

Receptor	MEC Hazard Type [1]	MEC Depth bgs [2]	Migration/ Erosion Potential [3]	Level of Receptor Intrusion [4]	Accessibility Factor [5]	Frequency of Receptor Entry [6]	MEC Density [7]	Intensity of Receptor Contact with Soil [8]	Exposure Factor [9]	Overall MEC Risk [10]
Trespasser	1	6	3	1	3	1	1	1	1	A
	2	6	3	1	3	1	1	1	1	A
	3	-	-	-	-	-	-	-	-	-
Maintenance Worker (down to 24 inches bgs)	1	6	3	3	5	4	3	4	5	D
	2	6	3	3	5	4	2	4	4	E
	3	-	-	-	-	-	-	-	-	-

Notes:
MEC = munitions and explosives of concern
bgs = below ground surface
"-" = not applicable because no MEC of this particular hazard type was found at the site

[1]**MEC Hazard Type**:
1=Will cause an injury, or in extreme cases, could cause major injury or death if functioned by an individual's actions
2=Will cause major injury, or in extreme cases, could cause death if functioned by an individual's actions
3=Will kill if detonated by an individual's actions

[2]**MEC Depth bgs**:
6=MEC ≥ 1 ft bgs

[3]**Migration/Erosion Potential**:
3=Significant Migration, MEC may come to the surface within 5 years

[4]**Level of Receptor Intrusion**:
1=Non-intrusive - activity on the ground surface only
3=Moderate Intrusions - ground disturbances to a depth of 2 ft bgs

[5]**Accessibility Factor** combines MEC bgs, Migration/Erosion Potential, and Level of Receptor Intrusion (Appendix A, Table A-4).

[6]**Frequency of Receptor Entry**:
1=Rare – is not likely to occur (<1 time/year)
4=Frequent – will occur frequently (1 time/week to >1 time/week)

[7]**MEC Density**:
1=100% of detected MEC removed to level of Intrusion
2=Low (<0.1 items per acre)
3=Medium (>0.1 to 1.0 item/acre)

[8]**Intensity of Receptor Contact with Soil**:
1=Very Low: ≤1 hour/day
4=High: ≤ 9 hours/day
[9]**Exposure Factor**=Combines Frequency of Receptor Entry, MEC Density, and Intensity of Receptor Contact with Soil (Appendix A, Table A-8).
[10]**Overall MEC Risk**=Combines MEC Hazard Type, Accessibility Factor, and Exposure Factor (Appendix A, Table A-10):
A=Lowest Risk
D=High Risk
E=Highest Risk

Table 4-10
Analysis Summary for MRS-29 of the Laguna Seca Parking MRA

Receptor	MEC Hazard Type[1]	Overall MEC Risk[2]
Trespasser	1	A
	2	n/a
	3	n/a
Recreational User	1	A
	2	n/a
	3	n/a
Maintenance Worker (down to 24 inches bgs)	1	B
	2	n/a
	3	n/a
Construction Worker (down to 60 inches bgs)	1	B
	2	n/a
	3	n/a

Notes:
MEC = munitions and explosives of concern
bgs = below ground surface
[1]**MEC Hazard Type**:
1=Will cause an injury, or in extreme cases, could cause major injury or death if functioned by an individual's actions
2=Will cause major injury, or in extreme cases, could cause death if functioned by an individual's actions
3=Will kill if detonated by an individual's actions
[2]**Overall MEC Hazard**:
A=Lowest Risk
B=Low Risk
n/a = not applicable because MEC Hazard Types 2 and 3 were not found in this sector

Table 4-11
Analysis Summary for MRS-30 of the Laguna Seca Parking MRA

Receptor	MEC Hazard Type[1]	Overall MEC Risk[2]
Trespasser	1	n/a
	2	n/a
	3	A
Recreational User	1	n/a
	2	n/a
	3	A
Maintenance Worker (down to 24 inches bgs)	1	n/a
	2	n/a
	3	C
Construction Worker (down to 60 inches bgs)	1	n/a
	2	n/a
	3	C

Notes:
MEC = munitions and explosives of concern
bgs = below ground surface
[1]**MEC Hazard Type**:
1=Will cause an injury, or in extreme cases, could cause major injury or death if functioned by an individual's actions
2=Will cause major injury, or in extreme cases, could cause death if functioned by an individual's actions
3=Will kill if detonated by an individual's actions
[2]**Overall MEC Hazard**:
A=Lowest Risk
C=Medium Risk
n/a = not applicable because MEC Hazard Types 1 and 2 were not found in this sector

Table 4-12
Analysis Summary for MRS-47 of the Laguna Seca Parking MRA

Receptor	MEC Hazard Type[1]	Overall MEC Risk[2]
Trespasser	1	A
	2	A
	3	B
Recreational User	1	A
	2	A
	3	B
Maintenance Worker (down to 24 inches bgs)	1	D
	2	E
	3	E
Construction Worker (down to 60 inches bgs)	1	D
	2	E
	3	E

Notes:
MEC = munitions and explosives of concern
bgs = below ground surface
[1]**MEC Hazard Type**:
1=Will cause an injury, or in extreme cases, could cause major injury or death if functioned by an individual's actions
2=Will cause major injury, or in extreme cases, could cause death if functioned by an individual's actions
3=Will kill if detonated by an individual's actions
[2]**Overall MEC Hazard**:
A=Lowest Risk
B=Low Risk
D=High Risk
E=Highest Risk

Table 4-13
Analysis Summary for MRS-14A 4-ft Removal Action of the Laguna Seca Parking MRA

Receptor	MEC Hazard Type[1]	Overall MEC Risk[2]
Trespasser	1	A
	2	A
	3	n/a
Recreational User	1	A
	2	A
	3	n/a
Maintenance Worker (down to 24 inches bgs)	1	D
	2	E
	3	n/a
Construction Worker (down to 60 inches bgs)	1	D
	2	E
	3	n/a

Notes:
MEC = munitions and explosives of concern
bgs = below ground surface
[1]**MEC Hazard Type**:
1=Will cause an injury, or in extreme cases, could cause major injury or death if functioned by an individual's actions
2=Will cause major injury, or in extreme cases, could cause death if functioned by an individual's actions
3=Will kill if detonated by an individual's actions
[2]**Overall MEC Hazard**:
A=Lowest Risk
D=High Risk
E=Highest Risk
n/a = not applicable because MEC Hazard Type 3 was not found in this sector

Table 4-14
Analysis Summary for MRS-14A 1-ft Removal Action of the Laguna Seca Parking MRA

Receptor	MEC Hazard Type[1]	Overall MEC Risk[2]
Trespasser	1	A
	2	A
	3	n/a
Maintenance Worker (down to 24 inches bgs)	1	D
	2	E
	3	n/a

Notes:
MEC = munitions and explosives of concern
bgs = below ground surface
[1]**MEC Hazard Type**:
1=Will cause an injury, or in extreme cases, could cause major injury or death if functioned by an individual's actions
2=Will cause major injury, or in extreme cases, could cause death if functioned by an individual's actions
3=Will kill if detonated by an individual's actions
[2]**Overall MEC Hazard**:
A=Lowest Risk
D=High Risk
E=Highest Risk
n/a = not applicable because MEC Hazard Type 3 was not found in this sector

Table 5-1
MOUT Site MRA Future Land Use

USACE Parcel Number	MRS Number	Land Use Category	Description	Acreage
F1.7.2	MRS-28	Development	Law Enforcement Use, Homeland Security Training, Fenced-Off Training Areas	54
L20.8	No Related MRS	Development	Roadway	7
MRA TOTAL				**61**

Table 5-2
MOUT Site MRA Percent Detection

MEC Type	Maximum Penetrating Depth bgs[1] (inches)	Pd for Depth Interval bgs[2] (inches)		
		0-6	7-12	>12
Hand Grenade	NP	100% (4)	43% (7)	- -
Rifle Grenade	1.2	100% [3]	100% (2)	25% (4)
Projectile, 22mm, Sub-caliber, Practice, M744	22.8	100% (2)	25% (4)	13% (8)
Rocket, 3.5-inch, Practice, M29A2	9.6	100% [3]	100% (2)	40% (5)
Signals, Illumination, M125, M126, M127	NP	67% (3)	100% (2)	50% (2)
Totals	**- -**	**89% (9)**	**59% (17)**	**26% (19)**

Notes:
MEC = munitions and explosives of concern
Pd = percent detection
bgs = below ground surface
mm = millimeter
NP = non-penetrating (items expected on the surface only)
- - = not applicable or not evaluated
1. = maximum penetration depths are from the penetration study conducted as part of the Phase II Engineering Evaluation/Cost Analysis (USACE 1998)
2. = number of items seeded in the depth interval is included in parentheses.
3. = 100% Pd is assumed in depth intervals with no seed items when the next deeper depth interval has 100% Pd.

Source data provided in Section 6.2.2.2 of the Remedial Investigation (Volume 1).

Table 5-3
MOUT Site MRA MEC Density

Depth (feet)	USACE Parcel	MEC Density (number per acre calculated) MEC Hazard Type 1	2	3	MEC Density Input Factor Score MEC Hazard Type 1	2	3
0	F1.7.2	NC [1]	NC [1]	NC [1]	1	1	1
0-1		1.04	ND [2]	ND [1]	3	1 [b]	1 [b]
0-2 [a]		1.04	ND [2]	ND [1]	3 [b]	1 [b]	1 [b]
0-3 [a]		1.04	ND [2]	ND [1]	3 [b]	1 [b]	1 [b]
0-4 [a]		1.04	ND [2]	ND [1]	3 [b]	1 [b]	1 [b]
0-5 [a]		1.04	ND [2]	ND [1]	3 [b]	1 [b]	1 [b]
0	L20.8	NC [1]	NC [1]	NC [1]	NC [1]	NC [2]	NC [2]
0-1		0.63	NC [2]	NC [2]	3	NC [2]	NC [2]
0-2 [a]		0.63	NC [2]	NC [2]	3 [b]	NC [2]	NC [2]
0-3 [a]		0.63	NC [2]	NC [2]	3 [b]	NC [2]	NC [2]
0-4 [a]		0.63	NC [2]	NC [2]	3 [b]	NC [2]	NC [2]
0-5 [a]		0.63	NC [2]	NC [2]	3 [b]	NC [2]	NC [2]

Notes:
MEC = munitions and explosives of concern
USACE = United States Army Corps of Engineers
NC [1] = not calculated; assumed all surface MEC items were removed during removal actions.
NC [2] = not calculated; no MEC items with this hazard type were found on the MRS.
ND [1] = no Hazard Type 3 MEC items were found at this depth interval.
ND [2] = no Hazard Type 2 MEC items were found at this depth interval.
a = no additional MEC items were found at subsequent depth intervals.
b = all MEC items found in previous depth interval(s).

Table 5-4
After-Action Receptors for MOUT Training Area of the MOUT Site MRA MEC Risk Assessment

Receptor	Reuse Area	Description	Level of Intrusion[1]	Frequency of Entry[2]	Intensity of Contact with Soil[3]
Trespasser	Development (Sector 1)	Possible receptor even though the site will be surrounded with fencing and signs.	1 Not expected to intrude below the surface	1 Rare	1 ≤ 1 hr/day in contact with the soil
MOUT Trainee	Development (Sector 1)	Likely receptor. Expected MOUT trainee may spend a week at the site (overnight stays are prohibited).	1 Not expected to intrude below the surface.	4 Frequent	4 ≤ 9 hrs/day in contact with the soil
Maintenance Worker (down to 24 inches bgs)	Development (Sector 1)	Likely receptor. Expected to perform intrusive activities for planting and defoliating the trails.	3 Below the surface to a depth of 24 inches	4 Frequent	4 ≤ 9 hrs/day in contact with the soil

Receptor	Reuse Area	Description	Level of Intrusion[1]	Frequency of Entry[2]	Intensity of Contact with Soil[3]
Construction Worker (down to 60 inches bgs)	Development (Sector 1)	Likely receptor. The area is currently developed with mock housing without utilities (i.e., water, gas, electricity). More buildings and utilities could be installed in the future. Construction workers are expected to perform excavations for foundations and utilities and build structures.	5 Below the surface to a depth of 60 inches	4 Frequent	4 ≤ 9 hrs/day in contact with the soil

Notes:

[1]Level of Intrusion Scores

1 = Non-intrusive. Activity on the ground surface only.

2 = Minor Intrusions. Activity on ground surface and ground disturbances to a depth of 12 inches bgs

3 = Moderate Intrusions. Ground disturbances to a depth of 24 inches bgs

4 = Significant Intrusions. Ground disturbances to a depth of 48 inches bgs

5 = Highly Intrusive. Ground disturbances greater than 48 inches bgs

[2]Frequency of Entry Scores

1 = Rare. Not likely to occur (less than 1 time per year

2 = Infrequent. Seldom occurs (less than 1 time per season to 1 time per month)

3 = Occasional. Likely to occur from time to time (more than 1 time per month)

4 = Frequent. Will occur frequently (1 time per week to more than 1 time per week)

[3]Intensity of Contact with Soil Scores

1 = Very low: ≤ 1 hr/day

2 = Low: ≤ 3 hrs/day

3 = Moderate: ≤ 6 hrs/day

4 = High: ≤ 9 hrs/day

5 = Very high: > 9 hrs/day

Table 5-5
After-Action Receptors for Roadway Area of the MOUT Site MRA MEC Risk Assessment

Receptor	Reuse Area	Description	Level of Intrusion[1]	Frequency of Entry[2]	Intensity of Contact with Soil[3]
Recreational User	Development (Sector 2)	Likely receptor. Expected recreational uses include hiking and bicycling on the side of the road or on the roads.	1 Not expected to intrude below the surface	4 Frequent	1 ≤ 1 hr/day in contact with the soil
Maintenance Worker (down to 24 inches bgs)	Development (Sector 2)	Likely receptor. Expected to perform intrusive activities for defoliating shoulder of the road.	3 Below the surface to a depth of 24 inches	4 Frequent	4 ≤ 9 hrs/day in contact with the soil
Construction Worker (down to 60 inches bgs)	Development (Sector 2)	Likely receptor. Most of the surrounding area is undeveloped. Utilities (i.e., water, gas, electricity) may be required in the future and the roadway or shoulder of the road could be excavated to install underground utilities. Construction workers are expected to perform excavations for utilities.	5 Below the surface to a depth of 60 inches	4 Frequent	4 ≤ 9 hrs/day in contact with the soil

Notes:

[1]Level of Intrusion Scores	[2]Frequency of Entry Scores	[3]Intensity of Contact with Soil Scores
1 = Non-intrusive. Activity on the ground surface only.	1 = Rare. Not likely to occur (less than 1 time per year	1 = Very low: ≤ 1 hr/day
2 = Minor Intrusions. Activity on ground surface and ground disturbances to a depth of 12 inches bgs	2 = Infrequent. Seldom occurs (less than 1 time per season to 1 time per month)	2 = Low: ≤ 3 hrs/day
3 = Moderate Intrusions. Ground disturbances to a depth of 24 inches bgs	3 = Occasional. Likely to occur from time to time (more than 1 time per month)	3 = Moderate: ≤ 6 hrs/day
4 = Significant Intrusions. Ground disturbances to a depth of 48 inches bgs	4 = Frequent. Will occur frequently (1 time per week to more than 1 time per week)	4 = High: ≤ 9 hrs/day
5 = Highly Intrusive. Ground disturbances greater than 48 inches bgs		5 = Very high: > 9 hrs/day

Table 5-6
After-Action Analysis Results for the MOUT Training Area of the MOUT Site MRA

Receptor	MEC Hazard Type [1]	MEC Depth bgs [2]	Migration/ Erosion Potential [3]	Level of Receptor Intrusion [4]	Accessibility Factor [5]	Frequency of Receptor Entry [6]	MEC Density [7]	Intensity of Receptor Contact with Soil [8]	Exposure Factor [9]	Overall MEC Risk [10]
MOUT Trespasser	1	7	1	1	4	1	1	1	1	B
	2	7	1	1	4	1	1	1	1	B
	3	7	1	1	4	1	1	1	1	C
MOUT Trainee	1	7	1	1	4	4	1	4	1	B
	2	7	1	1	4	4	1	4	1	B
	3	7	1	1	4	4	1	4	1	C
MOUT Maintenance Worker (down to 24 inches bgs)	1	7	1	3	5	4	3	4	5	D
	2	7	1	3	5	4	1	4	1	B
	3	7	1	3	5	4	1	4	1	C
MOUT Construction Worker (down to 60 inches bgs)	1	7	1	5	5	4	3	4	5	D
	2	7	1	5	5	4	1	4	1	B
	3	7	1	5	5	4	1	4	1	C

Notes:
MEC = munitions and explosives of concern
bgs = below ground surface
[1]**MEC Hazard Type**:
1=Will cause an injury, or in extreme cases, could cause major injury or death if functioned by an individual's actions
2=Will cause major injury, or in extreme cases, could cause death if functioned by an individual's actions
3=Will kill if detonated by an individual's actions
[2]**MEC Depth bgs**:
7=No MEC on the surface and MEC bgs
[3]**Migration/Erosion Potential**:
1=Very Stable, MEC will not migrate

[4]**Level of Receptor Intrusion**:
1=Non-intrusive - activity on the ground surface only
3=Moderate Intrusions - ground disturbances to a depth of 2 ft bgs
5=Highly Intrusive - ground disturbances greater than 4 ft bgs
[5]**Accessibility Factor** combines MEC bgs, Migration/Erosion Potential, and Level of Receptor Intrusion (Appendix A, Table A-4).
[6]**Frequency of Receptor Entry**:
1=Rare – is not likely to occur (<1 time/year)
4=Frequent – will occur frequently (1 time/week to >1 time/week)
[7]**MEC Density**:
1=100% of detected MEC removed to level of Intrusion
3=Medium (>0.1 to 1.0 item/acre)
[8]**Intensity of Receptor Contact with Soil**:
1=Very Low: ≤1 hour/day
4=High: ≤ 9 hours/day
[9]**Exposure Factor**=Combines Frequency of Receptor Entry, MEC Density, and Intensity of Receptor Contact with Soil (Appendix A, Table A-8).
[10]**Overall MEC Risk**=Combines MEC Hazard Type, Accessibility Factor, and Exposure Factor (Appendix A, Table A-10):
B=Low Risk
C=Medium Risk
D=High Risk

Table 5-7
After-Action Analysis Results for the Roadway Area of the MOUT Site MRA

Receptor	MEC Hazard Type [1]	MEC Depth bgs [2]	Migration/ Erosion Potential [3]	Level of Receptor Intrusion [4]	Accessibility Factor [5]	Frequency of Receptor Entry [6]	MEC Density [7]	Intensity of Receptor Contact with Soil [8]	Exposure Factor [9]	Overall MEC Risk [10]
Roadway Recreational User	1	7	1	1	4	4	1	1	1	B
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
Roadway Maintenance Worker (down to 24 inches bgs)	1	7	1	3	5	4	3	4	5	D
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
Roadway Construction Worker (down to 60 inches bgs)	1	7	1	5	5	4	3	4	5	D
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-

Notes:
MEC = munitions and explosives of concern
bgs = below ground surface
"-" = not applicable because no MEC of this particular hazard type was found at the site

[1]**MEC Hazard Type**:
1=Will cause an injury, or in extreme cases, could cause major injury or death if functioned by an individual's actions
2=Will cause major injury, or in extreme cases, could cause death if functioned by an individual's actions
3=Will kill if detonated by an individual's actions

[2]**MEC Depth bgs**:
7=No MEC on the surface and MEC bgs

[3]**Migration/Erosion Potential**:
1=Very Stable, MEC will not migrate

[4]**Level of Receptor Intrusion**:
1=Non-intrusive - activity on the ground surface only
3=Moderate Intrusions - ground disturbances to a depth of 2 ft bgs
5=Highly Intrusive - ground disturbances greater than 4 ft bgs
[5]**Accessibility Factor** combines MEC bgs, Migration/Erosion Potential, and Level of Receptor Intrusion (Appendix A, Table A-4).
[6]**Frequency of Receptor Entry**:
4=Frequent – will occur frequently (1 time/week to >1 time/week)
[7]**MEC Density**:
1=100% of detected MEC removed to level of Intrusion
3=Medium (>0.1 to 1.0 item/acre)
[8]**Intensity of Receptor Contact with Soil**:
1=Very Low: ≤1 hour/day
4=High: ≤ 9 hours/day
[9]**Exposure Factor**=Combines Frequency of Receptor Entry, MEC Density, and Intensity of Receptor Contact with Soil (Appendix A, Table A-8).
[10]**Overall MEC Risk**=Combines MEC Hazard Type, Accessibility Factor, and Exposure Factor (Appendix A, Table A-10):
B=Low Risk
D=High Risk

Table 5-8
Analysis Summary for MOUT Training Area of the MOUT Site MRA

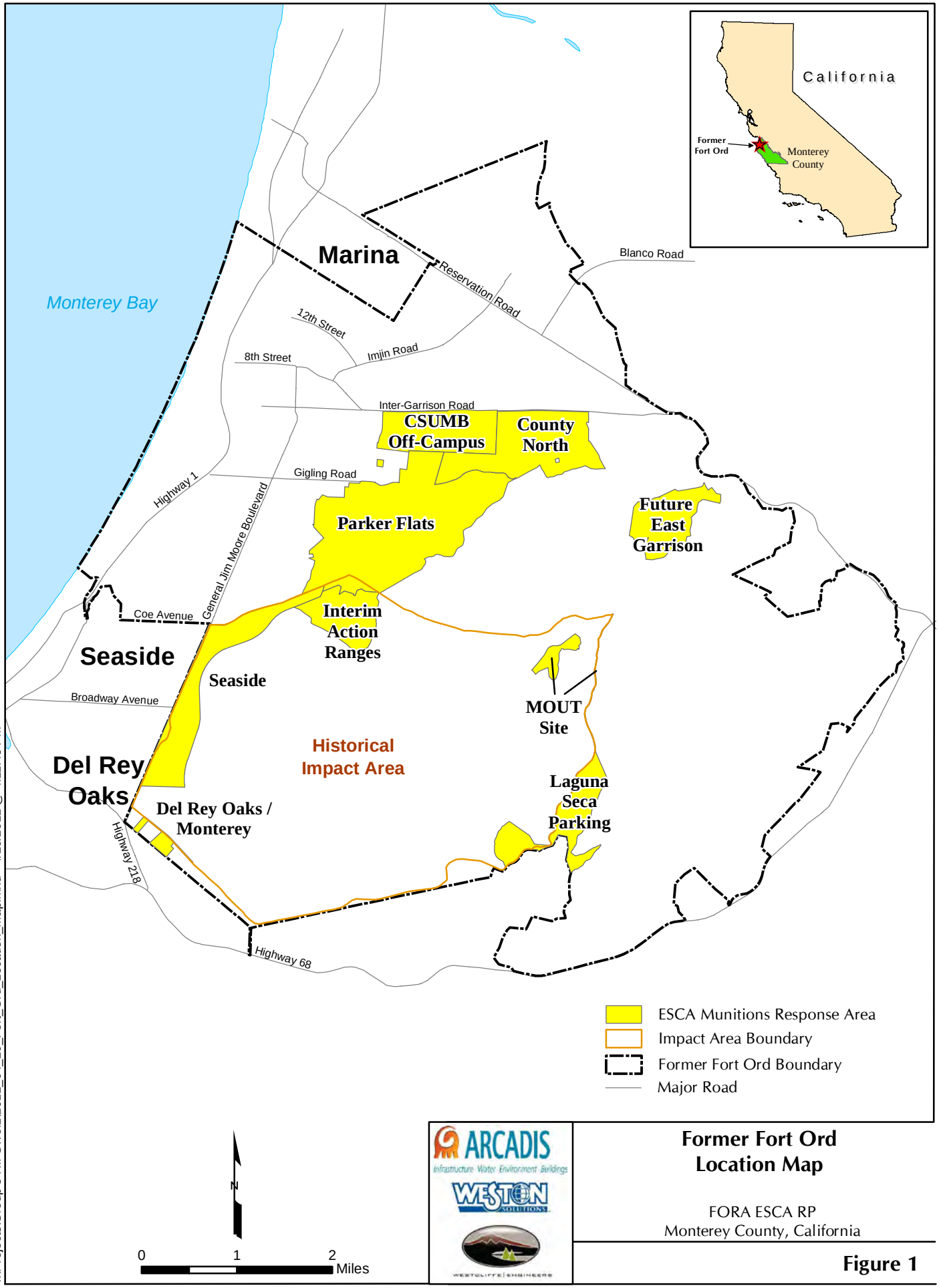
Receptor	MEC Hazard Type[1]	Overall MEC Risk[2]
Trespasser	1	B
	2	B
	3	C
MOUT Trainee	1	B
	2	B
	3	C
MOUT Maintenance Worker (down to 24 inches bgs)	1	D
	2	B
	3	C
MOUT Construction Worker (down to 60 inches bgs)	1	D
	2	B
	3	C

Notes:
MEC = munitions and explosives of concern
bgs = below ground surface
[1]**MEC Hazard Type**:
1=Will cause an injury, or in extreme cases, could cause major injury or death if functioned by an individual's actions
2=Will cause major injury, or in extreme cases, could cause death if functioned by an individual's actions
3=Will kill if detonated by an individual's actions
[2]**Overall MEC Hazard**:
B=Low Risk
C=Medium Risk
D=High Risk

Table 5-9
Analysis Summary for Roadway Area of the MOUT Site MRA

Receptor	MEC Hazard Type[1]	Overall MEC Risk[2]
Roadway Recreational User	1	B
	2	n/a
	3	n/a
Roadway Maintenance Worker (down to 24 inches bgs)	1	D
	2	n/a
	3	n/a
Roadway Construction Worker (down to 60 inches bgs)	1	D
	2	n/a
	3	n/a

Notes:
MEC = munitions and explosives of concern
bgs = below ground surface
[1]**MEC Hazard Type**:
1=Will cause an injury, or in extreme cases, could cause major injury or death if functioned by an individual's actions
2=Will cause major injury, or in extreme cases, could cause death if functioned by an individual's actions
3=Will kill if detonated by an individual's actions
[2]**Overall MEC Hazard**
B=Low Risk
D=High Risk
n/a = not applicable because MEC Hazard Types 2 and 3 were not found in this Area



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Former Fort Ord Location Map

FORA ESCA RP
Monterey County, California

Figure 1

CSUMB Off-Campus MRA

County North MRA

Parker Flats MRA

Future East Garrison MRA

Interim Action Ranges MRA

Seaside MRA

MOUT Site MRA

Laguna Seca Parking MRA

Del Rey Oaks/ Monterey MRA

Legend

Former Fort Ord Boundary

Group 1 MRAs

Seaside MRA
Parker Flats MRA

Group 2 MRAs

CSUMB Off-Campus MRA
County North MRA

Group 3 MRAs

MOUT Site MRA
Del Rey Oaks/Monterey MRA
Laguna Seca Parking MRA

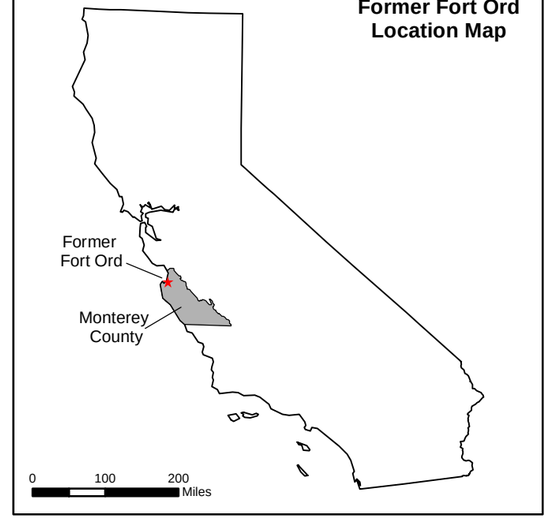
Interim Action Ranges MRA

Group 4 MRA

Future East Garrison MRA

NOTE:
Only the MOUT Site, Laguna Seca Parking, and Del Rey Oaks/ Monterey MRAs are included in this Group 3 RI/FS report.

Former Fort Ord Location Map



N

0 3,000 6,000 Feet

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ESCA Munitions Response Area Groups

FORA ESCA RP
Monterey County, California

Figure 2

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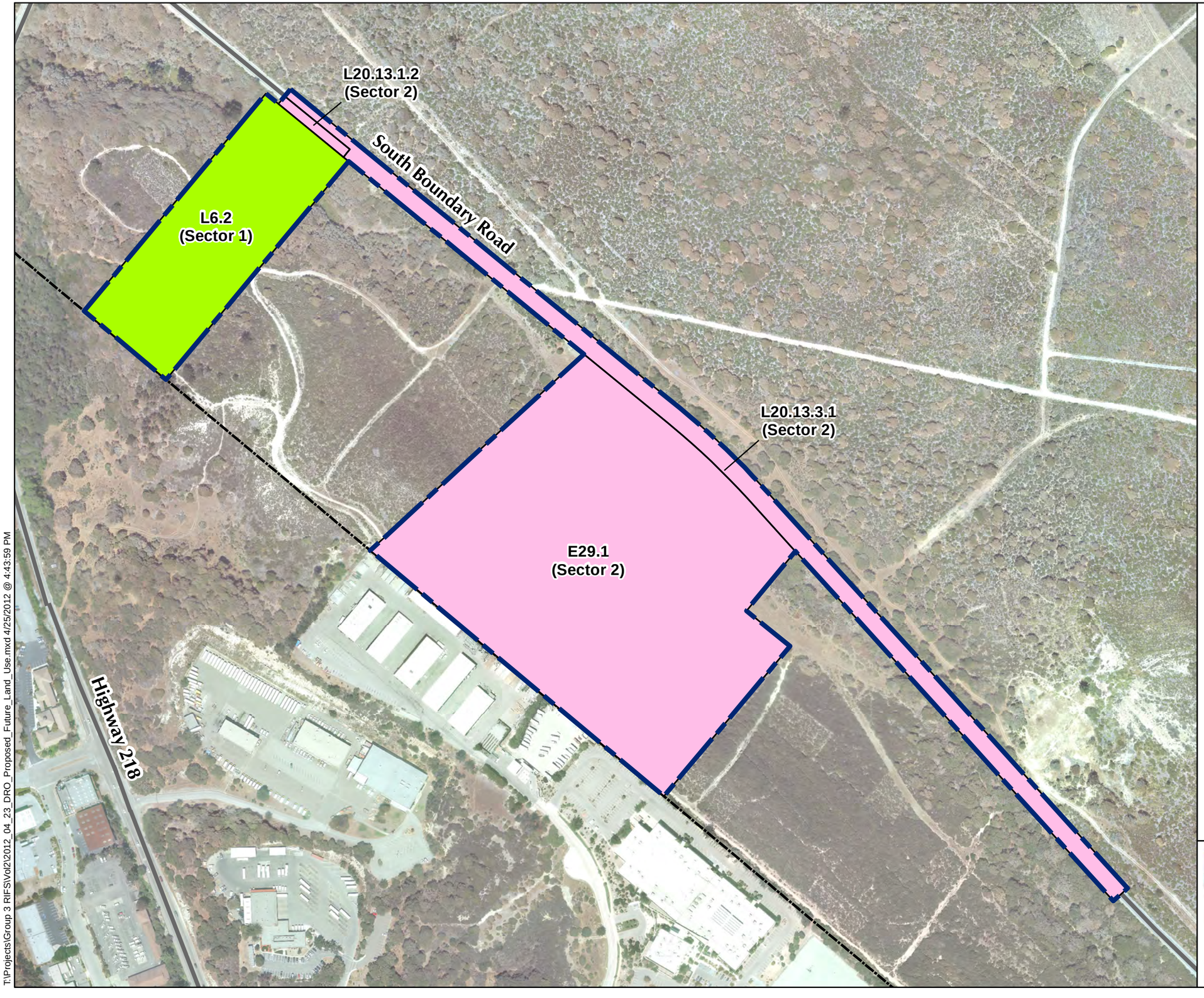
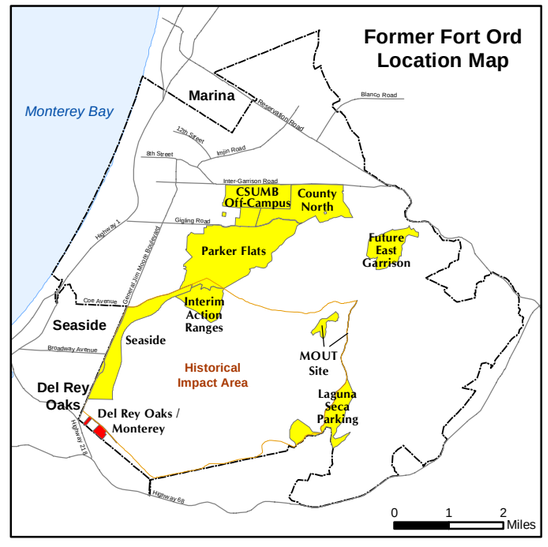


Legend

- Munitions Response Area
- Major Road
- Former Fort Ord Boundary
- E29.1 — USACE Parcel

Proposed Future Land Use

- Non-Residential
- Habitat Reserve



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0 300 600 Feet

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Del Rey Oaks / Monterey MRA
Proposed Future Land Use

FORA ESCA RP
Monterey County, California

Figure 3

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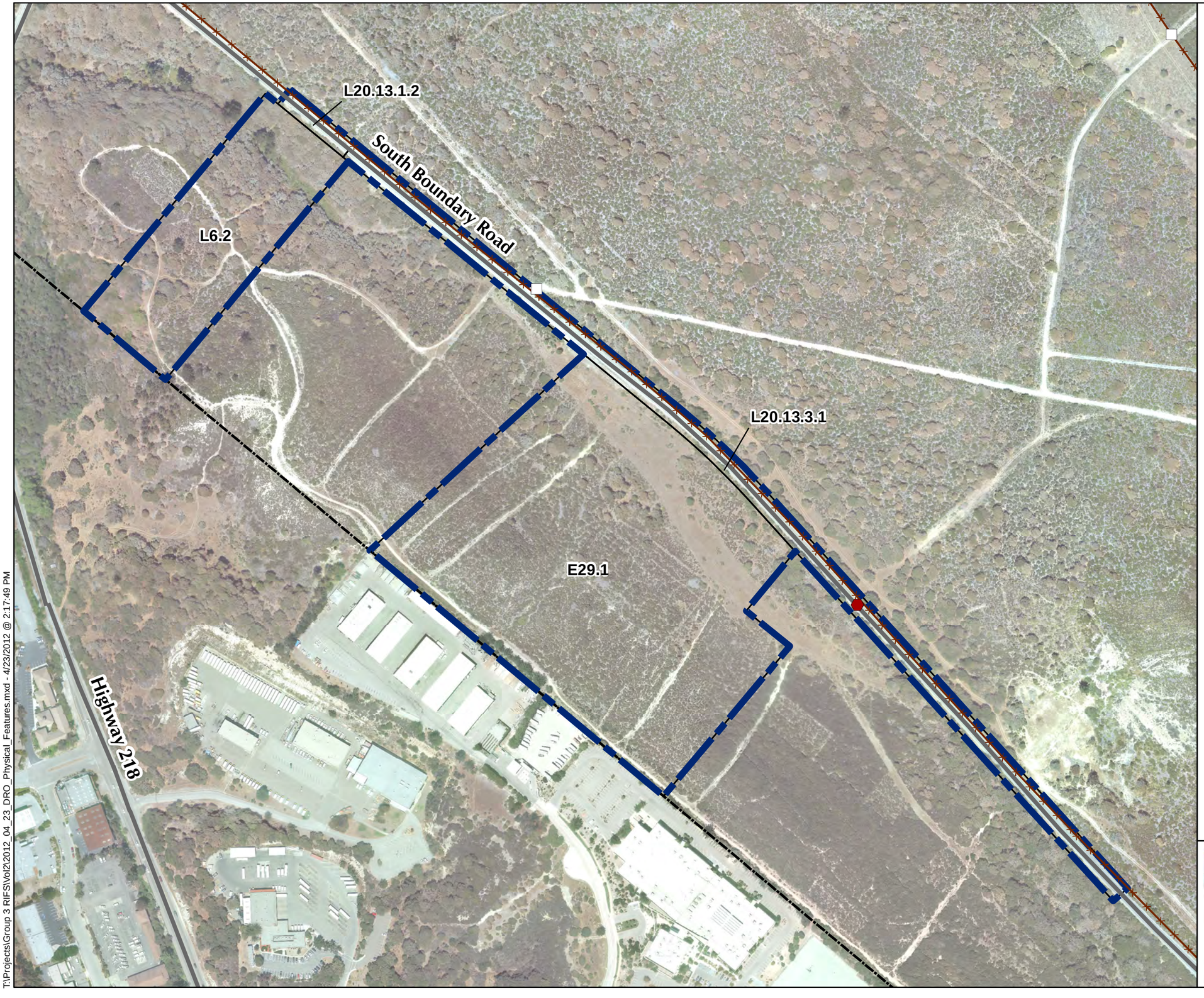
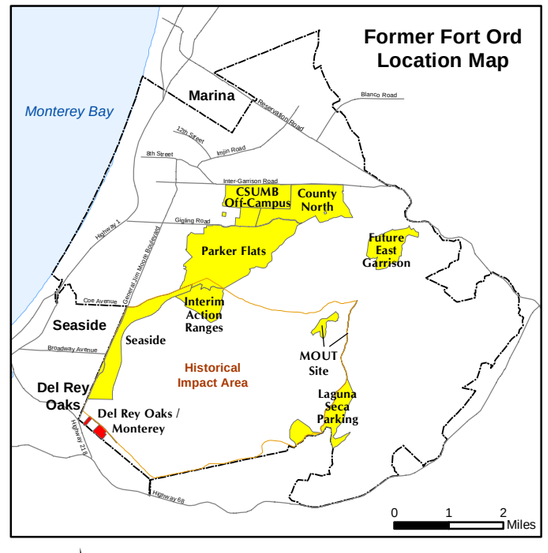
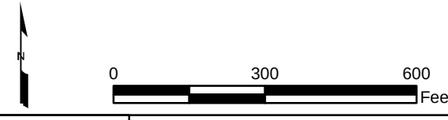


Legend

- E29.1 — USACE Parcel
- Gate
- Entry Forbidden Sign
- Fence
- Munitions Response Area
- Major Road
- Former Fort Ord Boundary





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Del Rey Oaks / Monterey MRA
Physical Features

FORA ESCA RP
Monterey County, California

Figure 4

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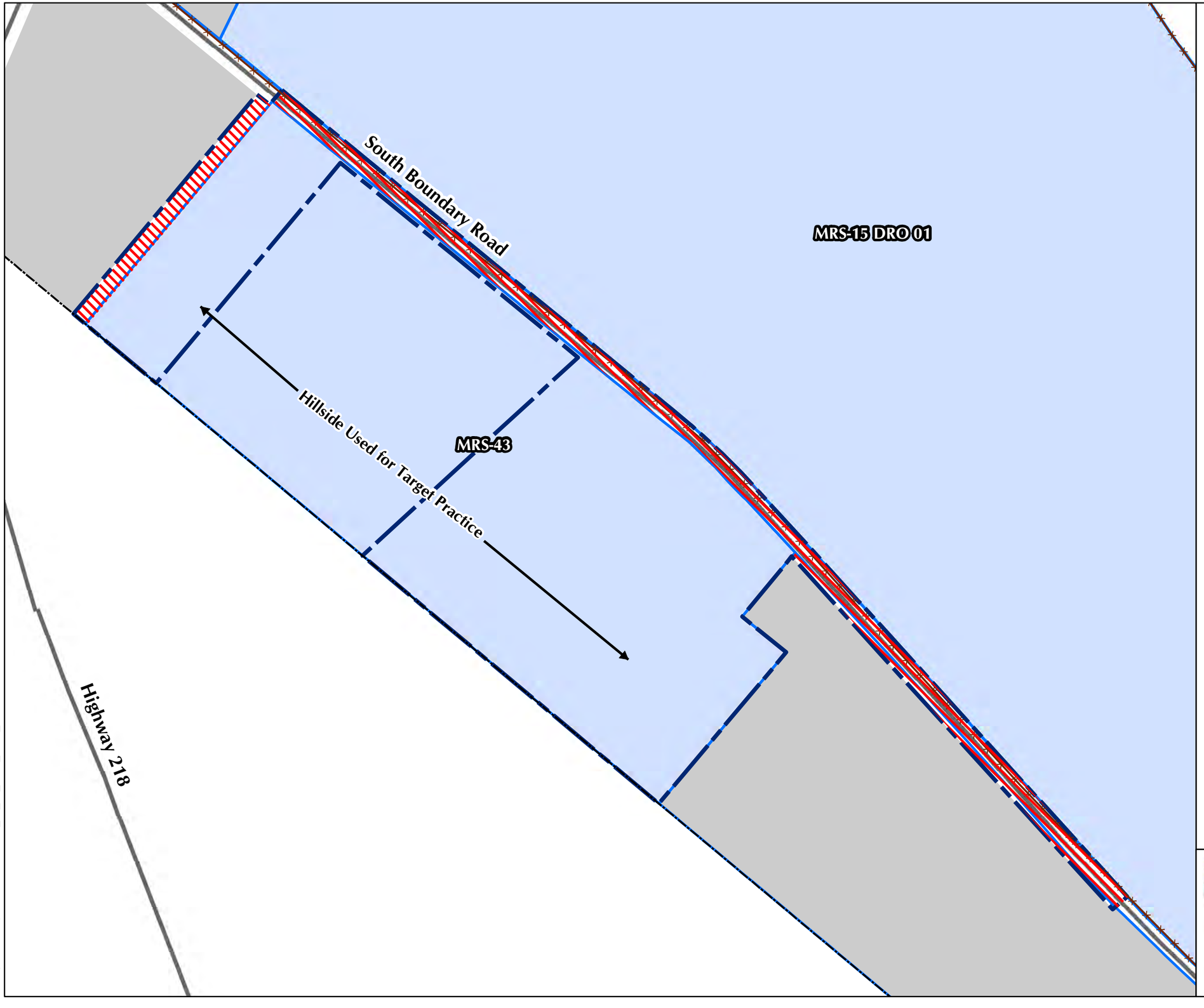
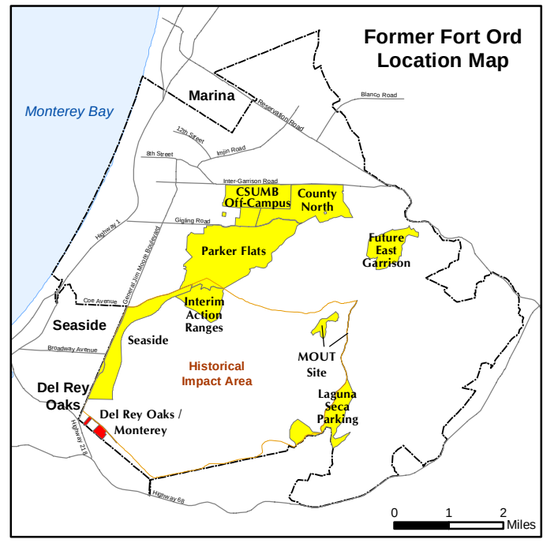
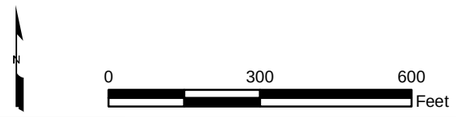


Legend

- MRS-43 — Munitions Response Site
- Track 1 Site
- Portion of MRA Where a Removal Action Was Not Conducted
- Munitions Response Area
- Major Road
- Fence
- Former Fort Ord Boundary





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Del Rey Oaks / Monterey MRA Munitions Response Site Boundaries

FORA ESCA RP
Monterey County, California

Figure 5

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Historical Impact Area

BARLOY CANYON RD

L20.5.1

L20.3.1

L20.3.2

L20.5.2

L20.5.4

L20.5.3

SOUTH BOUNDARY ROAD

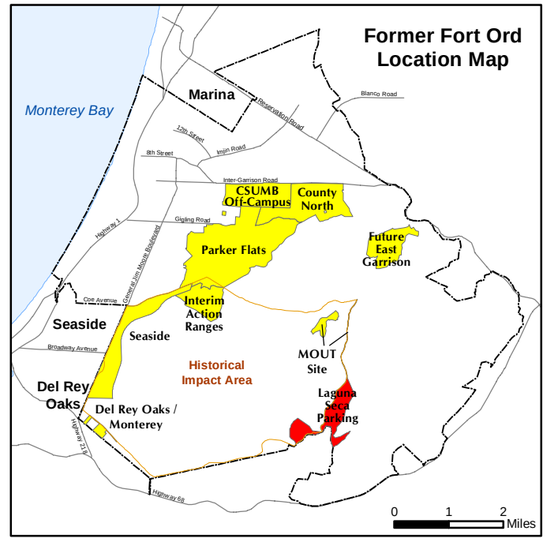
Laguna Seca Raceway

Legend

- Munitions Response Area
- Major Road
- Former Fort Ord Boundary
- L20.5.1 USACE Parcel

Proposed Future Land Use

- Non-Residential (Development with Reserve Areas or Development with Restrictions)



N

0 800 1,600 Feet

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Laguna Seca Parking MRA
Proposed Future Land Use

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Monterey County, California

Figure 6

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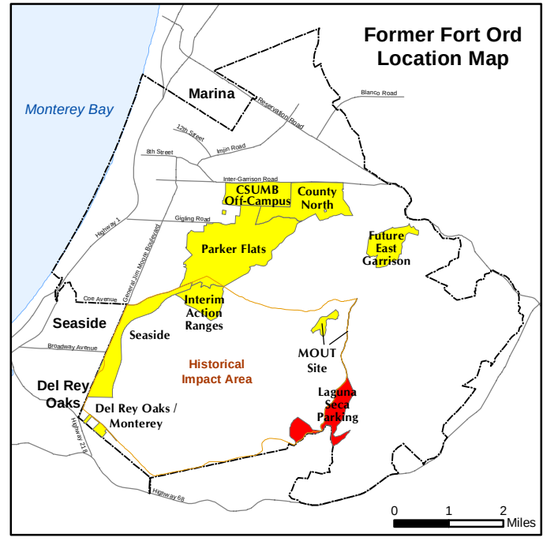
Legend

- E23.1 — USACE Parcel
- Gate
- Sign
- R9211 — Structure
- Electrical Line
- Fence
- Munitions Response Area
- Major Road
- Former Fort Ord Boundary



N

0 800 1,600 Feet

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Laguna Seca Parking MRA Physical Features

FORA ESCA RP
Monterey County, California

Figure 7

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Historical Impact Area

Lookout Ridge Area

Wolf Hill Training Area

Laguna Seca Raceway

MRS-14A

MRS-47

MRS-30

MRS-29

Unknown

BARLOY CANYON RD

SOUTH BOUNDARY ROAD

Pilarcitos Canyon

72

70

33

32

67

69

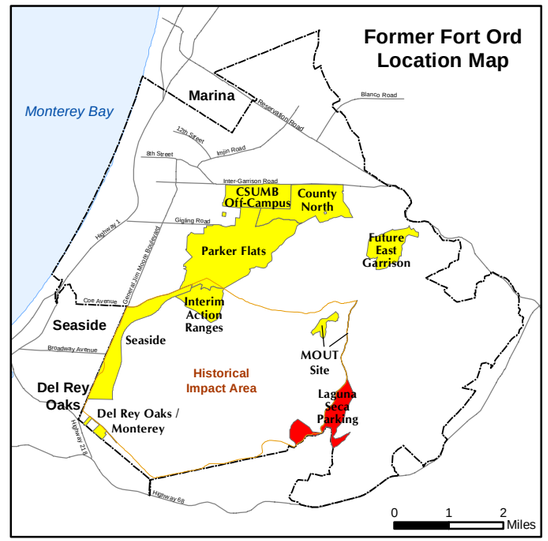
31

68

31A

Legend

- Portion of MRA Where Removal Action Was Partially Completed
- Portion of MRA Where Removal Action Was Not Conducted
- MRS-14A — Munitions Response Site
- 67 — Firing Range
- Historical Range
- Fence
- Munitions Response Area
- Major Road
- Former Fort Ord Boundary



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Laguna Seca Parking MRA Munitions Response Site Boundaries

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Monterey County, California

Figure 8

T:\Projects\Group 3 RIFS\Vol2\2012_04_25_LSP_MRS_Boundaries.mxd 6/4/2012 @ 12:28:05 PM

EUCALYPTUS RD

F1.7.2
(Sector 1)

L20.8
(Sector 2)

BARLOY CANYON RD

Legend

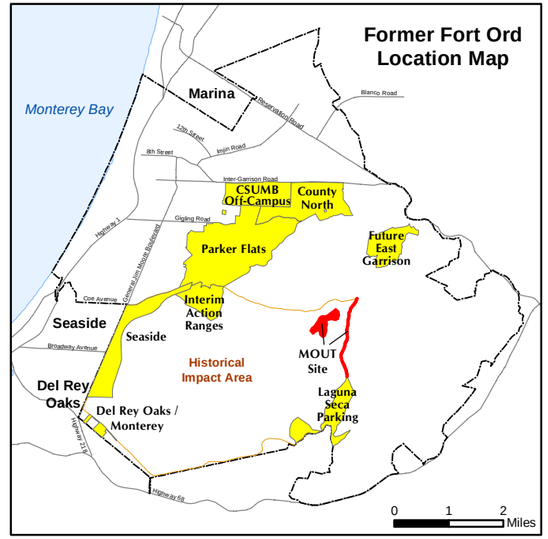
Munitions Response Area

Major Road

F1.7.2 USACE Parcel

Proposed Future Land Use

Non-Residential



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MOUT Site MRA
Proposed Future Land Use

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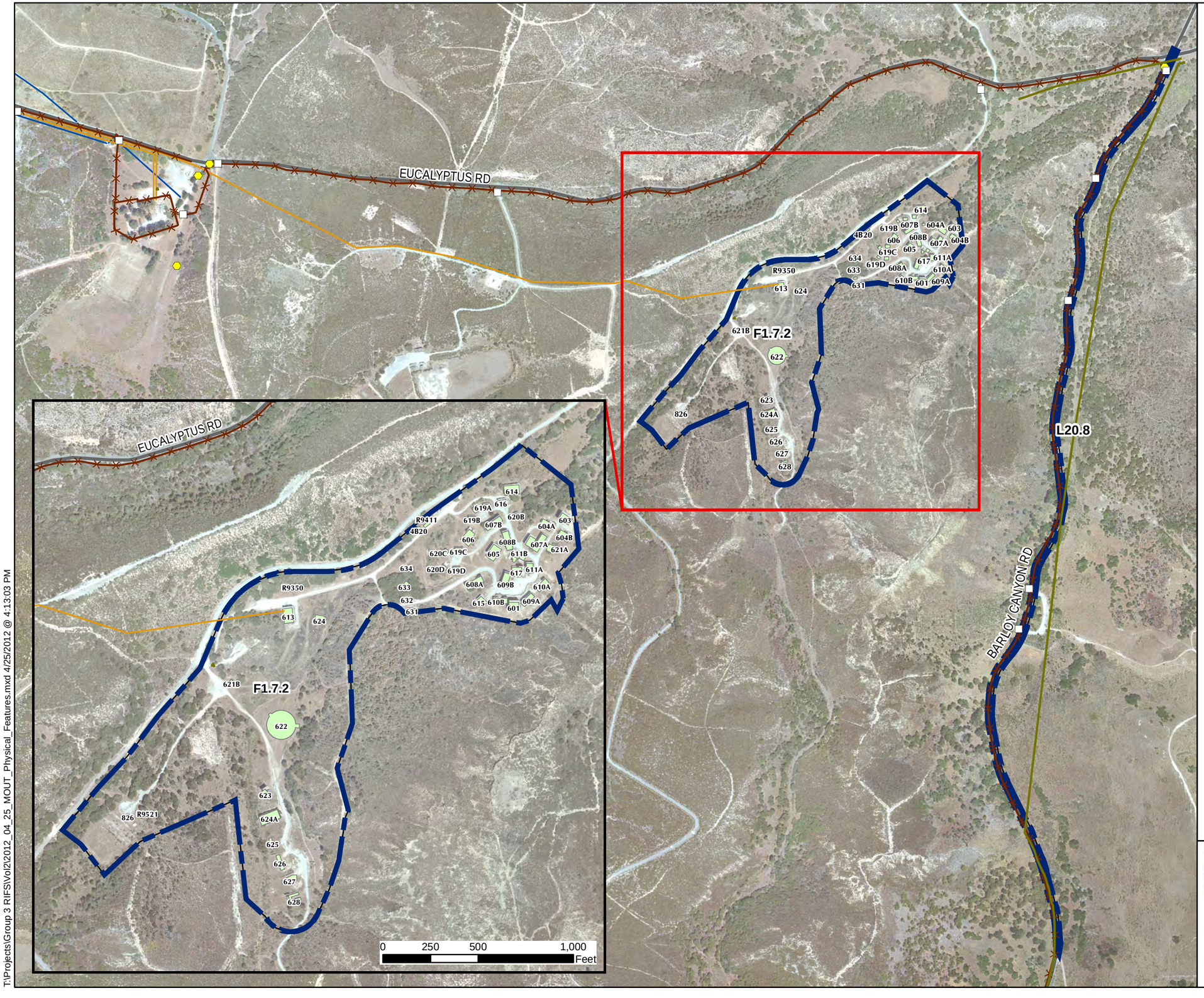
Monterey County, California

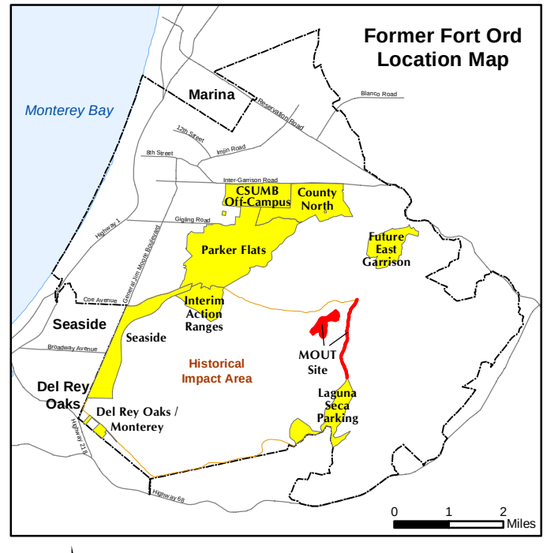
Figure 9

T:\Projects\Group 3 RIFS\Vol2\2012_04_25_MOUT_Proposed_Future_Land_Use.mxd 4/25/2012 @ 4:58:18 PM



Legend

- L20.8 — USACE Parcel
- Gate
- Sign
- R9211 — Structure
- Electrical Line
- Telephone Line
- Water Line
- Fence
- Munitions Response Area
- Major Road
- Former Fort Ord Boundary



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0 800 1,600 Feet

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MOUT Site MRA
Physical Features

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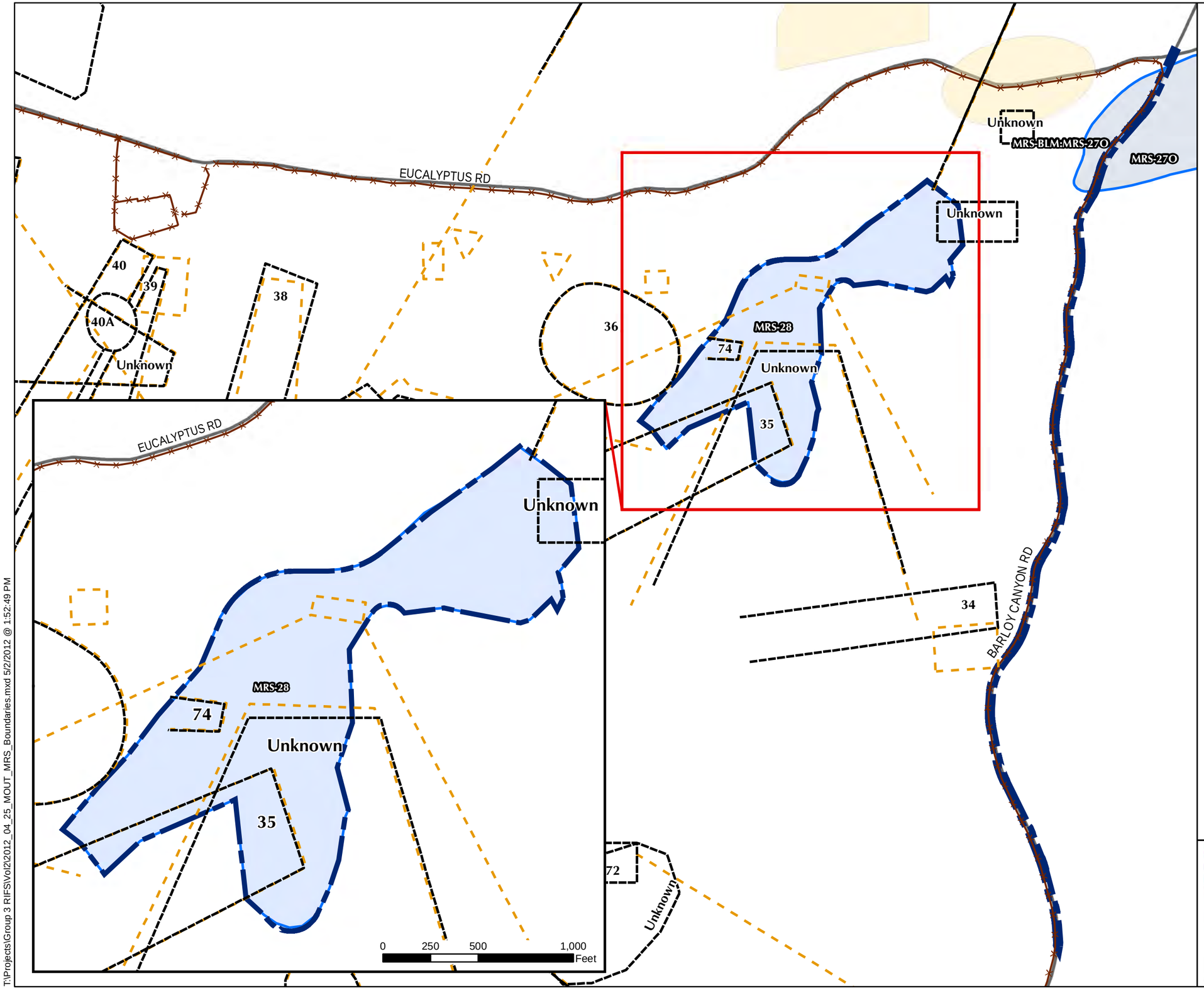
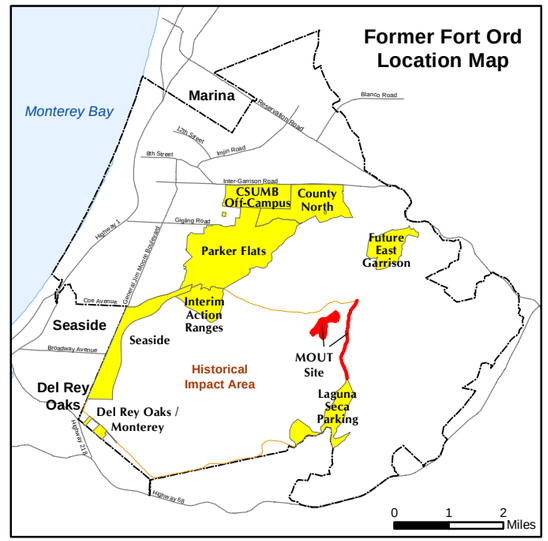
Figure 10

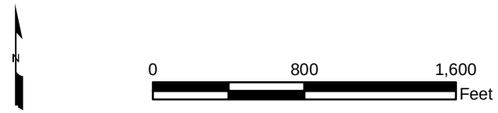
T:\Projects\Group 3 RIFS\Vol2\2012_04_25_MOUT_Physical_Features.mxd 4/25/2012 @ 4:13:03 PM



Legend

- MRS-28 — Munitions Response Site
- 36 — Firing Range
- Historical Range
- Fence
- Munitions Response Area
- Major Road
- Training Sites





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MOUT Site MRA
Munitions Response Site Boundaries

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Figure 11

T:\Projects\Group 3 RIFS\Vol2\2012_04_25_MOUT_MRS_Boundaries.mxd 5/2/2012 @ 1:52:49 PM

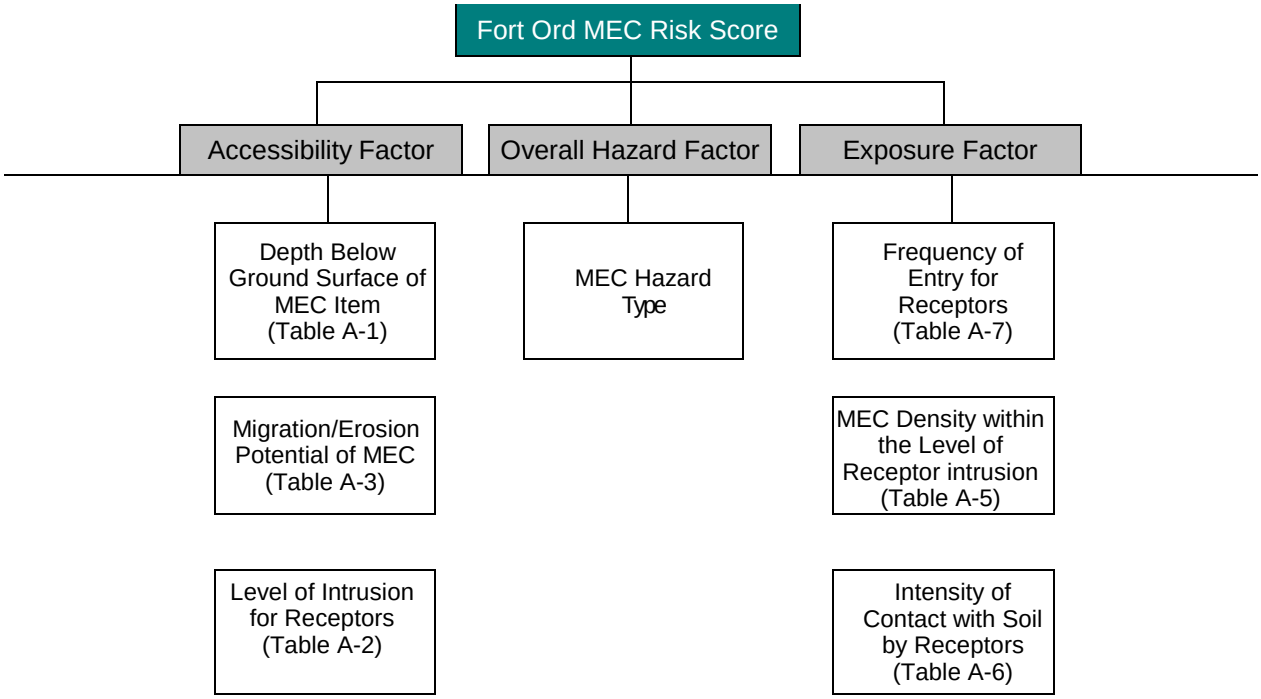
APPENDIX A

Risk Assessment Protocol

1.0 GENERAL OVERVIEW

The Fort Ord MEC Risk Assessment Protocol ("the Protocol"; Malcolm Pirnie 2002) is a qualitative risk assessment approach based on seven input factors. The input factors are both qualitative and quantitative. Two process matrices combine six of the input factors into scores for accessibility and exposure. A third process matrix combines the scores for accessibility, exposure, and overall hazard (the seventh input factor) into a single qualitative score for estimating munitions and explosives of concern (MEC) risk. The seven input factors are shown on Figure 1 below.

Figure A-1. Fort Ord MEC Risk Assessment



2.0 DEFINITION OF INPUT FACTORS AND ASSUMPTIONS

The following sections provide each of the input factors and the matrices used to determine an overall MEC risk score. For more information on the scoring process, please refer to the Protocol (Malcolm Pirnie 2002).

2.1 Accessibility Factor

The accessibility factor reflects how likely it is that the MEC items in the area are accessible by considering the three input scores related to MEC depth below ground surface (bgs), level of intrusion, and migration/erosion potential as described here. MEC depth bgs (Table A-1)

refers to the minimum depth of a MEC item below the surface, level of intrusion (Table A-2) considers the depth of soil intrusion for proposed activities, and migration/erosion potential (Table A-3) examines whether the depth of a MEC item will change from soil movement. A value is assigned for each of the three input scores using well-defined, set criteria, and then a scoring matrix combines the three input scores to produce a score for the accessibility factor.

The following tables identify the scoring for each of the inputs used to determine the accessibility factor.

Table A-1. MEC Depth Below Ground Surface

Score	Description [(a) (b) (c)]
1	100% of detected MEC removed considering data quality for the sector [(d)]
2	MEC > 5 feet bgs
3	MEC ≥ 4 feet bgs
4	MEC ≥ 3 feet bgs
5	MEC ≥ 2 feet bgs
6	MEC ≥ 1 foot bgs
7	No MEC on the surface and MEC below surface
8	Any MEC on the surface

Notes:

a. The shallowest MEC item found determines the depth below ground surface (bgs) for the sector.

b. If significant uncertainty exists about the depth of the MEC item, it may be appropriate to assign the next highest score.

c. Depth should be based on actual field measurements of MEC items found.

d. Detection and removal procedures meeting the Data Quality Objectives (DQOs) for the sector based on clearly defined investigation objectives including reuse and the detection of designated MEC. If DQOs have not been established for the sector, the quality of data should be reviewed and approved to score a '1'.

Table A-2. Level of Intrusion

Score	Description [(a) (b)]
1	Non-Intrusive: Activity on the ground surface, none below the surface
2	Minor Intrusions: Activity on the ground surface and ground disturbances to a depth of 1 foot bgs
3	Moderate Intrusions: Ground disturbances to a depth of 2 feet bgs
4	Significant Intrusions: Ground disturbances to a depth of 4 feet bgs
5	Highly Intrusive: Ground disturbances greater than 4 feet bgs

Notes:

a. The deepest intrusion level expected for a given reuse determines the intrusion level of activity for the sector.

b. If significant uncertainty exists about the depth of intrusion, it may be appropriate to assign the next higher score.

Table A-3. Migration/Erosion Potential

Score	Description [a]
1	Very Stable: MEC will not migrate. Annual erosion is equal to or less than the site-wide average of 3/100 inches.
2	Minor Migration: Recurring and extreme natural events may cause MEC to migrate upward, potentially reaching the intrusion level, over a long period of time (more than two five-year reviews). Annual erosion is greater than the average site-wide condition but less than 1 inch. [b]
3	Significant Migration: Recurring and extreme natural events will bring MEC to the surface within the first recurring review. Annual erosion is more than 1 inch. [c]

Notes:

a. The migration/erosion factor should consider the potential for change in depth of a MEC item due to erosion. The presence of human activities, streams, gullies, or steep slopes in an area may require a more thorough investigation of the potential for erosion.

b. Average annual site-wide erosion potential is 3/100 inches.

c. Significant erosion at the former Fort Ord will likely be limited to areas disturbed by human activity, such as roads or firebreaks.

The accessibility factor is determined using the qualitative scoring matrix in Table A-4.

Table A-4. Accessibility Factor Scoring Matrix [a]

MEC Depth Below Ground Surface	Level of Intrusion	Migration/Erosion Potential		
		1. Very Stable	2. Minor Migration	3. Significant Migration
1. 100% of detected MEC removed considering data quality for the sector	1. Non-Intrusive (surface only)	1	1	1
	2. Minor Intrusion (≤ 1 foot bgs)	1	1	1
	3. Moderate Intrusion (≤ 2 feet bgs)	1	1	1
	4. Significant Intrusion (≤ 4 feet bgs)	1	1	1
	5. Highly Intrusive (> 4 feet bgs)	1	1	1
2. MEC > 5 feet bgs	1. Non-Intrusive (surface only)	1	1	1
	2. Minor Intrusion (≤ 1 foot bgs)	1	1	1
	3. Moderate Intrusion (≤ 2 feet bgs)	1	1	1
	4. Significant Intrusion (≤ 4 feet bgs)	1	2	3
	5. Highly Intrusive (> 4 feet bgs)	3	3	4

Table A-4. Accessibility Factor Scoring Matrix [a]

MEC Depth Below Ground Surface	Level of Intrusion	Migration/Erosion Potential		
		1. Very Stable	2. Minor Migration	3. Significant Migration
3. MEC ≥ 4 feet bgs	1. Non-Intrusive (surface only)	1	1	1
	2. Minor Intrusion (≤ 1 foot bgs)	1	1	1
	3. Moderate Intrusion (≤ 2 feet bgs)	1	1	2
	4. Significant Intrusion (≤ 4 feet bgs)	3	3	4
	5. Highly Intrusive (> 4 feet bgs)	5	5	5
4. MEC ≥ 3 feet bgs	1. Non-Intrusive (surface only)	1	1	1
	2. Minor Intrusion (≤ 1 foot bgs)	1	1	2
	3. Moderate Intrusion (≤ 2 feet bgs)	1	2	3
	4. Significant Intrusion (≤ 4 feet bgs)	5	5	5
	5. Highly Intrusive (> 4 feet bgs)	5	5	5
5. MEC ≥ 2 feet bgs	1. Non-Intrusive (surface only)	1	1	3
	2. Minor Intrusion (≤ 1 foot bgs)	1	2	3
	3. Moderate Intrusion (≤ 2 feet bgs)	3	3	4
	4. Significant Intrusion (≤ 4 feet bgs)	5	5	5
	5. Highly Intrusive (> 4 feet bgs)	5	5	5
6. MEC ≥ 1 foot bgs	1. Non-Intrusive (surface only)	1	2	3
	2. Minor Intrusion (≤ 1 foot bgs)	3	3	4
	3. Moderate Intrusion (≤ 2 feet bgs)	5	5	5
	4. Significant Intrusion (≤ 4 feet bgs)	5	5	5
	5. Highly Intrusive (> 4 feet bgs)	5	5	5
7. No MEC on the surface and MEC below surface	1. Non-Intrusive (surface only)	4	5	5
	2. Minor Intrusion (≤ 1 foot bgs)	5	5	5
	3. Moderate Intrusion (≤ 2 feet bgs)	5	5	5
	4. Significant Intrusion (≤ 4 feet bgs)	5	5	5
	5. Highly Intrusive (> 4 feet bgs)	5	5	5
8. Any MEC on the surface	1. Non-Intrusive (surface only)	5	5	5
	2. Minor Intrusion (≤ 1 foot bgs)	5	5	5
	3. Moderate Intrusion (≤ 2 feet bgs)	5	5	5
	4. Significant Intrusion (≤ 4 feet bgs)	5	5	5
	5. Highly Intrusive (> 4 feet bgs)	5	5	5

Notes:

(a) Accessibility factor scores are defined as:

1. Least Potential for Accessibility
2. Not Likely to be Accessible
3. May Be Accessible
4. Likely to be Accessible
5. Greatest Potential for Accessibility

2.2 Exposure Factor

The exposure factor assesses how likely it is that someone will be exposed to the MEC item if they are in the area by considering the following three inputs: MEC density, intensity of contact with soil, and frequency of entry. MEC density (Table A-5) is the density of MEC items (excluding scrap) within the level of intrusion; intensity of contact with soil (Table A-6) is an hours/day assessment of the receptor's contact with soil based on proposed site use; and frequency of entry (Table A-7) refers to the number of times receptors enter an area based on proposed site use. A value is assigned for each of the three input scores using well-defined, set criteria, and then a scoring matrix combines the three input scores to produce a score for the exposure factor.

Table A-5. MEC Density

Score	Description [(a) (b) (c)]
1	100% of detected MEC removed to level of intrusion [(d)]
2	Low MEC density (< 0.1 item per acre) [(e)]
3	Medium MEC density (0.1 to 1 item per acre)
4	High MEC density (> 1 item per acre)

Notes:

a. MEC density depends on actual MEC items in the level of intrusion from Table A-2. MEC scrap should not be considered.

b. If significant uncertainty exists about MEC density, it may be appropriate to assign the next higher score.

c. Density should be based on actual field measurements of MEC items.

d. Detection and removal procedures meeting the DQOs for the sector based on clearly defined investigation objectives including reuse and the detection of designated MEC. If DQOs have not been established for the sector, the quality of data should be reviewed and approved to score a `1.'

e. As available, the measurement of number of items per acre should be determined from the aerial extent of the area and the level of intrusion.

Table A-6. Intensity of Contact with Soil

Score	Description [(a) (b)]
1	Very Low: ≤ 1 hour/day

2	Low: ≤ 3 hours/day
3	Moderate: ≤ 6 hours/day
4	High: ≤ 9 hours/day
5	Very High: > 9 hours/day

Notes:

a. Activities involving direct contact with soil should be considered in this category. Direct contact with soil can range from walking on the soil to digging in the soil.

b. If significant uncertainty exists about intensity of contact with soil, it may be appropriate to assign the next higher score.

Table A-7. Frequency of Entry

Score	Description [a] [b]
1	Rare: Is not likely to occur (less than once per year to once per year)
2	Infrequent: Will seldom occur (less than once per season to once per month)
3	Occasional: Will likely occur from time to time (more than once per month)
4	Frequent: Will occur frequently (once a week to more than once a week)

Notes:

a. Unexploded Ordnance- (UXO-) trained professionals and others covered by MEC-specific health and safety plans should not be considered in the frequency of entry categories.

b. Depending on the type of reuse, different sectors may have different entry frequencies for the same activity.

The exposure factor is determined using the qualitative scoring matrix given in Table A-8.

Table A-8. Exposure Factor Scoring Matrix [a]

Frequency of Entry	MEC Density	Intensity of Contact with Soil				
		1. Very Low: < 1 hr/day	2. Low: ≤ 3 hrs/day	3. Moderate: ≤ 6 hrs/day	4. High: ≤ 9 hrs/day	5. Very High: > 9 hrs/day
1. Rare	1. 100% of detected MEC removed to intrusion depth	1	1	1	1	1
	2. Low MEC density	1	2	2	3	3
	3. Medium MEC density	2	3	3	3	3
	4. High MEC density	3	3	3	4	4
2. Infrequent	1. 100% of detected MEC removed to intrusion depth	1	1	1	1	1
	2. Low MEC density	1	2	2	3	3
	3. Medium MEC density	2	3	3	4	4
	4. High MEC density	3	3	4	4	4

3. Occasional	1. 100% of detected MEC removed to intrusion depth	1	1	1	1	1
	2. Low MEC density	2	2	3	3	3
	3. Medium MEC density	3	3	4	4	4
	4. High MEC density	3	4	5	5	5
4. Frequent	1. 100% of detected MEC removed to intrusion depth	1	1	1	1	1
	2. Low MEC density	2	2	3	4	4
	3. Medium MEC density	3	4	4	5	5
	4. High MEC density	4	5	5	5	5

Notes:

(a) Exposure factor scores are defined as:

1. Least Potential for Exposure
2. Not Likely to be Exposed
3. May be Exposed
4. Likely to be Exposed
5. Greatest Potential for Exposure

2.3 Overall Hazard Factor

The overall hazard factor examines how hazardous the MEC item itself is. This is based on the type of MEC item present, which must be determined by UXO-trained personnel. The overall hazard factor is then given a score based on how likely the MEC type is to cause injury and how severe the injury may be.

Table A-9. MEC Hazard Classification

Score	Description [(a)]
0	Inert MEC, will cause no injury [(b)]
1	MEC that will cause an injury, or in extreme cases, could cause major injury or death to an individual if functioned by an individual's activities [(c)]
2	MEC that will cause major injury, or in extreme cases, could cause death to an individual if functioned by an individual's activities [(d)]
3	MEC that will kill an individual if detonated by an individual's activities

Notes:

(a) MEC type must only be determined by UXO-trained personnel.

(b) Inert describes the condition of a munition, or component thereof, which contains no explosive, pyrotechnic, or chemical agent.

(c) An injury is defined as a flesh wound or a minor burn.

(d) A major injury is defined as the loss of sight, hearing, or limb, or a major burn.

2.4 Overall MEC Risk

The overall MEC risk is determined by the accessibility factor, the exposure factor, and the overall hazard factor. The three factors are combined in a matrix to yield an overall MEC risk score designated by the letters A through E, where A represents the lowest risk and E represents the highest risk. The scoring matrix for the overall MEC risk score is given in Table A-10 below. Information on the MEC type and accessibility factors is in the first two columns, while exposure factor information is given in a row across the top.

Table A-10. Overall MEC Risk Scoring Matrix [(a)]

MEC Type	Accessibility	Exposure				
		1. Least Potential for Exposure	2. Not Likely to be Exposed	3. May be Exposed	4. Likely to be Exposed	5. Greatest Potential for Exposure
0. Inert MEC	1. Least Potential for Accessibility	A	A	A	A	A
	2. Not Likely to be Accessible	A	A	A	A	A
	3. May be Accessible	A	A	A	A	A
	4. Likely to be Accessible	A	A	A	A	A
	5. Greatest Potential for Accessibility	A	A	A	A	A
1. MEC that will cause an injury	1. Least Potential for Accessibility	A	A	A	B	B
	2. Not Likely to be Accessible	A	B	B	B	B
	3. May be Accessible	A	B	B	C	C
	4. Likely to be Accessible	B	B	C	D	D
	5. Greatest Potential for Accessibility	B	C	D	D	D
2. MEC that will cause a major injury	1. Least Potential for Accessibility	A	A	B	B	B
	2. Not Likely to be Accessible	A	B	B	C	C
	3. May be Accessible	A	B	C	D	D
	4. Likely to be Accessible	B	C	D	D	E
	5. Greatest Potential for Accessibility	B	C	D	E	E
3. MEC that will kill	1. Least Potential for Accessibility	A	B	B	C	C
	2. Not Likely to be Accessible	B	B	C	D	D
	3. May be Accessible	B	C	D	E	E
	4. Likely to be Accessible	C	C	D	E	E
	5. Greatest Potential for Accessibility	C	D	E	E	E

Notes:

(a) Overall MEC risk scores are defined as:

A. Lowest Risk

B. Low Risk
C. Medium Risk
D. High Risk
E. Highest Risk

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APPENDIX B

MEC Items Found by MRA

Table B-1
MEC Items Found in the DRO/Monterey MRA

Sector 1 - Habitat Reuse Area - Habitat Reserve (Parcel L6.2)

Northing	Easting	OE Model Description	Risk Code	Qty	Depth (in)	Burial Pit
2110530	5731190	Charge, 0.25lbs, demolition, TNT*	2	0	3	N
2110765	5731355	Cartridge, ignition, M2 series	1	2	2	N
		TOTAL		**2**		

Sector 2 - Development Reuse Area (Non-residential) - Light Industrial (Parcel E29.1) and Roadway (Parcels L20.13.3.1 and L20.13.1.2)

Northing	Easting	OE Model Description	Risk Code	Qty	Depth (in)	Burial Pit
2109928	5732508	Pot, 10lb, smoke, HC, screening, M1	1	1	6	N
2109560	5732905	Grenade, rifle, smoke, M23 series	1	1	6	N
2110835	5731410	Cartridge, 40mm, practice, M781	1	1	0	
		TOTAL		**3**		

Notes:

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

1) Reference: Fort Ord MMRP Database.

2) 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.

3) Additional MEC items were identified in the Summary of Existing Data Report (ESCA RP Team 2008) as being located within the MRA; however, these items were located in the vicinity of the MRA.

Table B-2
MEC Items Found in the Laguna Seca Parking MRA

Sector 1 - Development Reuse Area (Non-residential) - Parking/Easement for Highway Bypass - MRS-14A

Northing	Easting	OE Model Description	Risk Code	Qty	Depth (in)	Burial Pit
2111588.32576	5755334.749	Simulator, projectile, ground burst, M115A2	2	1	0[2]	
2109552	5754958	Signal, smoke, ground, M62 series	1	1	2	N
2109633.36	5754786.12	Propellant, 60mm, wafers, mortar	1	1	4	N
2109710	5755175	Grenade, rifle, smoke, M22 series	1	1	6	N
2112810	5755215	Signal, illumination, ground, M126 series	2	1	4	Y
2112810	5755215	Ash, Pyrotechnic	999	5	4	Y
2112967	5755886	Flare, surface, trip, M49 series	1	1	1	N
2112810	5755215	Grenade, rifle, smoke, M23 series	1	5	4	Y
2113745.909	5756264.794	Fuze, grenade, hand, practice, M228	1	1	4	N
2113879.653	5756010.913	Grenade, hand, smoke, HC, AN-M8	1	1	1	N
2109980	5754915	Primer, igniter tube, M57	1	1	12	N
2110620	5754135	Pot, 2.5lb, smoke, HC, screening, M1	1	1	20	N
2110770	5754285	Cap, blasting, electric, M6	1	9	48	N
2110980	5754225	Grenade, hand, smoke, M18 series	1	2	48	N
2110980	5754225	Grenade, rifle, smoke, M22 series	1	4	48	N
2110985	5754115	Grenade, rifle, smoke, M22 series	1	1	12	N
2111475	5754290	Flare, surface, trip, M49 series	1	1	12	N
2111675	5754685	Flare, surface, trip, M49 series	1	1	24	N
2111757.74	5754565.48	Signal, illumination, ground, M126 series	2	1	3	N
2112301	5756198	Flare, surface, trip, M49 series	1	1	0	
2113032	5755981	Signal, illumination, ground, M126 series	2	1	12	N
2113177	5755927	Signal, illumination, AN-M43 series	1	9	8	N
2113336	5755940	Fuze, grenade, hand, M213	1	1	5	N
2113424.603	5755645.068	Grenade, hand, smoke, HC, AN-M8	1	1	0	
2113525	5756630	Fuze, grenade, hand, M213	1	1	6	N
2113660	5756180	Flare, surface, trip, M49 series	1	1	3	N
2113735.909	5756284.794	Grenade, hand, practice, MK II	1	1	3	N
2110853.125	5754193.5	Cartridge, 40mm, practice, M781	1	1	0[2]	
2110663.25	5754314.25	Simulator, projectile, ground burst, M115A2	2	1	0[2]	
2113469.509	5756453.825	Signal, illumination, ground, M125 series	2	1	0	N
2113020.5	5755435.5	Signal, illumination, ground, M125 series	2	5	0[2]	
2114465	5756250	Projectile, 14.5mm, subcaliber, practice, M181 series[1]	1	1	0	
2114305	5756225	Projectile, 14.5mm, subcaliber, practice, M181 series	1	1	0	
2111630	5755327	Projectile, 37mm (Model Unknown)[3]	0*	1	0	N
		TOTAL		**66**		

Sector 1 - Development Reuse Area (Non-residential) - Parking/Expansion of Laguna Seca Raceway - MRS-29

Northing	Easting	OE Model Description	Risk Code	Qty	Depth (in)	Burial Pit
2108493.96453	5755747.90408	Grenade, rifle, smoke, M22 series	1	1	0[2]	
		TOTAL		**1**		

Sector 1 - Development Reuse Area (Non-residential) - Parking/Expansion of Laguna Seca Raceway - MRS-30

Northing	Easting	OE Model Description	Risk Code	Qty	Depth (in)	Burial Pit
2109213.17773	5753052.63744	Projectile, 75mm, high explosive (model unknown)	3	1	0[2]	
2109118.19064	5753352.63744	81mm, Illumination, mortar round (model unknown)[4]	0*	1	0[2]	
		TOTAL		**2**		

Table B-2
MEC Items Found in the Laguna Seca Parking MRA

Sector 1 - Development Reuse Area (Non-residential) - Parking/Easement for Highway Bypass - MRS-47

Northing	Easting	OE Model Description	Risk Code	Qty	Depth (in)	Burial Pit
2109190.37	5751539.94	Signal, illumination, ground, M126 series	2	1	0	
2110064.14	5751071.82	Projectile, 3inch, trench mortar, practice, MK I (Stokes)	1	1	18	N
2110085.36	5750990.83	Projectile, 3inch, trench mortar, practice, MK I (Stokes)	1	1	36	N
2110015.36	5750955.83	Projectile, 3inch, trench mortar, practice, MK I (Stokes)	1	1	12	N
2110147.91	5751765.75	Projectile, 81mm, mortar, high explosive, M43 series	3	1	0	
2110179.64	5751476.52	Projectile, 37mm, armor piercing tracer, M51 series	0*	1	0	
2110135.64	5751463.52	Projectile, 37mm, armor piercing tracer, M51 series	0*	1	0	
2110119.64	5751436.52	Projectile, 37mm, armor piercing tracer, M51 series	0*	1	0	
2110191.64	5751456.52	Projectile, 37mm, armor piercing tracer, M51 series	0	1	0	
2109201.5	5751503.14	Fuze, grenade, hand, practice, M205 series	1	2	0	
2109200.5	5751502.14	Fuze, grenade, hand, practice, M205 series	1	1	0	
2109201.73	5751420.2	Fuze, grenade, hand, practice, M205 series	1	4	0	
2109200.73	5751420.2	Fuze, grenade, hand, M204 series	1	1	0	
2109217.73	5751411.2	Fuze, chemical, mine, antitank, M600	0*	1	0	
2109269.48	5751225.08	Projectile, 57mm, high explosive antitank, M307	3	1	0	
2108844.04	5751845.95	Projectile, 75mm, high explosive, MK I	3	1	0	
2108915.94	5751405.32	Projectile, 75mm, high explosive, MK I	3	1	0	
2108996.26	5751048.11	Signal, smoke, ground, M62 series	1	1	0	
2109793.95	5751120.29	Projectile, 81mm, mortar, high explosive, M43 series	3	1	18	N
2109819.1	5752284.2	Projectile, 81mm, mortar, high explosive, M43 series	3	1	0	
2109824.87	5751719.36	Projectile, 81mm, mortar, illumination, M301 series	2	1	0	
2109878.87	5750894.51	Projectile, 81mm, mortar, high explosive, M43 series	3	1	0	
2109990.83	5751004.24	Projectile, 81mm, mortar, high explosive, M43 series	3	1	12	N
2110307.27	5751356.9	Projectile, 4.2inch, mortar, high explosive, M3 series	3	1	0	
2110380.27	5751398	Projectile, 81mm, mortar, high explosive, M43 series	3	1	0	
2110366.27	5751302.9	Projectile, 81mm, mortar, practice, M43 series	2	1	0	
2110394.27	5751392.9	Projectile, 4.2inch, mortar, high explosive, M3 series	3	1	0	
2110333.77	5751229.29	Projectile, 81mm, mortar, high explosive, M43 series	3	1	18	N
2108684.86	5750912.44	Projectile, 75mm, high explosive, MK I	3	1	24	N
2108710.2	5751609.4	Projectile, 75mm, high explosive, MK I	3	1	0	
2108556.36	5751255.87	Projectile, 75mm, high explosive, MK I	3	1	0	
2109040.36	5752004.49	Projectile, 75mm, high explosive, MK I	3	1	0	
2109125.31	5752144.92	Projectile, 75mm, high explosive, MK I	3	1	0	
2109154.37	5751544.94	Signal, illumination, ground, M126 series	2	1	0	
2109190.37	5751560.94	Signal, illumination, ground, M126 series	2	1	0	
2109908.12	5750911.36	Projectile, 3inch, trench mortar, practice, MK I (Stokes)	1	1	6	N
2109918.12	5750916.36	Projectile, 3inch, trench mortar, practice, MK I (Stokes)	1	1	6	N
2110060.51	5752013.13	Cartridge, 20mm, high explosive incendiary, M210	3	1	0	
2110049.14	5751069.85	Projectile, 3inch, trench mortar, practice, MK I (Stokes)	1	1	18	N
2110031.14	5751072.85	Projectile, 40mm, high explosive tracer, M677	3	1	0	
2110039.14	5751067.85	Projectile, 3inch, trench mortar, practice, MK I (Stokes)	1	1	0	
2110015.36	5750935.83	Grenade, rifle, smoke, M23 series	1	1	12	N
2110122.06	5751978.51	Rocket, 2.36inch, high explosive antitank, M6	3	1	0	
2110115.61	5751795.75	Projectile, 4.2inch, mortar, high explosive, M3 series	3	1	0	
2110168.9	5751102.49	Projectile, 81mm, mortar, high explosive, M43 series	3	1	0	
2110140.9	5751195.49	Cap, blasting, electric, M6	1	176	0	
2110187.9	5751102.49	Projectile, 81mm, mortar, high explosive, M43 series	3	1	0	
2110092.339	5754717.705	Projectile, 81mm, mortar (model unknown)	3	1	0	N
2110107.87	5751058.65	Projectile, 40mm, high explosive, M381	3	1	12	N
2110219.89	5751664.51	Projectile, 81mm, mortar, high explosive, M43 series	3	1	8	N
2110240.95	5751358.03	Projectile, 81mm, mortar, high explosive, M43 series	3	1	0	
2110212.95	5751309.03	Projectile, 3inch, trench mortar, practice, MK I (Stokes)	1	1	0	

Table B-2
MEC Items Found in the Laguna Seca Parking MRA

Sector 1 - Development Reuse Area (Non-residential) - Parking/Easement for Highway Bypass - MRS-47

Northing	Easting	OE Model Description	Risk Code	Qty	Depth (in)	Burial Pit
2110221.37	5751216.26	Projectile, 81mm, mortar, high explosive, M43 series	3	1	0	
2110217.37	5751208.26	Projectile, 81mm, mortar, high explosive, M43 series	3	1	0	
2110246.37	5751208.26	Projectile, 3inch, trench mortar, practice, MK I (Stokes)	1	1	0	
2110225.57	5751149.79	Grenade, hand, smoke, M18 series	1	2	0	
2110275.57	5751197.79	Projectile, 3inch, trench mortar, practice, MK I (Stokes)	1	1	0	
2110260.57	5751197.79	Projectile, 81mm, mortar, high explosive, M43 series	3	1	0	
2110225.57	5751149.79	Grenade, hand, smoke, HC, AN-M8	1	2	0	
2110250.57	5751197.79	Projectile, 81mm, mortar, high explosive, M43 series	3	1	0	
2110286.57	5751143.79	Projectile, 81mm, mortar, high explosive, M43 series	3	1	24	N
2110286.57	5751156.79	Projectile, 81mm, mortar, high explosive, M43 series	3	1	28	N
2110270.57	5751146.79	Projectile, 3inch, trench mortar, practice, MK I (Stokes)	1	1	8	N
2110276.57	5751166.79	Projectile, 3inch, trench mortar, practice, MK I (Stokes)	1	1	12	N
2110267.57	5751172.79	Projectile, 3inch, trench mortar, practice, MK I (Stokes)	1	1	14	N
2110360.45	5751738.43	Projectile, 4.2inch, mortar, high explosive, M3 series	3	1	0	
2110326.58	5751508.5	Projectile, 81mm, mortar, high explosive, M43 series	3	1	18	N
2110332.58	5751515.5	Projectile, 81mm, mortar, high explosive, M43 series	3	1	26	N
2110316.58	5751524.5	Projectile, 81mm, mortar, high explosive, M43 series	3	1	12	N
2110340.27	5751175	Projectile, 3inch, trench mortar, practice, MK I (Stokes)	1	1	6	N
2110408.55	5751448.34	Projectile, 81mm, mortar, high explosive, M43 series	3	1	18	N
2110413.55	5751418.34	Projectile, 81mm, mortar, high explosive, M43 series	3	1	12	N
2109121.37	5751556.94	Projectile, 40mm, practice, M385	0*	1	6	N
2109202.5	5751504.14	Fuze, grenade, hand, practice, M205 series	1	4	0	
2109201.5	5751502.14	Fuze, grenade, hand, practice, M205 series	1	1	0	
2109407.66111	5751773.49935	Cartridge, 37mm, high explosive (model unknown)	3	2	0[2]	
		TOTAL		**261**		

Notes:

[1]Item found within Laguna Seca Parking MRA, but outside current MRS boundary.

[2]The depth of items recovered by HFA and UXB were not recorded at the time of removal activities and were, therefore not entered into the MMRP Database. To facilitate mapping of these items, the MMRP Database has assigned the depth of zero and the northing and easting of the center of the grids in which the items were found.

[3]No OE Model Description was provided for this item in the Army's MMRP database. The Original OE Nominclature has been provided as the item description.

[4]Item found within Laguna Seca Parking MRA, but outside current MRS boundary. No OE Model Description was provided for this item in the Army's MMRP database. The Original OE Nominclature has been provided as the item description.

* No hazard classification code assigned to this item in the Fort Ord Military Munitions Response Program (MMRP) database. Item assigned a hazard classification code based on professional judgment.

1) Reference: Fort Ord MMRP Database.

2) 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.

3) Risk code 999 was assigned to items in the MMRP database when the exact item could not be identified.

4) Additional MEC items were identified in the Summary of Existing Data Report (ESCA RP Team 2008) as being located within the MRA; however, these items were located in the vicinity of the MRA.

Table B-3
MEC Items Found in the MOUT Site MRA

Sector 1 - Development Reuse Area (Non-residential) - MOUT Training Area (Parcel F1.7.2)

Northing	Easting	OE Model Description	Risk Code	Qty	Depth (in)	Burial Pit
2120080.84017	2120080.84017	Grenade, hand, fragmentation, M67	3	1	0	
2120050	5753550	Rocket, 3.5inch, practice, M29 series	0*	1	2	N
2120123	5754035	Simulator, projectile, ground burst, M115A2	2	1	0	
2120255	5753860	Fuze, grenade, hand, M10 series	1	40	10	Y
2119250	5753050	Fuze, grenade, hand, practice, M228	1	1	12	N
2119084.747	5754040.421	Simulator, blast, stinger, civilian, M15	2	1	0	
2120249.37	5754440.014	Cartridge, ignition, M2 series	1	1	2	N
2120219.37	5754490.014	Fuze, mine, combination, M10 series	1	16	10	Y
2120734.637	5754818.952	Fuze, grenade, hand, M204 series	1	1	5	N
2120739.694	5755269.843	Grenade, hand, practice, MK II	1	1	8	N
2120838.911	5755004.258	Grenade, hand, smoke, M18 series	1	1	4	N
2120835.911	5755014.258	Grenade, hand, smoke, M18 series	1	1	6	N
2119537.29	5753285.3	Grenade, hand, smoke, M18 series	1	1	0	N
2120838.911	5755074.258	Grenade, hand, practice, MK II	1	1	6	N
2120651.73748	5755157.15741	Simulator, projectile, airburst, M74 series	1	1	0	
2120665.78777	5755150.28349	Grenade, hand, smoke, M48	1	1	0	
2120611.22352	5755297.65449	Grenade, hand, smoke, M48	1	3	0	
2120679.57723	5755351.94805	Flare, surface, trip, M49 series	1	1	0	
2120220.07496	5754963.20918	Fuze, grenade, hand, practice, M205 series	1	1	0	
2120278.28058	5754985.29578	Simulator, explosive boobytrap, flash, M117	1	1	0	
2120154.32655	5754839.81153	Fuze, grenade, hand, practice, M205 series	1	2	0	
2120167.9115	5754351.79356	Grenade, hand, practice, M21	1	1	0	
2120083.74426	5753762.59232	Simulator, grenade, hand, M116A1	2	1	0	
2120077.46559	5753877.378	Grenade, hand, smoke, M18 series	1	1	0	
2120034.35237	5753905.28641	Simulator, flash artillery, M110	1	1	0	
2119793.02537	5753831.95611	Fuze, grenade, hand, M204 series	1	1	0	
2119766.77936	5753812.88563	Fuze, grenade, hand, M204 series	1	1	0	
2119759.64625	5754227.72039	Grenade, hand, practice, M21	1	1	0	
2119820.95563	5753800.37665	Grenade, rifle, antitank, M9 series	3	1	0	
2119816.39956	5753534.05121	Grenade, hand, practice, M21	1	1	0	
2119463.63547	5753662.493	Grenade, hand, practice, M21	1	1	0	
2119222.59181	5753721.22013	Signal, illumination, ground, M125 series	2	1	0	
2119249.69766	5753851.43084	Fuze, grenade, hand, M204 series	1	1	0	
2119103.66448	5753861.69345	Fuze, grenade, hand, M204 series	1	2	0	
2119123.64044	5753838.7031	Simulator, blast, stinger, civilian, M15	2	1	0	
2119054.13112	5753968.85586	Fuze, grenade, hand, M204 series	1	1	0	
2120792.35613	5754913.59912	Grenade, hand, smoke, M18 series	1	4	0	
2120787.6607	5754944.01007	Projectile, 40mm, parachute, illumination, M583 series	1	1	0	
2120823.58241	5754958.33301	Grenade, hand, smoke, M48	1	1	0	
2120846.47567	5755127.24202	Grenade, hand, practice, M62	1	1	0	
2120765.52002	5754950.97632	Grenade, hand, smoke, M48	1	1	0	
2120545.2287	5754586.80955	Ash, Pyrotechnic	999	1	0	
2120627.3846	5755145.50983	Grenade, hand, practice, M69	1	1	0	
		TOTAL		**104**		

Table B-3
MEC Items Found in the MOUT Site MRA

Sector 2 - Development Resue Area (Non-residential) - Roadway (Parcel L20.8)

Northing	Easting	OE Model Description	Risk Code	Qty	Depth (in)	Burial Pit
2114650	5756240	Projectile, 14.5mm, subcaliber, practice, M181 series	1	1	0	
2114695	5756240	Projectile, 14.5mm, subcaliber, practice, M181 series	1	1	0	
2114535	5756245	Projectile, 22mm, subcaliber, practice, M744	1	1	0	
		TOTAL		**3**		

Notes:

* No hazard classification code assigned to this item in the Fort Ord Military Munitions Response Program (MMRP) database. Item assigned a hazard classification code based on professional judgment.

1) Reference: Fort Ord MMRP Database.

2) 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.

3) Risk code 999 was assigned to items in the MMRP database when the exact item could not be identified.

4) Additional MEC items were identified in the Summary of Existing Data Report (ESCA RP Team 2008) as being located within the MRA; however, these items were located in the vicinity of the MRA.

APPENDIX C

Erosion Input Calculations

EROSION CALCULATION

The erosion input is based on an estimate of erosion that occurs at the site. Erosion is estimated using the Universal Soil Loss Equation. The data used to support the erosion estimate is from reference documents. The Universal Soil Loss Equation and a step-by-step example calculation are provided as follows:

$$A = R \times K \times LS \times C \times P$$

Where:

A = the estimation of average annual soil loss in tons per acre caused by sheet and rill erosion

R = rainfall erosivity factor

K = soil erodibility factor

LS = slope length and steepness factor

C = cover and management factor

P = support practice factor

Values for each of the above factors were calculated or taken from references as indicated below:

- R = United States Department of Agriculture (USDA) Soil Conservation Service (now called Natural Resource Conservation Service), Davis, CA. "Guides for Erosion and Sediment Control," Appendix A. August 1983 (USDA 1983).
- K = Soil Survey Geographic (SSURGO) Database published by the USDA.
- LS = Site-specific information calculated by using digital elevation model (DEM) data set (published by the United States Geological Survey [USGS]), and by applying a geographic information system (GIS) tool developed by Robert J. Hickey (May 2002).
- C and P = Frederick R. Troeh and Louis M. Thompson. Soil and Soil Fertility. Oxford Press. 1991 (Troeh et. al. 1991).

Calculation of R, Rainfall Erosivity Factor

Step 1: Determine the 2-year 6-hour precipitation in tenths of an inch by looking at appropriate map in Appendix A of "Guides for Erosion and Sediment Control" (USDA 1983). The former Fort Ord is within the 10 tenths of an inch isopluvial. Convert to inches (10 tenths of an inch = 1 inch).

Step 2: Refer to Figure A-1 of "Guides for Erosion and Sediment Control" (USDA 1983) to determine the R Factor Zone. The former Fort Ord is located in R Factor Zone 1.

Step 3: Use Table A-1 (USDA 1983) to look up the Rounded Annual "R" Values for California R Zones. The former Fort Ord, which is in R Zone 1 and has a 2-year 6-hour

precipitation of 1.0 inch, has an R Factor value of 15. (R values in R Zone 1 are based on the equation $R = 16.552 \times P^{2.17}$ where P = the 2-year 6-hour precipitation).

R Factor = 15

Calculation of K, Soil Erodibility Factor

Look up the soil erodibility or K Factor value for the soil type. The SSURGO Database published by the USDA was used to determine the K Factor value. The former Fort Ord has three soil types according to the SSURGO Database; the Arnold-Santa Ynez Complex, Baywood Sand, and Oceano Loamy Sand. The K Factors for each of the three soil types found at the former Fort Ord are listed below:

Oceano; K = 0.1
Arnold-Santa Ynez Complex, K = 0.49
Baywood Sand, K = 0.15

The soil type for the DRO/Monterey MRA is 2/3 Arnold Santa Ynez Complex (K Factor = 0.49) and 1/3 Baywood Sand (K Factor = 0.15). **K Factor (average) = 0.38**

The soil type for the Laguna Seca Parking MRA is mixed. MRSs-14A and -30 are entirely Santa Ynez Fine Sandy Loam (K Factor = 0.49). MRS-29 is almost entirely Arnold Loamy Sand (K Factor = 0. 49). MRS-47 is approximately 1/3 Dissected Xerorthents and 2/3 Arnold-Santa Ynez complex (K Factor = 0.49) (ESCA RP Team 2008). **K Factor = 0.49**

The soil type for the MOUT Site MRA is mixed. The majority of the land area is Arnold Loamy Sand with a narrow strip of Aquic Xerofluvents running the entire length of the MRA (ESCA RP Team 2008). **K Factor = 0.49**

Calculation of LS, Slope Length and Steepness Factor

Step 1: Obtain a data set for slope length and steepness. The DEM dataset, published by the USGS was used to obtain these values for the former Fort Ord. The DEM data is a grid system of 100 square ft grids.

Step 2: Input data found in Step 1 into a GIS and use a calculation tool to determine the LS Factor value. The tool developed by Robert J. Hickey, was used to calculate the LS factor for the former Fort Ord. This tool uses the DEM grid system and the calculation shown below to determine the LS Factor:

$$LS = (I/72.6ft) \times (65.41 \sin 2B + 4.56 \sin 2B + 0.065)$$

Where:

I = the cumulative slope length in ft

B = the downhill slope angle

The LS Factor used here is the mean calculated over the entire Fort Ord site.

LS Factor = 0.054 (mean)

Calculation of C, Cover and Management Factor

This factor is based on land cover and management practices. According to Soils and Soil Fertility (Troeh, et.al., 1991, pg 381), the C factor for a good growth of permanent pasture is 0.004. Because most of the former Fort Ord is covered by native vegetation, this value was chosen.

C Factor = 0.004

Calculation of P, Support Practice Factor

According to Soils and Soil Fertility (Troeh, et.al., 1991, pg 381), this factor is assigned a value of 1.0 unless special practices are used to reduce erosion. No special erosion reducing practices are used at the former Fort Ord, therefore, the value of 1.0 was used.

P Factor = 1.0

Calculation of A, Estimation of Average Annual Soil Loss in Tons per Acre Caused by Sheet and Rill Erosion for DRO/Monterey MRA

$$\mathbf{A = R \times K \times LS \times C \times P}$$

A (tons per acre) = 15 x 0.38 x 0.054 x 0.004 x 1 = 0.0012 tons per acre

Conversion to inches

Conversion factors:

1 US ton = 907.2 kilograms (kg)
1 kg = 1000 grams (g)
1 acre (ac) = 6,170,256 square inches (in^2)
Average Soil Bulk Density = 1.65 g per centimeter cubed (cm^3) (assumed bulk density for undisturbed soils [Troeh, er.al., 1991, pg 53])

Conversion calculations:

$$\text{A (cubic inches/ac)} = \frac{0.0012 \text{ tons}}{1 \text{ acre}} \times \frac{907.2 \text{ kg}}{1 \text{ ton}} \times \frac{1000 \text{ g}}{1 \text{ kg}} \times \frac{1 \text{ cm}^3}{1.65 \text{ g}} \times \frac{1 \text{ in}^3}{16.39 \text{cm}^3} = \frac{41.30 \text{ in}^3}{\text{acre}}$$

$$A \text{ (inches)} = \frac{41.30 \text{ in}^3}{1 \text{ acre}} \times \frac{1 \text{ acre}}{6{,}170{,}256 \text{ in}^2} = 0.0000067 \text{ inches}$$

The erosion input factor of 0.0000067 inches for the DRO/Monterey MRA equates to a migration/erosion potential score of "1" (Appendix A, Table A-3). A score of 1 indicates: "Very stable: MEC will not migrate annual erosion is equal to or less than the site-wide average of 3/100 inch per year". Erosion may have occurred on the MRA, but it is expected to be associated mostly with roads and trails.

The MOUT Site and Laguna Seca Parking MRAs have soil erodibility factors (K = 0.49) slightly higher than that of the DRO/Monterey MRA (K = 0.38). The estimation of average annual soil loss is calculated at 0.0000086 inches for the MOUT Site and Laguna Seca Parking MRAs. The erosion input factor is less than 0.03 inches per year, and therefore, is the same migration/erosion potential score of "1" as the DRO/Monterey MRA.

APPENDIX D

Distribution List

Document Distribution List

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1	Roman Racca	California Department of Toxic Substances Control	8800 California Center Drive	Sacramento, CA	95826
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Approved:

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