APPENDIX F

Residential Quality Assurance Pilot Study

Appendix F: Residential Quality Assurance Pilot Study Work Plan

DRAFT FINAL
Group 1 Remedial Investigation / Feasibility Study Work Plan

Volume 2 - Sampling and Analysis Plan

Parker Flats Munitions Response Area Phase II

Former Fort Ord
Monterey County, California

November 13, 2008

Prepared for:

FORT ORD REUSE AUTHORITY

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Prepared Under:

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

Document Control Number: 09595-08-086-005

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ACRONYMS AND ABBREVIATIONS

BADT	Best Available (and Appropriate) Detection Technology
CSUMB	California State University Monterey Bay
CTS	California Tiger Salamander
DGM	digital geophysical mapping
DTSC	Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
ESCA	Environmental Services Cooperative Agreement
ESCA RP	Environmental Services Cooperative Agreement Remediation Program
FORA	Fort Ord Reuse Authority
MEC	munitions and explosives of concern
MRA	Munitions Response Area
QA	quality assurance
QC	quality control
RI/FS	Remedial Investigation/Feasibility Study
RQA	Residential Quality Assurance
SUXOS	Senior Unexploded Ordnance Supervisor
UXO	unexploded ordnance

F-1.0 INTRODUCTION

During development of the Environmental Services Cooperative Agreement (ESCA) for the Fort Ord Reuse Authority (FORA), the U.S. Environmental Protection Agency (EPA) and the Department of Toxic Substances Control (DTSC) expressed concern with the adequacy of the Best Available (and Appropriate) Detection Technologies (BADT) and related processes to remove munitions and explosives of concern (MEC) to the point that land could be released for residential use. This concern was attributed to the potential for small, but possibly hazardous items to remain at depths below the capability of instrument detection and close enough to the surface to pose a threat to future residents and/or land users.

In an effort to satisfy these concerns, a conceptual process was developed that would allow the project stakeholders to gain comfort with the acceptability of a parcel for residential use, hereinafter referred to as the Residential Quality Assurance (RQA) process.

As specified in the ESCA, FORA and their response contractor were tasked to develop a RQA Pilot Study, which includes recommending areas for inclusion in the study and developing success criteria to be used by EPA and DTSC to determine if and when the RQA process will be applied to other designated residential parcels covered by the ESCA. The RQA process is presented on Figure F-1. The following sections of this work plan address the scope of the RQA Pilot Study.

F-1.1 Test Area Selection and Location

There are approximately 690 acres of land identified for residential development within the ESCA Areas Covered by Environmental Services; 360 of the 690 acres are located in the Seaside Munitions Response Area (MRA) and 48 of the 690 acres are located in the California State University Monterey Bay (CSUMB) Off-Campus MRA.

Two test areas have been identified and are proposed for the RQA Pilot Study, as shown on Figure F-2 for the Seaside MRA and Figure F-3 for the CSUMB Off-Campus MRA. In accordance with the ESCA, the RQA study areas acreage is within 100 acres. In choosing the areas to include in the pilot study, the following selection criteria were developed:

- located within a future residential parcel
- varying types of approaches and instruments used in initial munitions response actions
- varying densities of MEC removed
- varying MEC hazard classifications
- varying MEC removal depths
- minimizing disturbance in designated California Tiger Salamander (CTS) habitat areas

The Seaside MRA is located in the southwestern portion of the former Fort Ord, bordered by the City of Seaside and General Jim Moore Boulevard to the west, the former impact area to

the east, Eucalyptus Road to the north, and additional former Fort Ord property to the south (Figure F-2). The Seaside MRA is wholly contained within the jurisdictional boundaries of the City of Seaside.

The CSUMB Off-Campus MRA is located in the north-central portion of the former Fort Ord, bordered by Inter-Garrison Road to the north, the County North MRA to the east and southeast, Parker Flats MRA to the south, and CSUMB campus property to the west and southwest (Figure 3). The CSUMB Off-Campus MRA is wholly contained within the jurisdictional boundaries of Monterey County.

RQA Pilot Study areas within the Seaside and CSUMB Off-Campus MRAs are shown on Figures F-2 and F-3, respectively.

F-1.2 Purpose and Scope

The purpose of this RQA Pilot Study Work Plan is to define the procedures, methods, and resources that will be used to complete the RQA Pilot Study. The purpose of the RQA Pilot Study is to employ the RQA process on specific residential areas to evaluate whether or not the value added/risk reduction associated with the RQA process justifies the additional time and cost required. Results and conclusions of the RQA Pilot Study will be documented in a Technical Memorandum.

Upon completion of the RQA Pilot Study, EPA and DTSC will determine if continuation of the process is warranted on other residential parcels or portions of parcels, based upon the results of the RQA Pilot Study. The regulatory agencies' decision will be documented and entered into the administrative record.

F-1.3 Success Criteria

The ESCA specifies that "The 'success criteria' should be established prior to commencing the cleanup efforts on approved 'test' parcels." Considering the objectives of the RQA Pilot Study, the process will be considered "successful" if it:

- increases the level of confidence in the ability of the MEC removal activities to meet remediation goals
- demonstrates the effectiveness of the MEC remediation activities with respect to explosive hazard risk to future residential users
- can be implemented in a technically defensible manner and the cost of implementation is quantifiable

If the RQA Pilot Study is found to be successful, it is expected that the MEC remediation, quality control (QC), and quality assurance (QA) processes may be revised to include a more rigorous protocol, such as that employed in the RQA Pilot Study on the ESCA parcels designated for residential development. If the RQA Pilot Study is found to be unsuccessful,

the existing MEC remediation, QC, and QA processes will generally be sustained in compliance with the terms of the ESCA and the Administrative Order on Consent.

Specific conditions of each of the three success criteria are outlined in the following subsections.

F-1.3.1 Level of Confidence

At the conclusion of the remediation activities specified in the Group 1 Remedial Investigation/Feasibility Study (RI/FS) Work Plan, the Group 1 MRAs will have been subjected to rigorous physical investigation, data analysis, hazard identification, hazard removal, and site restoration. Integrated into this process is an extensive process of QC and QA to provide a level of confidence that the remediation activities have been effective at meeting the project remediation goals. Because of the risks involved with residential land use, it is the obligation of the regulatory agencies to ensure optimal confidence in the remediation, QC, and QA processes relative to site conditions and current technology. Implementation of the RQA Pilot Study is intended to identify if the existing remediation, QC, and QA processes employed provide optimal confidence or if the QA protocol should be revised to include a more rigorous process, such as that employed in the RQA Pilot Study.

The impact of the RQA Pilot Study on the level of confidence will be assessed using standard statistical methods and/or models that are designed to specifically assess this parameter.

F-1.3.2 Explosive Hazard Risk

Similar to the rationale for the level of confidence discussed above, implementation of the RQA Pilot Study is intended to identify if the existing remediation, QC, and QA processes employed were sufficient to identify and remove explosive hazards on property proposed for residential use or if the QA protocol should be revised.

The degree of explosive hazard risk reduction will be assessed using industry explosive hazard risk reduction analysis and models to process the data obtained during the RQA Pilot Study. Specific emphasis will be placed on the hazard classification and the distribution and density of items found, if any. In addition, if items are discovered, an analysis will be conducted to ascertain the reasons that the items were missed in the initial remediation, QC, and QA efforts.

F-1.3.3 Technical Implementability and Cost

The third criterion is to demonstrate that the activities for the RQA Pilot Study can be implemented at the Site such that the goals can be accomplished and the cost of implementation can be quantified. Specifically, the implementation of the RQA Pilot Study will generate data that can be used to identify remediation, QC, and QA protocol adjustments, if any, necessary to achieve the level of confidence and explosive hazard risk reduction desired. At a minimum, data will include:

- historical site information, method previously cleared, weapons employed, etc.
- anomaly characteristics, such as depth density condition, hazard class, signal response, etc.
- implementation costs for equipment, labor, subcontractors, short- and long-term site management costs, sifting, stockpiling, etc.
- field conditions and challenges (and any related cost impact) encountered during implementation of the RQA Pilot Study activities

F-1.4 Document Structure

This RQA Pilot Study Work Plan is presented in numbered sections and figures. This Work Plan is not intended to be a stand-alone document. Sections 3, 4, 6, 7, 8, 9, 10, 11, and 12 in their entirety from Volume 2 of the Group 1 RI/FS Work Plan will be used to perform the work. Portions of Section 5 of Volume 2 of the Group 1 RI/FS Work Plan are referenced within this work plan, as appropriate.

F-2.0 TECHNICAL MANAGEMENT PLAN

F-2.1 RQA Pilot Study Test Areas

As indicated in the table provided below, the test areas for the RQA Pilot Study include one portion of the future residential land in the Seaside MRA (RQA-SEA.4) and a portion of the future residential land in the CSUMB Off-Campus MRA (RQA-CSUMB), as shown on Figures F-2 and F-3, respectively. During the initial munitions response activities, analog mag-and-dig (Schonstedt G52-CV) was the investigation approach used in the RQA test areas for the CSUMB Off-Campus MRA and a combination of digital geophysical mapping (DGM; EM61-MK2) and analog mag-and-dig (Schonstedt G52-CV) was the investigation approach used in the RQA test area for the Seaside MRA. Based upon the data obtained during the initial munitions response activities, and as illustrated on Figures F-2 and F-3, each area chosen for inclusion in the RQA Pilot Study exhibited varying densities of MEC with a variety of hazard classifications. Munitions smaller than 40 millimeters in size were recovered between 6 and 18 inches below ground surface on the Seaside MRA and at unknown depths on the CSUMB Off-Campus MRA. For the Seaside MRA, this depth interval is on the edge of the detection capability (both the EM61-MK2 and the Schonstedt) for these relatively small munitions. The three test areas also include portions of the MRAs where no MEC were encountered during previous munitions response actions, which will help to validate the effectiveness of initial response actions. In addition, designated CTS habitat areas were avoided when selecting these test areas.

Test Area	MRA	Acres (approx.)	Initial Munitions Response Approach / Equipment
RQA-SEA.4	Seaside	18.6	DGM / EM61-MK2; Mag-and-Dig / Schonstedt G52-CX
RQA-CSUMB	CSUMB Off-Campus	TBD	Mag-and-Dig / Schonstedt G52-CV

TBD = To Be Determined

F-2.2 Field Operations

The following are the major tasks that will be implemented in order to accomplish the overall objectives of the RQA Pilot Study:

- Site Preparation (Section F-2.2.1)
  - Preparatory Inspection (Section F-2.2.1.1)
  - Boundary Surveys for RQA Pilot Study Test Areas (Section F-2.2.1.2)
  - Brush Cutting and Removal (Section F-2.2.1.3)
  - Clearing and Grubbing (Six-Inch Scrape; Section F-2.2.1.4)
- Digital Geophysical Mapping Surveys (Section F-2.2.2)
- Anomaly Reacquisition (Section F-2.2.3)
- Excavation of Anomaly Targets (Section F-2.2.4)
- Site Restoration (Section F-2.2.5)

F-2.2.1 Site Preparation

The following activities will be conducted to prepare the test areas in advance of RQA Pilot Study activities:

- preparatory inspection
- boundary surveys and staking activities
- vegetation cutting and removal to the extent possible
- clearing and grubbing

F-2.2.1.1 Preparatory Inspection

A preparatory inspection of the test area will be performed before starting operations. Some boundary survey work may need to be conducted prior to the formal preparatory inspection to assist in delineation of the test areas to be inspected.

The purpose of this inspection is to determine what site preparatory measures are needed. This preparatory inspection is also used to identify environmentally sensitive areas, degree of vegetation present, and restoration requirements.

F-2.2.1.2 Boundary Surveys

Once the preparatory inspection is completed and prior to beginning vegetation cutting activities, the test area boundaries will be established with survey markers. Survey teams will work under the direction of the Senior Unexploded Ordnance Supervisor (SUXOS). An unexploded ordnance (UXO) escort will not be required during these activities.

Once clearing and grubbing is completed and prior to DGM survey activities, the surveyors will establish and stake 100-foot by 100-foot grids and partial grids within each test area in accordance with the grid system previously established for the former Fort Ord. These markers will provide a frame of reference during DGM investigations.

Survey work in the test areas will be based on monuments previously established in the field. The coordinate system to be used for control points and other survey activities is North American Datum 83 California State Plane Zone IV.

F-2.2.1.3 Vegetation Cutting and Removal

Vegetation will be cut and debris will be removed from the test areas. Tree removal will be minimized to the extent feasible. Subcontracted brush removal teams will conduct vegetation removals utilizing manual brush cutting and mechanical vegetation removal equipment. An UXO escort will not be required during vegetation cutting in areas that have been previously cleared by the United States Department of the Army. Brush cutting teams will work under the direction of the SUXOS and in coordination with the Field Biologist.

The brush cutting teams will be equipped with brush-clearing machines, power chippers, powered weed cutters, chainsaws, and a variety of hand tools. Each brush cutting team will have a leader or foreman that will ensure that personnel engaged in brush cutting activities wear personal protective equipment and accessories appropriate for the equipment being operated (e.g., chainsaw chaps).

F-2.2.1.4 Clearing and Grubbing (Six-Inch Scrape)

Approximately six inches will be removed from the existing ground surface within the RQA test areas. The intent of the clearing and grubbing is to 1) remove potential interference associated with the vegetative layer and 2) create a new ground level that will bring smaller subsurface items, that may have been previously undetectable, approximately six inches closer to the newly exposed surface; therefore, bringing them to a detectable depth. UXO construction support will be used during clearing and grubbing.

The six-inch layer will be removed from each test area and stockpiled within the MRA. No stockpiled soil will be removed from the ESCA property during the RQA Pilot Study, or used within a residential reuse area, without the prior written permission of EPA and DTSC.

F-2.2.2 Digital Geophysical Mapping Surveys

The newly exposed ground surface will be geophysically investigated using the BADT instrumentation. Standard DGM-quality process checks will be conducted throughout the RQA process, including by FORA's Quality Assurance Oversight Professionals, to ensure established processes and procedures are being followed and that the highest quality data possible is being collected.

The purpose of the DGM survey will be to establish and record the locations of geophysical anomalies that could potentially represent subsurface MEC. The digital geophysical survey methodology is detailed in Section 5 (Geophysical Investigation Plan) of Volume 2 of the Group 1 RI/FS Work Plan.

QC and QA activities will not include redoing DGM surveys or analog QC or QA inspections.

F-2.2.3 Anomaly Reacquisition

Anomaly reacquisition methodology is detailed in Section 5 (Geophysical Investigation Plan) of Volume 2 of the Group 1 RI/FS Work Plan.

F-2.2.4 Excavation of Anomaly Targets

Excavation methodology is detailed in Section 5 (Geophysical Investigation Plan) of Volume 2 of the Group 1 RI/FS Work Plan.

F-2.2.5 Site Restoration

There are no requirements to implement restoration measures. However, the test areas will be periodically monitored for erosion and invasive weeds. Erosion and/or weed mitigation measures, such as reseeding or soil stabilizing applications, will be implemented in coordination with the Field Biologist, if determined to be necessary.

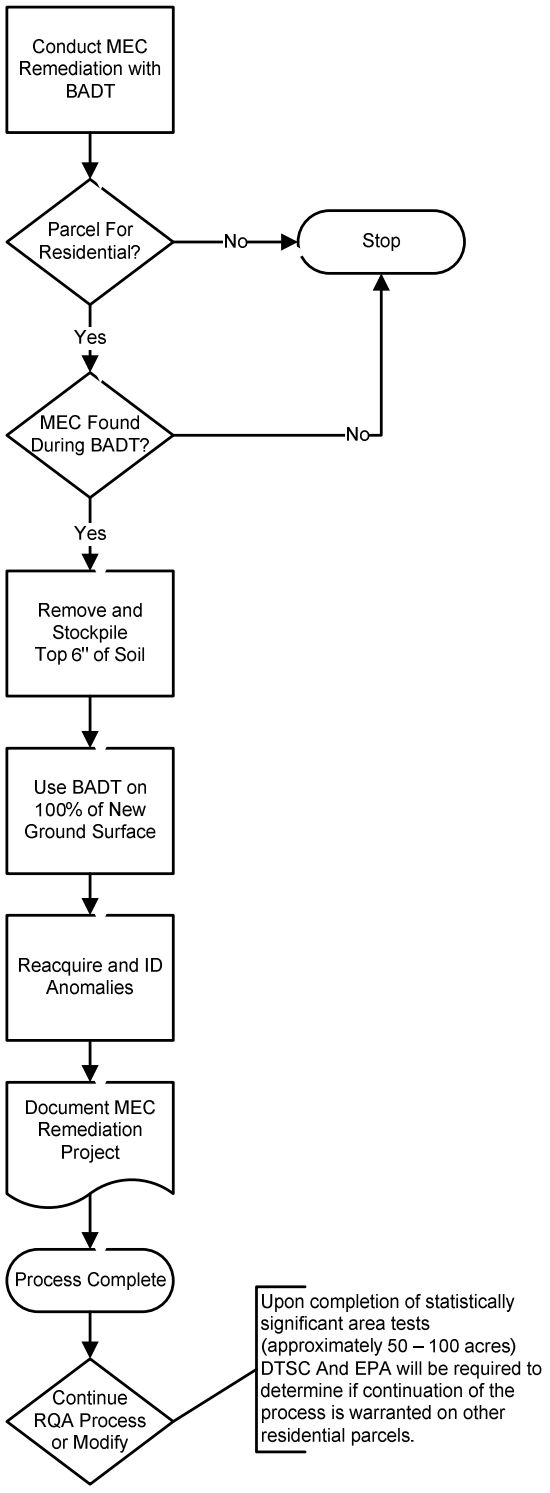
F-2.3 RQA Pilot Study Reporting

A Technical Memorandum will be prepared that documents the RQA Pilot Study field activities, data analysis, and evaluation. Complete reporting of data collected will include, but not be limited to, the following:

- historical site information, such as method cleared, weapons employed, etc.
- anomaly results, such as type, depth, density, condition, hazard classification, etc.

- implementation costs and timing (including erosion and weed control)
- implementation issues or field changes

The Technical Memorandum will also include an evaluation of the RQA Pilot Study success and provide RQA implementation alternatives and adjustments.



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RQA Process Flow Diagram

FORA ESCA RP
Monterey County, California

Figure F-1

RQA-SEA.4
18.6 Acres

Eucalyptus Road (West)

MRS-15 SEA 04

MRS-15 SEA 03

MRS-15 SEA 02

MRS-15 SEA 01

Coe Avenue

City of Seaside

General Jim Moore Boulevard

Broadway Avenue

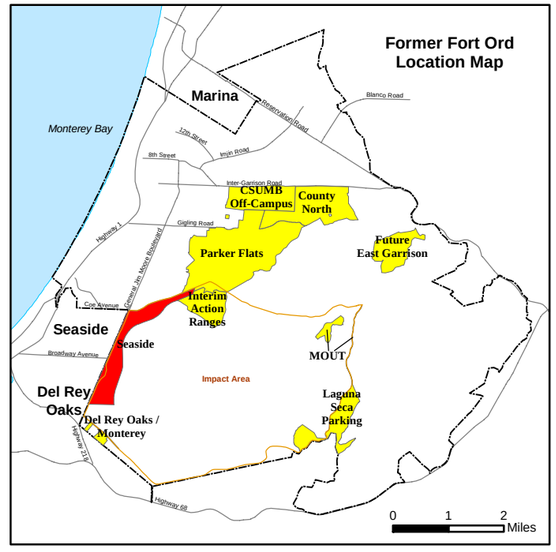
Watkins Gate Road

Legend

- Seaside MRA
- Munitions Response Site
- Major Road
- California Tiger Salamander Buffer
- Former Fort Ord Boundary
- Roadway Alignment
- Residential Land Use
- Non-Residential Land Use

MEC Hazard Classification

- **0** Inert munitions item that will cause no injury
- **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 activites
- **2** MEC that will cause major injury or, in extreme cases, could cause death to an individual if functioned by an individual's activites
- **3** MEC that will kill an individual if detonated by an individual's activites



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Seaside MRA
RQA Pilot Study Area

FORA ESCA RP
Monterey County, California

Figure F-2

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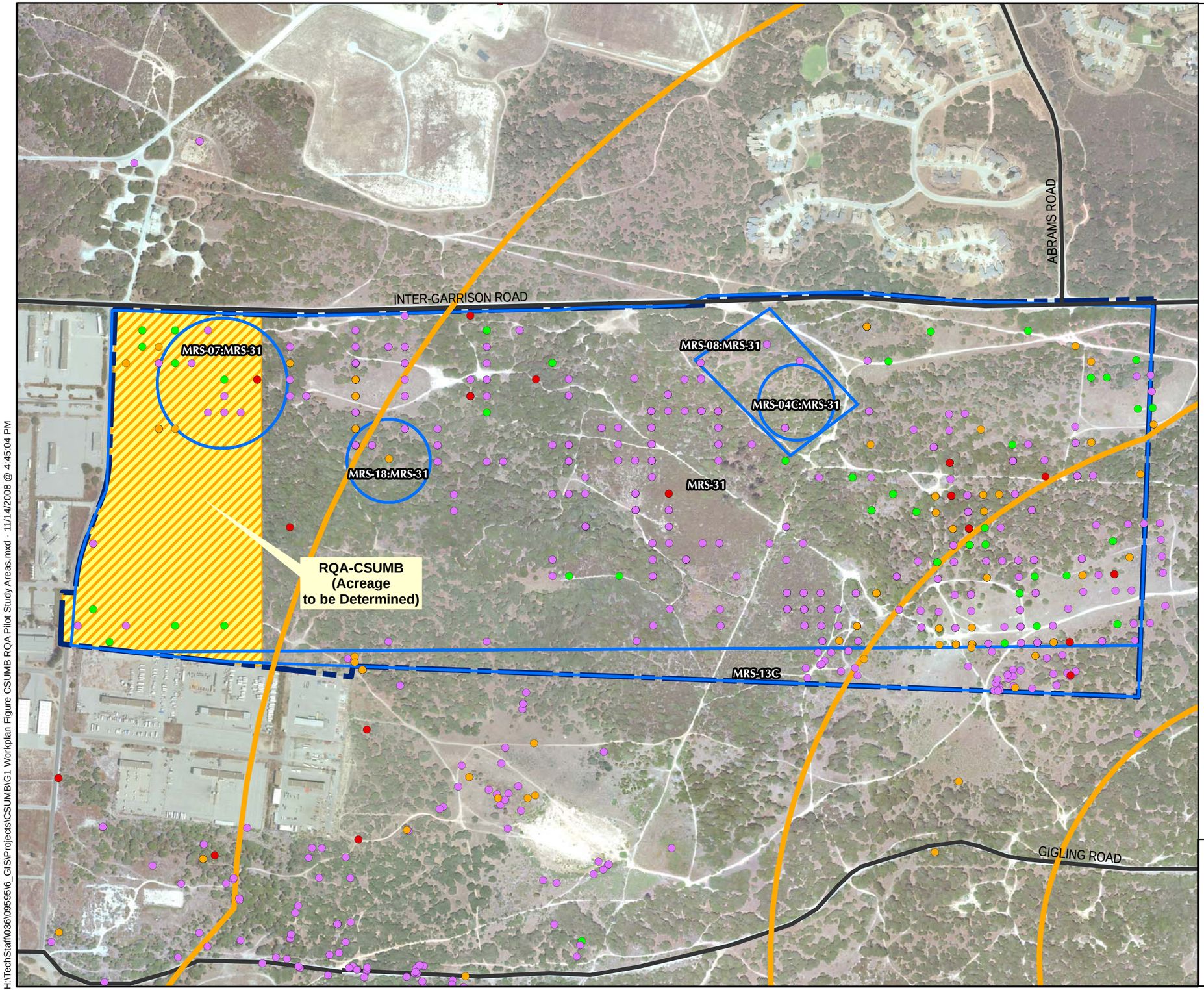
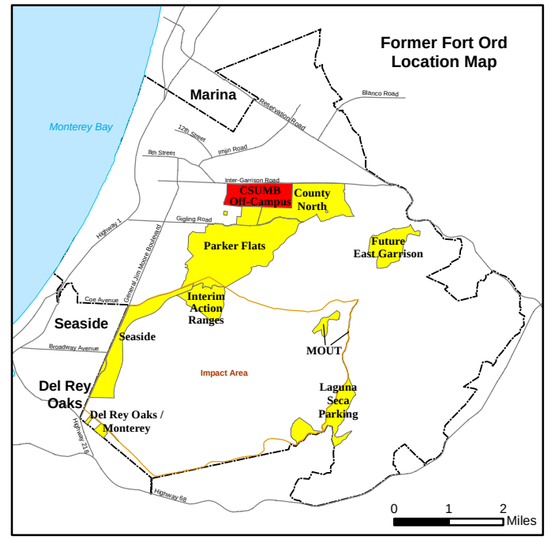


Legend

- CSUMB MRA
- Munitions Response Site
- Major Road
- California Tiger Salamander Buffer
- Residential Land Use

MEC Hazard Classification

- **0** Inert munitions item that will cause no injury
- **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 activites
- **2** MEC that will cause major injury or, in extreme cases, could cause death to an individual if functioned by an individual's activites
- **3** MEC that will kill an individual if detonated by an individual's activites



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CSUMB MRA
RQA Pilot Study Areas

FORA ESCA RP
Monterey County, California

Figure F-3

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