

Final, Track 1
Plug-In Approval Memorandum
MRS-24A, MRS-24C, and Parcel E20c.1
Former Fort Ord, California

Prepared for

**United States Department of the Army
Base Realignment and Closure (BRAC)
Former Fort Ord, California**

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Evaluation Checklist Part 1: Literature Review

Evaluation Checklist Part 2: Sampling Evaluation

Evaluation of Previous Work: Investigation Area

Evaluation Checklist Part 1: Site Walk Evaluation

Evaluation Checklist Part 2: Sampling Evaluation

Evaluation of Previous Work: Remainder of Parcel E20c.1

Evaluation Checklist Part 1: Literature Review

Evaluation Checklist Part 2: Sampling Evaluation

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Acronyms and Abbreviations

%	percent
AAR	After Action Report
amsl	above mean sea level
Army	U.S. Department of the Army
ASR	<i>Archives Search Report</i>
BCT	BRAC Cleanup Team
bgs	below ground surface
BRAC	Base Realignment and Closure
CSM	conceptual site model
DGM	digital geophysical mapping
DMM	discarded military munitions
DTSC	Department of Toxic Substances Control
EDC	Economic Development Conveyance
EM	electromagnetic
EPA	U.S. Environmental Protection Agency
ESCA	Environmental Services Cooperative Agreement
FFA	Federal Facility Agreement
FORA	Fort Ord Reuse Authority
ft	foot or feet
FWV	Field Work Variance
GIS	Geographic Information System
GJMB	General Jim Moore Boulevard
GPS	global positioning system
HE	high explosive
HLA	Harding Lawson Associates
HMP	Habitat Management Plan
MD	munitions debris
MEC	munitions and explosives of concern
mm	millimeter
MMRP	Military Munitions Response Program
MR	Munitions Response
MRS	Munitions Response Site
mV	millivolt
NFA	no further action
ODDS	Ordnance Detection and Discrimination Study
OE	Ordnance and Explosives
OESS	Ordnance and Explosives Safety Specialist
Parsons	Parsons Corporation
PBC	Public Benefit Conveyance
QA	quality assurance
QC	quality control
RI/FS	Remedial Investigation/Feasibility Study

Acronyms and Abbreviations (continued)

ROD	Record of Decision
RP	Remediation Program
RSOP	Reconnaissance, Selection, and Occupation of Position
SAA	small arms ammunition
SCA	special case area
Shaw	Shaw Environmental, Inc.
SS/GS	SiteStats/GridStats
USA	USA Environmental
USACE	U.S. Army Corps of Engineers
USAEDH	U.S. Army Engineer Division, Huntsville
UXO	unexploded ordnance
WP	white phosphorus
WWII	World War II

1.0 Introduction

The Munitions Response (formerly Ordnance and Explosives [OE]) Remedial Investigation/Feasibility Study (MR RI/FS) for the former Fort Ord is being implemented to evaluate and address all areas within the base with regards to known and suspected areas containing munitions and explosives of concern (MEC) from past military training activities. The MR RI/FS program is being completed by grouping areas and sites within the former Fort Ord as a series of “tracks” numbered 0 through 3 that are based on MEC-related characteristics to expedite clean-up, reuse and/or transfer of Fort Ord property. The Track 1 portion of the MR RI/FS program addresses sites or areas that were suspected to have been used for military training with military munitions but based on the RI/FS, the sites fall into one of the following three categories:

- Category 1: There is no evidence to indicate military munitions were used at the site, i.e., suspected training did not occur.
- Category 2: The site was used for training, but the military munitions items used do not pose an explosive hazard, i.e., training did not involve explosive items.
- Category 3: The site was used for training with military munitions, but military munitions items that potentially remain as a result of that training do not pose an unacceptable risk based on site-specific evaluations conducted in the Track 1 MR RI/FS. Field investigations identified evidence of past training involving military munitions, but training at these sites involved only the use of practice and/or pyrotechnic items that are not designed to cause injury. In the unlikely event that a live item of the type previously observed at the site is found, it is not expected that the item would function by casual contact (i.e., inadvertent and unintentional contact).

This Approval Memorandum presents the rationale for designating Munitions Response Site (MRS) MRS-24A, MRS-24C including an additional Investigation Area, and the remainder of Parcel E20c.1, as Track 1 sites or areas. It provides the required documentation for these areas to be addressed using the plug-in process established in the *Record of Decision, No Further Action Related to Munitions and Explosives of Concern – Track 1 Sites, No Further Remedial Action with Monitoring for Ecological Risks from Chemical Contamination at Site 3 (MRS-22)* (Track 1 ROD) (U.S. Department of the Army [Army], 2005a). Based on the evaluation described in this Approval Memorandum, MRS-24A meets the Track 1, Category 3 criteria; MRS-24C (the original location in the *Archives Search Report* [ASR], U.S. Army Engineer Division, Huntsville [USAEDH], 1994 and 1997) meets the Track 1, Category 1 criteria; the Investigation Area immediately south of MRS-24C is a Track 1, Category 3 variant site; and the remainder of Parcel E20c.1 meets the Track 1, Category 1 criteria. Upon receiving concurrence from the U.S. Environmental Protection Agency (EPA) and acknowledgement from the

California Environmental Protection Agency's Department of Toxic Substances Control (DTSC), this Approval Memorandum will serve as the decision document stating that no further action (NFA) regarding an MR is required for MRS-24A, MRS-24C including an additional Investigation Area, and the remainder of Parcel E20c.1.

1.1 Fort Ord and Munitions Response RI/FS Background

The former Fort Ord is located in northern Monterey County approximately 80 miles south of San Francisco. The former Army base is made up of approximately 28,000 acres of land next to Monterey Bay and the cities of Seaside, Sand City, Monterey, and Del Rey Oaks to the south, and the city of Marina to the north. The former Fort Ord is bounded to the east and north by the Salinas Valley. A Union Pacific Railroad right-of-way and State Route 1 (Cabrillo Highway) pass through the western portion of the former Fort Ord, separating the beach from the rest of the base. Laguna Seca Recreation Area, Toro Park, and State Route 68 (Monterey-Salinas Highway) border former Fort Ord to the south and southeast.

Since it was established in 1917, Fort Ord served primarily as a training and staging facility for infantry troops. Fort Ord was a basic training center from 1947 to 1975, served as a base for the 7th Infantry Division after 1975, and was selected for closure in 1991. Fort Ord was officially closed in September 1994 in response to the 1991 Base Realignment and Closure (BRAC) Act. No active Army division is stationed at Fort Ord; however, Army personnel operate the areas of Fort Ord still held by the Army. Much of the Installation has been or will be disposed to federal, state, local, and private entities through economic development conveyance, public benefit conveyance, negotiated sale, or other means.

Because various Army units used portions of Fort Ord for maneuvers, target ranges, and other training/staging activities, military munitions may be present at the former Fort Ord. In preparation for transfer and reuse of former Fort Ord property, various military munitions-related investigative and removal/remedial activities have been performed since 1993. Potential chemical contamination at the former Fort Ord was investigated under the *Basewide Remedial Investigation/Feasibility Study* (Harding Lawson Associates [HLA], 1995), and continues to be addressed under the Site 39 program.

A Federal Facility Agreement (FFA) was signed in 1990 by the Army, EPA, DTSC (formerly the Department of Health Services), and the Regional Water Quality Control Board. The FFA established schedules for performing remedial investigations and feasibility studies and requires that remedial actions be completed as expeditiously as possible. In 1998, the Army agreed to evaluate military munitions at the former Fort Ord in the MR RI/FS consistent with the Comprehensive Environmental Response, Compensation, and Liability Act.

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 Fort Ord FFA. The MR RI/FS uses a “tracking” process that categorizes areas with similar MEC-related characteristics to expedite clean-up, reuse, and/or transfer of Fort Ord property. According to this “tracking process,” an area under investigation is assigned one of four tracks, which are described as follows:

- *Track 0*: Areas that contain no evidence of MEC and have never been suspected as having been used for military munitions-related activities of any kind. Details of the Track 0 program and areas addressed are provided in the Track 0 ROD (Army, 2002), and the Track 0 Explanation of Significant Differences (Army, 2005b).
- *Track 1*: Sites where military munitions were suspected to have been used, but based on the RI/FS for each site, it falls into one of the following three categories:
 - Category 1 – There is no evidence to indicate military munitions were used at the site, i.e., suspected training did not occur.
 - Category 2 – The site was used for training, but the military munitions items used do not pose an explosive hazard, i.e., training did not involve explosive items.
 - Category 3 – The site was used for training with military munitions, but military munitions items that potentially remain as a result of that training do not pose an unacceptable risk based on site-specific evaluations conducted in the Track 1 MR RI/FS. Field investigations identified evidence of past training involving military munitions, but training at these sites involved only the use of practice and/or pyrotechnic items that are not designed to cause injury. In the unlikely event that a live item of the type previously observed at the site is found, it is not expected that the item would function by casual contact (i.e., inadvertent and unintentional contact).

Details of the Track 1 program and sites addressed are provided in the Track 1 ROD (Army, 2005a).

- *Track 2*: Sites where MEC items were present and MEC removal action has been conducted.
- *Track 3*: Areas where MEC items are known or suspected to be present, but MEC investigations have not yet been completed.

1.2 Track 1 Plug-In Process

As described in the Track 1 ROD, NFA decisions for future Track 1 plug-in sites will be proposed and documented in Approval Memoranda. This Approval Memorandum provides the same level of information that was included in the RI Site Reports and in the *Final Track 1 Ordnance and Explosives Remedial Investigation/Feasibility Study* (MACTEC, 2004), and describes the rationale for Track 1 designation. In accordance with the Track 1 ROD, the

Approval Memorandum for MRS-24A, MRS-24C including an additional Investigation Area, and the remainder of Parcel E20c.1, includes the following information:

- (1) Descriptions of the area.
- (2) The historical use of the area.
- (3) The rationale for the designation of the area as a Track 1 site.
- (4) A map of the area detailing the location and any pertinent available MEC-related information.

There will be a public review process for all Approval Memoranda, and these memoranda will be primary documents under the Ford Ord FFA. Each Track 1 Plug-In Approval Memorandum will be submitted and finalized according to the agency consultation process outlined in Section 7 of the FFA. Following the agency review of the draft Approval Memorandum and necessary revisions, the Army will submit the Approval Memorandum for a 30-day public review and comment period. A public notice will be posted in a local newspaper announcing the opportunity to review and comment on the proposed decision(s). Subsequently, the Army will submit to the agencies a summary of public comments and responses to the comments, and any needed revisions to the Approval Memorandum, at which time the Approval Memorandum will be considered a draft final document as defined in the FFA. Within 30 days of this submittal, the agencies will, in writing, either concur with or acknowledge the Army's decision(s), or initiate a dispute per Section 12 of the FFA.

When the written concurrence from EPA and acknowledgement from DTSC are received, a public notice will be posted in a local newspaper, and the Approval Memorandum will be placed in the Fort Ord Administrative Record. Planned and completed 'NFA Related to MEC' site determinations will also be described in Fort Ord environmental cleanup newsletters prepared by the Army for local residents. Notification of these proposed and completed activities will also be distributed to appropriate local agencies. The Proposed Plan and ROD for Track 1 and other tracks, as well as previously approved Approval Memoranda, are available in the former Fort Ord Administrative Record and the local information repositories.

1.3 Approval Memorandum Organization

This Approval Memorandum contains two major elements: (1) a presentation and assessment of archival data ([Sections 2 and 3](#)), and (2) a site evaluation ([Section 4](#)) that uses the archival data presented in the preceding sections.

The archival data presented in [Section 2](#) includes a review of the area history, evaluation of potential military munitions in the area, and a summary of previous MR investigations. [Section 3](#) presents the conceptual site model (CSM) for the MRSs and parcel. The site evaluation in [Section 4](#) was conducted in accordance with the procedures described in the *Final Plan for Evaluation of Previous Work* (HLA, 2000) and may restate some information presented

in Sections 2 and 3. The site evaluation discusses the evaluation of literature review, sampling, and site walk processes. These discussions are based upon information from standardized literature evaluation, sampling evaluation, and site walk evaluation checklists ([Appendix A](#)) and summarize the conclusions for the areas. The recommendations for MRS-24A, MRS-24C including an additional Investigation Area, and the remainder of Parcel E20c.1, are presented in [Section 5](#).

2.0 Site Summary

2.1 Site Description

Parcel E20c.1 is located immediately north of and adjacent to the former Fort Ord Impact Area on the north side of Eucalyptus Road ([Appendix B, Figure 1](#)). The 70.3-acre parcel is in close proximity to a residential neighborhood (Fitch Park) on the former Fort Ord. Access to Parcel E20c.1 is currently unrestricted.

The Fort Ord Reuse Authority (FORA) Reuse Plan designates the land that includes Parcel E20c.1 as “military enclave,” which could include housing (FORA, 1997). The parcel is currently undeveloped. The property is classified as a development parcel under the *Installation-Wide Multispecies Habitat Management Plan (HMP) for Former Fort Ord* (U.S. Army Corps of Engineers [USACE], 1997), which describes special land restrictions and habitat management requirements within habitat reserve and other areas.

MRS-24A (formerly known as OE-24A) lies within the boundary of Parcel E20c.1 in the southwest corner of the parcel ([Appendix B, Figure 2](#)). The boundary of MRS-24A was originally obtained based on a “Practice Rifle Grenade” area depicted in a hand-sketched August 1945 historical range map included in the ASR (USAEDH, 1994 and 1997). Based on this boundary, MRS-24A is approximately 13.9 acres in size. Evaluation of aerial photographs in figures included in this Approval Memorandum indicates the actual range may have been smaller, corresponding to a visible cleared area.

MRS-24C (formerly known as OE-24C) is located on the north side of Parcel E20c.1 ([Appendix B, Figure 2](#)). The boundary of MRS-24C was originally identified in the 1994 ASR based on a “Live Grenade” area from a hand-sketched 1946 master plan map included in the ASR. Based on this boundary, MRS-24C is approximately 9.7 acres in size and located outside the boundary of Parcel E20c.1 in an area now developed as housing. Evaluation of aerial photographs in figures included in this Approval Memorandum indicates the actual range associated with MRS-24C may have been smaller (approximately 0.8 acre) and located south of the location described in the ASR, partially within Parcel E20c.1. This 0.8-acre area is addressed as the “Investigation Area” throughout this document.

2.2 Site History

The following presents a summary of the site history and development for MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1, based on archival research and review of historical training maps and aerial photographs.

2.2.1 Pre-1940s Era

Parcel E20c.1 lies within a tract of land purchased from private landowners by the government in 1917 (Little, 1994). Documentation for use of this area by the Army for training prior to 1940 is limited to topographic maps. Topographic maps of the area from 1918 (Department of the Interior, 1918) and 1933 (Army, 1933-34) were reviewed. No identifiable features or text were associated with the parcel. There is no evidence of munitions-related activities in the areas later designated as MRS-24A or MRS-24C. Eucalyptus Road is shown on the 1933 topographic map and is close to its present location.

2.2.2 1940s Era

Review of the 1940s era documentation including historical maps and aerial photographs indicates that a practice rifle grenade range and a live grenade range were present in the area in the 1940s.

- A “Practice Rifle Grenade” training area (MRS-24A) is shown on the Fort Ord facility map from 1945 (Army, 1945) and master plan map from 1946 (Army, 1946). A “Live Grenade” training area (MRS-24C) is identified north of the practice rifle grenade area. Practice grenade (MRS-24B), practice rifle grenade (MRS-24E), and booby trap (MRS-24D) training areas are also shown on the map to the northeast (MSR-24B) and northwest (MRS-24D and 24E) of Parcel E20c.1.
- Aerial photographs from 1941 and 1949 show two disturbed/cleared areas within the area defined as the location of MRS-24A ([Appendix B, Figures 3 and 4](#)).
- Aerial photographs from 1941 and 1949 show a cleared area south of the location defined as MRS-24C in the ASR ([Appendix B, Figures 3 and 4](#)). There are no cleared locations within the boundary of MRS-24C, indicating the cleared area south of MRS-24C (“Investigation Area”) is likely the actual training area meant to be encompassed by MRS-24C. The Investigation Area corresponds with the size of a typical live grenade range ([Section 3.1.2](#)), which is the range designation for MRS-24C.
- A developed trail trending north-south adjacent to Parcel E20c.1 to the west is seen on the 1941 and 1949 aerial photographs. The trail appears to link Eucalyptus Road to the area later developed as the Fitch Park housing development. Another trail intersects at the northwest corner of Parcel E20c.1, and appears to connect the live grenade training area at MRS-24C to the practice grenade training area at MRS-24B.

2.2.3 1950s Era

Review of the 1950s era documentation including training maps, aerial photographs, and grading plans indicated that grenade training ended sometime prior to 1954 and that the area to the north

of Parcel E20c.1 was developed as base housing by 1959. The results of historical map and aerial photograph review are as follows:

- The developed trail trending north-south adjacent to Parcel E20c.1 to the west and the trail intersecting the northwest corner are still visible on the 1951 aerial photograph ([Appendix B, Figure 5](#)).
- The 1951 aerial photograph shows an additional road trending north-south through the areas of MRS-24A and Parcel E20c.1, and to the east of the area of MRS-24C.
- The practice rifle grenade (MRS-24A) and live grenade (MRS-24C) training areas, as well as other training areas (practice grenade [MRS-24B], booby trap [MRS-24D], and practice rifle grenade [MRS-24E]) are not shown on the circa 1954 map or on maps after that date (Army, 1956).
- The 1956 Fort Ord facility map indicates the parcel is in a restricted fire area, and MRS-24A is designated as a Reconnaissance, Selection, and Occupation of Position (RSOP) area (MACTEC, 2004). Army field manuals describe RSOP as an activity to assess and prepare for movement of platoon-based or battery-based field artillery (Army, 1990). The RSOP training area is not considered a location where ordnance firing would be undertaken.
- East Officers Area Section 4 grading plans dated 1957 are available for the area (USACE, 1959). The grading plans are as-built revisions dated 1959 and show the Fitch Park housing development north of Parcel E20c.1.
- Review of aerial photographs in the 1950s appears to identify two small (10-foot [ft] by 20-ft) buildings near Eucalyptus Road within the MRS-24A area. The buildings are suspected to be temporary field latrines or storage buildings.
- An aerial photograph from 1959 (USACE, 1960) shows the completed Fitch Park housing development and is identified as “East Officers Housing Area.” It appears the areas cleared of vegetation in MRS-24A and near MRS-24C (the Investigation Area) in the 1949 and 1951 aerial photographs were covered fill material or vegetation in 1959.

2.2.4 1960s to Present

From the 1960s until Base closure, the closest training areas used were south of Parcel E20c.1 inside the Impact Area, across Eucalyptus Road. The results of historical map, aerial photograph, and document review are as follows:

- No training sites are present in Parcel E20c.1 on training maps from 1964 through 1988.
- Aerial photographs from 1966 and 1999 show housing over the adjacent former grenade areas (MRS-24B and 24C), booby trap (MRS-24D), and practice rifle grenade area (MRS-24E). The housing area is identified as Rogers Fitch Park on a 1967 map (Army, 1967).

- The developed trail trending north-south adjacent to Parcel E20c.1 to the west and the trail intersecting the northwest corner are still visible on a 1966 aerial photograph. The trails are partially overgrown by vegetation in a 1999 aerial photograph.
- Power transmission lines were installed by Pacific Gas & Electric Company in 1965. These lines extend through MRS-24A ([Appendix B, Figure 2](#)). The easement contains no restrictions on excavation. No information is known about any encounters with MEC during construction activities.
- The Monterey Peninsula Water Management District installed two observation wells along Eucalyptus Road west of MRS-24A in July 1994 ([Appendix B, Figure 2](#)). No discoveries of MEC were reported during the construction of the wells.
- Denise Duffy and Associates coordinated investigative work for the preparation of the environmental impact report, as well as an environmental assessment, for the proposed First Tee project. As part of the environmental assessment work, personnel who received MEC recognition training visited the First Tee site within Parcel E20c.1 numerous times in 2002 and 2003 for various reasons, including planning, surveying, archaeological resources assessment, and biological resources assessment. Of note are field inspections conducted by Staub Forestry and Environmental Consulting between May and July 2002, as part of a Forest Management Plan preparation. Field work included visiting all tree-bearing portions of the proposed golf course site to sample tree sizes and densities and to characterize different vegetation types. Every area visited was examined to some detail, including crawling into vegetated areas. No MEC was reported during any of these site visits conducted as part of the environmental assessment (Archaeological Consulting, 2003).

2.3 Potential Military Munitions Based on Historical Use of the Area

Based on the review of munitions-related information presented above, military munitions-related activities that could be expected to have occurred at MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1, include (a) practice rifle grenade training in the 1940s at MRS-24A, and (b) live hand grenade training in the 1940s at the Investigation Area located south of MRS-24C.

Based on suspected use of the area from historical documentation, the types of military munitions that could be found at MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1 include:

- **Practice rifle grenades.** The practice rifle grenade that was available for use in the World War II (WWII) era was the M11A2. This item was an inert loaded grenade similar in shape and weight to the M9A1 high explosive (HE) antitank grenade. No explosive charge was associated with this practice item.

- **Rifle grenades (smoke).** Signaling smoke grenades (M20, M22, and M23 series and T6E1 smoke grenades) were available for use during the WWII-era. The M22 series rifle grenade (smoke) was used for signaling and for laying smoke screens; it produces green, red, violet, or yellow smoke. The M23 series rifle grenade (smoke) was used only for signaling purposes; it produces green, red, violet, or yellow smoke streamers.

Based on review of available data and the site configuration, is it unlikely that the M19A1 white phosphorus (WP) rifle grenade was fired at MRS-24A because a correctly constructed rifle grenade range for firing items other than inert or practice rifle grenades (such as the M19A1 WP rifle grenade) is too large to fit inside the boundaries of a practice rifle grenade range (War Department, 1944). Additionally, the M19A1 WP rifle grenade is designed to fragment and scatter burning WP and grenade body metal fragments upon initiation (War Department, 1944) and is significantly more hazardous than the smoke rifle grenades listed above. There is no physical evidence to indicate that the M19A1 WP rifle grenade was used at MRS-24A.

- **Illumination Signals.** Ground illumination signals (M17A1 through M22A1, M17A1B2 through M22A1B2, and M125A1) were available for use during the WWII era, and were used for signaling by ground units. The M17A1 through M22A1 and M17A1B2 through M22A1B2 signals were launched from a rifle or carbine fitted with a launcher. They produced either a colored star supported by a parachute or a cluster of five free-falling stars. The M125A1 is a green star cluster ground illumination signal used for daytime or nighttime signaling from a hand-held aluminum launching tube.
- **Hand grenades.** Five types of hand grenades were associated with the WWII era: MKIIA1-Standard (fragmentation); MKIIIA1-Limited Standard (offensive); chemical; MKII-Standard (practice); and MKIA1 (training). The MKII fragmentation and MKIII offensive grenades contained HE. The chemical grenade contained irritants, tear gas, smoke, incendiary, or colored smoke. The MKII practice grenade contained a black powder filler. The MKIA1 training grenade was completely inert.

In addition to the types of munitions listed above, it is known from investigations in the area that other “incidental munitions” may be present as the result of training in adjacent areas such as the Impact Area to the south of Eucalyptus Road.

2.4 History of Area Investigations

2.4.1 USA Environmental Sampling 1996/1997/2000

2.4.1.1 MRS-24A

USA Environmental (USA), formerly CMS Environmental, Inc., completed sampling within MRS-24A in 1996 and 1997 (USA, 2000a). This sampling consisted of 100 percent (%) search and investigation of nine 100-ft by 100-ft grids and a “perfunctory” search and investigation of ten additional 100-ft by 100-ft grids within the MRS. In August 2000, an additional 100% grid

sampling of 12 grids was completed to collect additional information ([Appendix B, Figure 6](#)). These additional 12 grids included the areas of the 10 perfunctory grids and sampling was conducted to confirm the presence or absence of MEC. Based on this work, approximately 30% of MRS-24A was sampled.

A Schonstedt Model GA-52/Cx magnetometer was used to perform the sampling operations. Three MEC items were found during sampling ([Appendix C, Table 1](#)):

- M2 series ignition cartridge,
- M83 series illumination mortar 60 millimeter (mm) projectile, and
- M43 series practice mortar 81 mm projectile.

Munitions debris (MD) items found were of the following types:

- MKII practice and fragmentation hand grenades,
- M11 and M29 series practice antitank rifle grenades,
- M7 series practice 2.36-inch rocket,
- M29 series practice 3.5-inch rockets,
- M17 series parachute rifle ground signal,
- M181 series practice subcaliber 14.5 mm projectile,
- MKII practice and fragmentation hand grenade fragments¹,
- Flame thrower igniter cartridge¹, and
- Unknown fragments¹.

2.4.1.2 MRS-24C

USA completed sampling in the vicinity of MRS-24C in 1997 (USA, 2000b). One 100-ft by 200-ft sample grid and three sample grids of non-standard dimensions (48,250 square ft) were sampled using the SiteStats/GridStats (SS/GS) method ([Appendix B, Figure 6](#)). Two of the four sample grids were established outside of the ASR MRS boundary because of terrain and structures within the site. The sample grids were surveyed with a Schonstedt Model GA-52/Cx magnetometer and anomalies were excavated at various depths down to 2 ft. Within the ASR boundary of MRS-24C, 19 grenade fragments were identified in the northern grid and 19 grenade fragments and 2 grenade fuzes were identified in the southern grid (USA, 2000b). Within the grid located directly south of the boundary of MRS-24C, 17 grenade fragments were identified ([Appendix C, Table 2](#)). Within the grid overlapping the Investigation Area and Parcel E20c.1, three expended signals (marine smoke and illumination, ground illumination, and parachute ground illumination) were identified in a “trash pit” located in Parcel E20c.1 ([Appendix C, Table 3](#)).

¹ Item description is the original field-assigned description; item does not have a quality control (QC) “MMRP” description in the Fort Ord Military Munitions Response Program (MMRP) Database. See Section 4.2.2.

2.4.2 Fuel Break Development 2002

In 2002, a fuel break was developed along the northern parcel boundary adjacent to the Fitch Park housing development ([Appendix B, Figure 7](#)). This fuel break was developed by cutting vegetation, and it traversed the majority of the Investigation Area associated with MRS-24C. MEC recognition training was not provided since the activities did not involve soil disturbance. No MEC was reported during this work; subsurface investigations were not conducted (Parsons Corporation [Parsons], 2007).

2.4.3 USACE Site Walks 2003

On February 13, 2003, representatives from the Army Environmental Policy Institute, USACE, EPA, and DTSC conducted a site walk in accessible areas of the parcel and MRSs ([Appendix B, Figure 8](#)). The participants received MEC recognition training and were escorted by a USACE OE Safety Specialist (OESS). No MEC was found during the site walk (USACE, 2003b).

USACE conducted site walks of the parcel and MRSs between February 23 and March 5, 2003. An OESS and typically two other persons conducted these site walks. The walks were recorded using a global positioning system (GPS) unit. The OESS, using a Schonstedt Model GA-52/Cx magnetometer, walked along open trails through the parcel and searched for metallic anomalies. If an anomaly was found, the OESS exposed the anomaly to determine if the item was munitions-related. The site walks covered approximately 10.5 miles over the roads and trails in and around Parcel E20c.1. GPS tracks and MEC or MD finds were recorded in the Fort Ord MMRP database. MEC reported during the site walks included:

- One M306 series HE 57 mm projectile found in the southeastern portion of the E20c.1 parcel. The item is not consistent with the past use of the parcel. However, 57 mm items have been found in the Impact Area across Eucalyptus Road during previous investigations ([Section 2.6.3](#)). The 57 mm projectiles are fired from recoilless rifles (direct fire weapon). From available information, it was not determined if the item was fired or a kick out from a demolition operation in the Impact Area.

MD identified during the site walks included:

- M11 series practice antitank rifle grenades in and around the MRS-24A area.
- MKII hand grenade fragments in and north of the MRS-24A area¹.
- M7 series 2.36-inch practice rocket at the eastern portion of the E20c.1 parcel. The item is not consistent with the past use of the parcel.

2.4.4 Shaw Site Walks 2003

In December 2003, Shaw Environmental, Inc. (Shaw) conducted site walks in the habitat area in the southwest portion of Parcel E20c.1 ([Appendix B, Figure 8](#)). The site walk team consisted of an unexploded ordnance (UXO) technician performing a visual and magnetometer survey and a

GPS technician recording the walked path along existing trails. The site walk magnetometer survey covered approximately 3.8 acres and did not identify any geophysical anomalies or military munitions items (Shaw, 2004).

2.4.5 Shaw Grid Investigation 2004

In 2004, Shaw conducted a systematic subsurface investigation with Schonstedts in 10 grids in the center of Parcel E20c.1 ([Appendix B, Figure 9](#)). The major objective of the investigation was to conduct additional sampling in the area where a 57 mm projectile (MEC) was found during USACE site walks in 2003. No MEC was found during the investigation. Of 517 geophysical anomalies investigated, 228 were identified as MD and were primarily fragments from MKII hand grenades (Shaw, 2004). MD from M17 series parachute rifle ground signal and M721 illumination mortar 60 mm projectile was also identified. Most of the military debris-related anomalies were in the two western-most sample grids.

2.4.6 USACE Site Walk 2006

USACE conducted a site walk in Parcel E20c.1 and the Investigation Area near MRS-24C in January 2006 ([Appendix B, Figure 8](#)). No MEC was identified during the site walk; however, grenade safety levers were located. GPS tracks were recorded in the Fort Ord MMRP database; the grenade safety lever locations were not input to the database.

2.4.7 USACE Grid Inspection 2006

In October 2006, USACE conducted a grid inspection in the northwestern portion of Parcel E20c.1 in response to agency concerns about the presence of grenade fragments. Ten readily accessible grids in two clusters of five grids were inspected with Schonstedts to evaluate the presence of MKII grenade fragments ([Appendix B, Figure 10](#)). The western cluster was located around the Investigation Area associated with MRS-24C. If 10 pieces of fragments were identified in one grid, the inspection stopped in that grid. MD finds were recorded in the Fort Ord MMRP database by grid only. No MEC was found during the inspection. MKII fragments were identified in all ten grids, and six of the ten grids contained 10 or more MKII grenade fragments. One fuze, two levers, and three pins (all MD) were found in one grid in the western cluster near the Investigation Area (Army, 2006b).

2.4.8 Shaw DGM Survey 2007

Shaw conducted a digital geophysical mapping (DGM) survey in the central portion of Parcel E20c.1 (a portion of which overlaps MRS-24A) in October 2007 as a response to agency concerns about grenade fragment distribution ([Appendix B, Figure 11](#)). Vegetation was cleared from approximately 7 acres of a 10-acre DGM investigation area, informally referred to as the “Grenade Frag” Area, in August 2007. An EM61 MK2 time-domain metal detector survey of

the cleared area was conducted in October 2007. Some isolated anomalies were detected, but there was no indication of widespread or concentrated fragments (Shaw, 2007).

2.4.9 USACE Site Walk 2008

USACE conducted an additional site walk in January 2008 ([Appendix B, Figure 8](#)). The site walk was performed with Schonstedts in the central portion of Parcel E20c.1 between grids where concentrated grenade fragments were identified in Shaw's 2004 grid sampling. Although MKII grenade fragments and expended small arms were observed, no MEC was identified. GPS tracks and MD finds were recorded in the Fort Ord MMRP database (Army, 2008a).

2.4.10 USACE Anomaly Investigation 2008

In March 2008, in cooperation with DTSC, USACE conducted an investigation of anomalies from Shaw's DGM survey. Thirty-five anomalies were selected for investigation with agency input, and were reacquired and excavated. One piece of MKII fragment was found, in addition to cultural debris ([Appendix B, Figure 11](#)) (Army, 2008b).

2.4.11 Shaw Test Plot 2008

Shaw conducted an instrument test survey over a seeded test plot at Parcel E20c.1 in September 2008 ([Appendix B, Figure 12](#)). The work was authorized by Field Work Variance (FWV) 025 issued to supplement the Work Plan for E20c.1 (Shaw, 2007). The purpose of the test plot was to evaluate the effectiveness of different methods for detecting intact grenades under Parcel E20c.1 field conditions. Surveys of the test plot were completed with EM61 MK2 time-domain metal detector, G-858 cesium vapor magnetometer, and Schonstedt magnetometer.

Inert intact grenades and grenade fragments were blind-seeded in a test plot adjacent to one of the grids where grenade fragments were found in previous investigations. Three geophysical methods were compared. Two methods, Schonstedt "mag and dig" and DGM using the EM61 had been employed previously at Parcel E20c.1. The third method involved DGM with a cesium vapor magnetometer that, compared with the EM61, employs a high sensitivity magnetometer with the sensor closer to the ground. An additional 50-ft by 30-ft section was added to the eastern edge of the original plot to compare the anomaly density within the seeded plot to a representative portion of the site that did not contain seeded items ([Appendix B, Figure 12](#)).

The test plot results were used to determine which method(s) should be used for any additional investigation of Parcel E20c.1. The Schonstedt survey produced more targets than the other methods. The test plot survey showed that the EM61, G-858, and Schonstedt can reliably detect intact MKII hand grenades at their expected depths (up to 12 inches below ground surface [bgs]) (Shaw, 2009). No MEC items were found during the survey.

2.4.12 Shaw DGM Survey 2009/2010

Shaw completed two DGM surveys at two grids within the Investigation Area considered to be the live grenade training area associated with MRS-24C ([Appendix B, Figure 13](#)). The work was authorized by FWV 032 and FWV 035 issued to supplement the Work Plan for E20c.1 (Shaw, 2007). The initial survey took place in October 2009 in a grid located at the north end of the Investigation Area. The area of investigation was then expanded and an additional survey was conducted in February 2010 in a grid comprising the remaining portion of the Investigation Area ([Appendix D; Shaw, 2010](#)).

During the combined DGM surveys, 335 targets were identified and investigated. Of the 335 targets, 222 targets were MKII hand grenade fragments and 6 targets were empty MKII hand grenade bodies (two grenade bodies were collocated at one target, for a total of seven grenade bodies found). The remaining targets were identified as cultural debris ([Appendix D; Shaw, 2010](#)).

As shown on [Figure 13 \(Appendix B\)](#), the majority of the targets were identified in the northern portion of the Investigation Area (Shaw, 2010). This is consistent with the CSM for a hand grenade range where grenades would be thrown from the south, downhill towards the north ([Section 3.1.2](#)).

2.5 Summary of Previous Investigations

A summary of previous investigations at MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1, is presented on [Figure 14 \(Appendix B\)](#).

2.5.1 MRS-24A

As indicated on [Figure 15 \(Appendix B\)](#), MEC and MD items have been identified at MRS-24A during investigations and site walks. MEC items identified within the MRS-24A boundary as identified in the ASR include one M2 series ignition cartridge, one M83 series illumination mortar 60 mm projectile, and one M43 series practice mortar 81 mm projectile ([Appendix C, Table 1](#)). These items are not consistent with historical use of the range because projectiles of this type were not associated with practice rifle grenade training ranges. The items are incidental items potentially related to training activities at the Impact Area, located to the south across Eucalyptus Road, where similar items have been found during various investigations ([Section 2.6.3](#)).

MD items found within the MRS-24A boundary included: MKII practice and fragmentation hand grenade fragments¹, M11 and M29 series practice antitank rifle grenades, M29 series practice 3.5-inch rockets, M7 series practice 2.36-inch rockets, M181 series practice subcaliber 14.5 mm projectile, M17 series parachute rifle ground signal, flame thrower igniter cartridge¹, and unknown fragments¹ ([Appendix C, Table 1](#)). Practice hand grenades, practice rifle grenades, and

grenade fragments would be expected in the area because of the type of practice grenade training conducted at the MRS. The igniter cartridge MD could be related to training activities in the Impact Area to the south, where several similar items were found south of the location of the igniter cartridge in MRS-24A. Practice rockets (MEC and MD) were found in large quantities in an Artillery Range located directly south of Parcel E20c.1 (and southeast of MRS-24A) within the Impact Area ([Section 2.6.3](#)).

2.5.2 MRS-24C

As indicated on [Figure 16 \(Appendix B\)](#), investigations and site walks at MRS-24C have been conducted within the ASR boundary and at the Investigation Area identified on historical aerial photographs, located south of the ASR MRS-24C boundary. No MEC has been reported within the boundaries of MRS-24C or the Investigation Area.

MD found within the ASR boundary of MRS-24C included grenade fragments and M228 series practice hand grenade fuzes. Within the Investigation Area, identified MD included MKII hand grenade fragments¹, seven empty MKII grenade bodies¹, grenade safety levers (not recorded in database), and unknown fragments¹ ([Appendix C, Table 2](#)).

2.5.3 Remainder of Parcel E20c.1

In the remaining portion of Parcel E20c.1, three MEC items were identified to the east of MRS-24A ([Appendix B, Figure 17; Appendix C, Table 3](#)). Two of the items were 57 mm projectiles, which are not consistent with known training identified for the parcel. One of the projectiles (M306 series target practice 57 mm projectile) was discovered along Eucalyptus Road during road realignment ([Section 2.6.4](#)) and the other (M306 series HE 57 mm projectile) was discovered within the southeastern portion of Parcel E20c.1. The items are considered to be incidental items potentially associated with training activities conducted in the adjacent Impact Area south of Eucalyptus Road, where several 57 mm items were identified during previous sampling ([Section 2.6.3](#)). Approximately twenty 57 mm projectile MEC and MD items have been discovered within a 1,000-ft radius of the 57 mm projectile located in the southeastern portion of Parcel E20c.1. A smoke rifle grenade was found in a foxhole in 1993. This item is considered incidental and does not indicate past training involving smoke rifle grenades. MD in the remaining portion of Parcel E20c.1 included MKII fragmentation hand grenade fragments, M11 series practice antitank rifle grenades, M7 series 2.36-inch practice rockets, M721 illumination mortar 60 mm projectile, AN-MK13 marine smoke and illumination signal, M19 series rifle parachute ground illumination signal, M125 series ground illumination signal, and M17 series parachute rifle ground signal ([Appendix B, Figure 18; Appendix C, Table 3](#)). Three of the signals were identified together buried in a trash pit located south of the Investigation Area. In addition, .30 and .50-caliber small arms¹ were identified.

Parcel E20c.1 includes an area that has been informally referred to as the “Grenade Frag” Area, investigated by the Shaw DGM survey in 2007. Grenade fragments were found in this area; however, there is no evidence grenade training occurred, as the photographic record indicates this area was heavily vegetated throughout the Fort Ord training history. Most of the grenade fragments were detected at a depth of less than 2 inches and, although the distribution could appear dense on [Figure 9 \(Appendix B\)](#), the highest density in any one grid was one piece of grenade fragment per 63 square ft. Only three grenade-related items were found east of the DGM area.

2.5.4 MEC Incidents

In February 1993, explosive ordnance disposal personnel responded to an incident in the northeastern portion of Parcel E20c.1. An M23 series smoke rifle grenade (MEC) and 100 rounds of small arms ammunition (SAA) were removed from what appeared to be a former foxhole (HLA, 1994).

In January 2008, an M306 series target practice 57 mm projectile (MEC) was identified within Parcel E20c.1 north of Eucalyptus Road during the road realignment ([Section 2.6.4](#)). The item location was recorded in the Fort Ord MMRP database (Army, 2008c).

2.6 Summary of Investigations at Surrounding Sites

2.6.1 Parcel E20c.1.1.1

Parcel E20c.1.1.1, approximately 81 undeveloped acres, is located immediately adjacent to the west of Parcel E20c.1 ([Appendix B, Figure 1](#)). Training activities identified on Fort Ord training facilities maps indicate that a portion of Parcel E20c.1.1.1 was used for RSOP training and target detection (Army, 2006a). MD found during site walks within the parcel during February and March 2003 included M11 series practice antitank rifle grenades, M29 series practice 3.5-inch rockets in a burial pit, M21A1 ground illumination signal, 3.5-inch motor¹, M2 tail fin assembly¹, and unknown fragments¹. No MEC was reported during site walks. In 2008, discarded military munitions (DMM) – two M18 series smoke hand grenades and an M69 series practice hand grenade – were identified at Parcel E20c.1.1.1 during the Eucalyptus Road realignment project (Army, 2008c).

With the exception of the practice rifle grenades and the 3.5-inch practice rockets, the items were single incidental items suggesting that the items were not present as a result of training activities within Parcel E20c.1.1.1. Parcel E20c.1.1.1 was designated as a Track 1 site requiring NFA related to MEC (Army, 2006a). The historical research and field investigation identified evidence of past training involving military munitions, and training at the site involved only the use of practice and pyrotechnic items that are not designed to cause injury.

2.6.2 Parcel E20c.2 and MRS-44EDC/PBC

Parcel E20c.2, approximately 33.2 undeveloped acres, is located immediately adjacent to the east of Parcel E20c.1 ([Appendix B, Figures 1 and 14](#)). The parcel has been transferred to FORA, in connection with the Environmental Services Cooperative Agreement (ESCA) project. Parcel E20c.2 is located within a portion of MRS-44, which is split into 2 parts: the Economic Development Conveyance (EDC) and the Public Benefit Conveyance (PBC) (USA, 2001). Investigation in MRS-44EDC is currently being conducted by FORA under the ESCA. MRS-44 was identified in 1996 when a USACE OESS reported inert fragments and a rotating band from a 37 mm HE projectile during a site visit. There is no historical record indicating a firing range in the vicinity of MRS-44EDC/PBC. MRS-44EDC/PBC was sampled in 1998-1999 using SS/GS and 100% grid sampling.

2.6.2.1 SS/GS Sampling

During SS/GS sampling conducted in May 1998, 128 occurrences of MEC or MD were recovered from four of 12 grids in MRS-44EDC. As identified in USA's report, one occurrence was determined to be MEC: an MKI illuminating hand grenade (USA, 2001).

2.6.2.2 100% Grid Sampling

In 1998-1999, 100% grid sampling was conducted in MRS-44EDC and PBC. Within the EDC portion, 20 sample grids were established due west of the PBC boundary. Within the PBC portion, 13 grids were established. As identified in USA's report, 45 occurrences of MEC or MD were recovered from sample grids within the two portions. Fourteen items were determined to be MEC. Within MRS-44EDC, MEC items included five M82 percussion primers and one M10 hand grenade fuze (DMM). Within MRS-44PBC, MEC items included two MK1 illuminating hand grenades, two M10 series hand grenade fuzes, two M18 smoke hand grenades, one M585 white star 40 mm projectile, and one M228 practice hand grenade fuze (USA, 2001).

2.6.2.3 Four-Foot Removal Operations

In September 1998, a 4-ft removal operation was conducted on 83 complete and partial grids within MRS-44 PBC. Work was completed in December 2000. As identified in USA's report, 39 MEC and MD items were encountered in the grids. Four items were determined to be MEC: two M18 smoke hand grenades, one MKI illuminating hand grenade, and one M228 practice hand grenade fuze (USA, 2001).

As identified in USA's report, 197 MD items were recovered from MRS-44EDC/PBC during SS/GS sampling, 100% grid sampling, and 4-ft removal operations. The MD items were determined to be of the following types: pull firing device, trip flares, projectile fuzes, hand grenade fuzes, 2.36-inch practice rockets, ground illumination signals, rifle grenades, hand grenades (smoke, practice, and fragmentation), projectiles (37 mm, 60 mm mortar, 75 mm,

81 mm mortar, 105 mm, and 4.2-inch mortar), and unknown fragments. Although there is no historical documentation indicating the use of the area as an impact area, the type of projectiles found at the parcel indicate that the parcel may have been an impact area. Based on the sampling results, a 4-ft removal action was recommended for the remainder of the site (USA, 2001).

2.6.2.4 Fuel Break and Four-Foot Removal Operations

In 1998, USA completed a 4-ft removal within a fuel break at the western boundary of MRS-44 EDC ([Appendix B, Figure 14](#)). Four MD items were identified during the fuel break 4-ft removal: M9 series antitank rifle grenade, M5 series release firing device, M306 series target practice 57 mm projectile, and M49 series HE mortar 60 mm projectile. No MEC was reported.

2.6.2.5 Additional MEC

In January 2008, an MKI 75 mm shrapnel projectile was identified at Parcel E20c.2. The item was determined to be MEC (Army, 2008c).

2.6.3 MRS-SEA.4

MRS-SEA.4, approximately 79 acres, is located south across Eucalyptus Road and is roughly coincident with USACE transfer parcel E23.2 ([Appendix B, Figure 1](#)). MRS-SEA.4 was transferred to FORA in connection with the ESCA project. MRS-SEA.4, along with MRS-SEA.1-3, was delineated based on transfer parcel boundaries. MRS-SEA.1-4 comprises the areas behind and between the firing ranges present at the time of base closure and identified historic ranges in the northwestern portion of the Impact Area. MRS-SEA.4 contained Ranges 18 (record firing), 46 (small arms), and 48 (weapons familiarization, sniper, mortar, machine gun). From January 2002 to March 2004, the following major site activities were conducted at MRS-SEA.1-4:

- A Time-Critical Removal Action, which entailed vegetation clearance operations and a surface removal of MEC (the selected removal action under the Action Memorandum).
- A Non-Time-Critical Removal Action, which entailed a 4-ft removal with analog or digital geophysical ordnance detection instruments on the five removal areas identified in the Notice of Intent.
- A 100% digital geophysical survey on all areas outside the removal areas.

During the removal actions and geophysical survey, 25 different types of MEC items were encountered at MRS-SEA.4. The types of munitions that have been found at MRS-SEA.4 that have also been found in MRS-24A, MRS-24C including the Investigation Area, or the remainder of Parcel E20c.1 as MEC or MD include:

- MKII practice and fragmentation hand grenades,

- M11 series practice antitank rifle grenades,
- M2 series ignition cartridges,
- M306 series HE and target practice 57 mm projectiles,
- M7 series practice 2.36-inch rockets,
- M29 series practice 3.5-inch rockets,
- M17 series parachute rifle ground signals,
- M19 series rifle parachute ground illumination signals, and
- M125 series ground illumination signals (Parsons, 2006).

2.6.4 Eucalyptus Road Realignment

The ESCA Remediation Program (RP) completed field activities in relation to the realignment of General Jim Moore Boulevard (GJMB) and Eucalyptus Road from December 2007 to July 2008 (ESCA RP Team, 2008). The scope of work for the realignment included:

- Clearing and grubbing of vegetated surface soils within areas that had previous MEC removal actions completed by the Army;
- Scraping and sifting of surface soils and/or excavating soils within the areas previously identified as special case areas (SCAs) by the Army where MEC removal actions could not be completed. A minimum of the top 6 inches of surface soils were scraped within the SCAs located in the roadway alignment and utility corridor. The SCAs were scraped to greater depths (generally 12 inches but in some cases down to 10 ft) where additional removal of soil was necessary to minimize the number of discrete anomalies from the subsequent DGM survey;
- Conducting a geophysical survey and investigating and removing target anomalies that potentially represented MEC from SCAs within the roadway alignment and utility corridor; and
- Conducting a geophysical survey and investigation and removing target anomalies that potentially represented MEC from the portion of the hillside west of GJMB within the roadway alignment.

The roadway alignment extended a length of approximately 6,400 linear ft along Eucalyptus Road on the northern edge of the Seaside Munitions Response Area, and encompassed portions of Parcel E20c.1 and MRS-SEA.4. The roadway alignment work area was defined as the width of the actual roadway and center median (varied from 100 to 200 ft wide) plus a 50-ft-wide work area on both sides of the roadway for a total approximate width of 200 to 300 ft. One M306 series target practice 57 mm projectile (unfuzed) was found north of the road within the roadway alignment clearing, inside Parcel E20c.1 ([Section 2.5.4](#)).

2.6.5 Surrounding Track 0 Areas and Track 1 Sites

Parcels E20c.1.2 and E20c.2.2 are located north of the northern tail of Parcel E20c.1 ([Appendix B, Figure 1](#)). The parcels were designated as Track 0 areas and no action is required

with regard to munitions response (Army, 2005c). Parcel E20c.1.2 contains cable television off-air equipment and several satellite receiver transmission dishes. Parcel E20c.2.2 contains a large aboveground water storage tank, an elevated water storage tower, and associated pumps and electrical generator. Based on a literature search that included the review of range control records, Fort Ord training facilities maps, aerial photographs, historical film footage, and historical archives searches and conducting interviews with former Fort Ord personnel, no evidence was found to indicate the use of military munitions on these parcels, and no military munitions investigations beyond the literature search (i.e., reconnaissance or sampling) have been performed. Both parcels were developed via ground disturbing activities (e.g., grading and excavating), during which no MEC was reported. The water storage facilities in Parcel E20c.2.2 were replaced in 2009. Construction personnel received MEC recognition training prior to the construction activities. There were no reports of MEC during construction activities.

MRS-49 is approximately 28 acres in size and overlaps portions of Parcels E20c.2.1, L23.5.1, and L31 ([Appendix B, Figure 1](#)). The site was reportedly used as a rifle grenade range in the 1940s and 1950s with use ending when the Officers' Club was built (Army, 2005d). During a site walk conducted in 2004, several items were found: an expended smoke signal, an expended smoke grenade, the candle housing for a 105 mm illumination projectile, and live and expended SAA. MRS-49 was categorized as a Track 1 site and evaluated in the Track 1 RI/FS, which recommended NFA regarding MR at MRS-49 (MACTEC, 2004). Based on review of existing information, MEC is not expected to be found at MRS-49, and in accordance with the Track 1 ROD, NFA related to MEC is required for this site. MRS-49 meets the Track 1, Category 3 criteria because historical research and field investigation (site walks) conducted at this site identified evidence of past training involving only practice and pyrotechnic items that are not designed to cause injury (Army, 2005a).

Parcels E20c.2.1, L23.5.1, and L31 are partially overlapped by MRS-49, which is located north of the northern tail of Parcel E20c.1 ([Appendix B, Figure 1](#)). Because the portions of Parcels E20c.2.1, L23.5.1, and L31 that lie within the boundary of MRS-49 were previously evaluated and determined to be Track 1, the remaining portions of the parcels were evaluated as Track 0 areas. The remaining portions of these parcels included approximately 1.8 acres of Parcel E20c.2.1, 1.7 acres of Parcel L31, and 13 acres of Parcel L23.5.1. Based on a literature search that included the review of range control records, Fort Ord training facilities maps, aerial photographs, historical film footage, and historical archives searches and conducting interviews with former Fort Ord personnel, no evidence was found to indicate the use of military munitions within the parcels that are outside of MRS-49 (Army, 2005d).

MRS-24B is 14.2 acres in size, and is located north of the main portion of Parcel E20c.1 and east-northeast of MRS-24C ([Appendix B, Figure 1](#)). Historical training maps from the ASR

indicated that the MRS was used as a practice hand grenade range in the 1940s. The Fitch Park housing development was built over the footprint of the MRS in the 1950s and has been used for military housing for more than 50 years. USA conducted an investigation in 1997. One MD item (M228 practice hand grenade fuze) was identified during the investigation. MRS-24B was designated Track 1, Category 3 because historical research and field investigations identified evidence of past training involving military munitions, and training at the site involved only the use of practice and pyrotechnic items that are not designed to cause injury (Army, 2005a).

3.0 Conceptual Site Model

A CSM is a description of a site and its environment that evolves as work on that site progresses. CSMs are developed for areas of interest such as MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1, to identify potential exposure pathways (ways in which humans may come into contact with MEC). This entails developing an understanding of the potential presence, nature, and extent of MEC and potential exposure pathways. Per USACE Engineering Manual 1110-1-1200 (USACE, 2003a), the identification of potential exposure pathways should result from the analysis of five categories of information (profiles) collected from the area of interest:

- (1) Facility – identification of military munitions origin (determined from sources such as historical records, land features, historical scars, military munitions previously encountered, and eyewitness accounts).
- (2) Physical – physical properties (e.g., terrain, vegetation, geology), which affect the location, movement, detectability, and recovery of military munitions.
- (3) Release – natural processes (e.g., erosion) or human activities (e.g., excavation, construction) that contribute to an increased accessibility of military munitions.
- (4) Land Use and Exposure – current and future use of the site and surrounding area, possible human receptors at or near a site, and the current and future activities that human receptors may engage in at or near a site in which they may be exposed to military munitions.
- (5) Ecological – type of habitat and species occurring in the habitat, disturbances, and potential exposure to military munitions. It should be noted that CSMs for MRSs primarily focus on the potential exposure of human receptors to military munitions as opposed to the habitat, as the habitat does not participate in activities that exposes it to military munitions.

The following subsections present the CSM for MRS-24A, MRS-24C including the Investigation Area, and Parcel E20c.1.

3.1 Facility Profile

The facility profile for Parcel E20c.1 consists of a practice rifle grenade training area (MRS-24A). In addition, the ASR identified a live grenade training area (MRS-24C) to the north, outside of the parcel boundary. However, historical aerial photographs indicate that the live grenade training area was probably located to the south of the MRS-24C boundary identified in the ASR, and partially within Parcel E20c.1 ([Appendix B, Figures 3, 4, and 5](#)). No other training areas were identified within Parcel E20c.1.

3.1.1 MRS-24A

MRS-24A was identified as a practice rifle grenade training area on historical maps from 1945 and 1946 (Army, 1945, 1946). The location was confirmed by a cleared area visible in various aerial photographs.

Range configuration information for practice rifle grenade training was obtained from *Policies and Procedures for Firing Ammunition for Training, Target Practice and Combat, Army Regulation 385-63* (Army, 1983). Descriptions for recent rifle grenade training were obtained from Technical Manual 43-0001-29 (Army, 1977), and information on WWII grenade launchers and available ordnance was obtained from *The American Arsenal* (Hogg, 2001). According to the policies and procedures in Army Regulation 385-63, live rifle grenades are fired behind a protective barrier equivalent to a screen of sandbags 0.5 meter thick or reinforced concrete walls 0.16 meter thick (Army, 1983). It is suspected that this would be simulated in the practice training area. The range for a rifle grenade depended on the rifle being used, the angle of fire, and how the grenade was fitted on the grenade launcher. Therefore, it is expected that targets would be placed at various distances to practice firing at different ranges. Because the practice rifle grenade is inert (cast iron body with stabilizer fin), no MEC associated with practice rifle grenade training would be expected.

3.1.2 MRS-24C Including the Investigation Area

MRS-24C was identified as a live grenade training area on historical maps from 1945 and 1946 (Army, 1945, 1946). The site boundary identified in the ASR is displaced to the north of where the grenade range appears to have been located based on a cleared area (the Investigation Area) visible in photographs and finds of grenade safety levers. The size of the cleared area identified in the aerial photographs, approximately 160 by 220 ft, is slightly larger than the size of a “live grenade practice course” (120-ft by 150-ft) used from World War I to the Vietnam time period. Common Army practices at the time indicated that a “live grenade practice course” consisted of individual throwing bays or a trench, with targets and an impact area approximately 75 ft in front of the throwing line. The course was laid out with a “ready line” located behind a barrier at least 5 ft high and a throwing area located a minimum of 45 ft in front of the barrier. Throwing bays were constructed from sandbags or concrete. Targets consisted of a circular outline, a crater, and/or a foxhole. The maximum danger area for hand grenades is 450 ft (USACE, 2006).

Live grenade training ranges were operated under strict guidelines to ensure safety of the trainees. Training would only have occurred in a designated area set up such that grenades could be observed. The suspected training area at MRS-24C (the Investigation Area) is located on a hill that slopes down from south to north. It is speculated grenades were thrown from behind a berm at the top of the hill. Traces of the berms are visible on the historical aerial photographs ([Appendix B, Figures 4 and 5](#)) and remnants are visible on the ground as of February 2010. As

per Army policies observed at the time, any dud grenades would have been policed and destroyed.

3.1.3 Remainder of Parcel E20c.1

Although MKII hand grenade fragments were identified in the remainder of Parcel E20c.1, there is no evidence to suggest the presence of additional ranges within the remainder of Parcel E20c.1 as the photographic record indicates this area was heavily vegetated throughout the Fort Ord training history. The suggested explanation for the fragments is that soil containing fragments may have been removed from the Investigation Area near MRS-24C and scattered in the heavily vegetated area.

3.2 Physical Profile

3.2.1 Vegetation

Parcel E20c.1 is vegetated with maritime chaparral, coastal scrub, and oak woodland. Central maritime chaparral is the most extensive natural community at Fort Ord, occupying approximately 12,500 acres in the south-central portion of the base. Oak woodlands are widespread at Fort Ord and occupy the next largest area, about 5,000 acres (MACTEC, 2004). In historical aerial photographs ([Appendix B, Figures 3, 4, and 5](#)), the majority of Parcel E20c.1 appears to be covered with trees except for the cleared former training areas and roads.

Outside of the areas cleared for fuel breaks, DGM investigations, and the Fitch Park housing development, the trees currently present at Parcel E20c.1 provide similar coverage around roads and training areas as observed on historical photographs, with the exception of the live grenade training area (the Investigation Area) that is no longer visible ([Appendix B, Figure 6](#)).

3.2.2 Terrain

Parcel E20c.1 consists of gently rolling terrain ranging from a low elevation of approximately 405 ft above mean sea level (amsl) at the northern side of the parcel near the Fitch Park housing development to approximately 470 ft amsl at the western and eastern sides of the parcel. The predominant topography of the former Fort Ord reflects morphology typical of the dune sand deposits that underlie the western and northern portions of the base (MACTEC, 2004).

The topography of MRS-24A as identified in the ASR is gently rolling with a low area trending northwest to southeast across the MRS. Elevations range from approximately 430 to 470 ft amsl. In the practice rifle grenade training area within MRS-24A, the topography is generally flat with a slight downslope to the west-northwest.

The topography of MRS-24C as identified in the ASR (outside of Parcel E20c.1) ranges from approximately 370 to 410 ft amsl. The northern portion of the MRS is relatively flat because of grading for the Fitch Park housing development. South of the development, there is an upslope

to the live grenade training area (the Investigation Area) and Parcel E20c.1. Topography in the live grenade training area (the Investigation Area) ranges from an elevation of 410 ft amsl (northeast) to 450 ft amsl (southwest).

3.2.3 Geology

Fort Ord is located within the Coast Ranges Geomorphic Province. The region consists of northwest-trending mountain ranges, broad basins, and elongated valleys generally paralleling the major geologic structures. In the Coast Ranges, older, consolidated rocks are characteristically exposed in the mountains but are buried beneath younger, unconsolidated alluvial fan and fluvial sediments in the valleys and lowlands. In the coastal lowlands, these younger sediments commonly interfinger with marine deposits (MACTEC, 2004).

Fort Ord is at the transition between the mountains of the Santa Lucia Range and the Sierra de la Salinas to the south and southeast, respectively, and the lowlands of the Salinas River Valley to the north. The geology of Fort Ord generally reflects this transitional condition; older, consolidated rock is exposed at the ground surface near the southern base boundary and becomes buried under a northward-thickening sequence of poorly consolidated deposits to the north (MACTEC, 2004).

Parcel E20c.1 is underlain by several hundred feet of eolian deposits consisting mostly of sand.

3.3 Release Profile

MEC and/or MD were found on or near the surface of MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1 during various site walks and investigations. If additional military munitions are present at the parcel, erosion or future excavations would likely increase their accessibility.

The suspected live grenade range, the Investigation Area, has been fully investigated with technology that was capable of detecting intact grenades, and no live grenades were found. The “Grenade Frag” Area within Parcel E20c.1 was investigated by the same process, during which no live grenades were found. No live grenades have been found in any of the subject areas during investigations or site walks.

3.4 Land Use and Exposure Profile

3.4.1 Land Use

Currently, the land encompassed by MRS-24A, the Investigation Area, and the remainder of Parcel E20c.1, bordered by Eucalyptus Road to the south and the Fitch Park housing development to the north, is undeveloped. The land that includes the subject areas is designated for “military enclave,” which could include housing, in the FORA Reuse Plan. The Monterey Peninsula Foundation was planning to develop a golf course and offices (called the “First Tee

Site”) on a 132-acre parcel encompassing a portion of Parcel E20c.1; however, the golf course development was cancelled. The property is classified as a development parcel under the HMP (USACE, 1997), which describes special land restrictions and habitat management requirements within habitat reserve and other areas. MRS-24C overlaps the Fitch Park housing development.

3.4.2 Exposure

The Fitch Park housing development, a residential neighborhood, is located north of MRS-24A, the Investigation Area, and Parcel E20c.1, and it overlaps MRS-24C. Parcel E20c.1 is also adjacent to Eucalyptus Road, located north of the Impact Area. Access to the subject areas is currently unrestricted. In the future, intrusive activities can be expected in the area as part of the reuse and development of the land. In addition, the development of the land could include residential housing so future residents could be living on parts of MRS-24A, the Investigation Area, and the remainder of Parcel E20c.1.

3.5 Ecological Profile

Natural resources of concern at MRS-24A, MRS-24C including the Investigation Area, and Parcel E20c.1, include sandmat manzanita, Monterey ceanothus, Monterey spineflower, Eastwood’s goldenbush, sand gilia, and the California black legless lizard. These resources are HMP-listed species associated with central maritime chaparral habitat or are considered threatened, rare, or species of concern by the federal government or the state of California (Shaw, 2007).

3.6 Potential Exposure Pathways Analysis

Based on the preceding profiles, MEC is not expected in MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1. However, the possibility of MEC cannot be ruled out; therefore, the potential exposure pathway is considered complete.

The following information is listed for the types of military munitions previously encountered and thus potentially remaining in MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1: (a) a description of the item, (b) how the item was designed to function, and (c) the likelihood the item would function if encountered and the type of injury that could result from the functioning of the item. The information is provided for practice rifle grenades, smoke rifle grenades, illumination signals, and MKII hand grenades, the primary items used and identified within MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1.

3.6.1 Practice Rifle Grenades

3.6.1.1 Description

The M11A2 antitank practice rifle grenade was available for use during the 1940s and 1950s. The M11A2 was designed for training in marksmanship. This item was an inert rifle grenade similar in shape and weight to the M9A1 HE antitank rifle grenade (Hogg, 2001).

3.6.1.2 Design for Functioning

Rifle grenades were designed to be fired from U.S. rifles and carbines by a launcher that is attached to the gun muzzle. A special blank cartridge, issued with the grenade, is required to complete the launching. The depth to which the launcher is inserted into the stabilizer tube determines the range attained by the fired grenade (Hogg, 2001).

3.6.1.3 Probability of Functioning

No explosive charge was associated with this training item. The practice rifle grenade is inert (cast iron body with a stabilizer fin).

3.6.2 Rifle Grenades (Smoke)

3.6.2.1 Description

The M20 and T6E1 smoke rifle grenades were used exclusively for screening purposes, whereas the M22 was designed for signaling and screening and the M23 was used only for signaling. The smoke rifle grenades consist of three basic parts: a steel stabilizer assembly, an integral fuze, and a body. The fuze is a mechanical impact-igniting type. The body is filled with a burning-type smoke charge that, in the M22 and M23, contains a dye to color the smoke. The surfaces of the smoke charge within the body are coated with a starter mixture to facilitate ignition. A nose-closing plug covers a small opening or air hole in the nose of the ogive (Army, 1994b).

3.6.2.2 Design for Functioning

The fuze of the M20 and T6E1 smoke rifle grenades functions on impact and ignites the hexachloroethane-zinc smoke mixture. The smoke mixture burns for approximately one minute, giving off a dense, white, non-toxic smoke through the emission holes in the base of the grenade body.

After being fired from a rifle equipped with a grenade launcher, the M22 functions by impact, causing the firing pin to strike the primer (like a small arms primer), which ignites the starter mixture charge, and in turn starts the smoke charge to burn. The smoke charge, consisting of baking soda, potassium perchlorate, sugar, and dye, burns for approximately 60 seconds.

The M23 smoke rifle grenade functions upon firing, emitting a stream of colored smoke (green, red, violet, or yellow) over the entire trajectory. Upon firing the grenade cartridge in the rifle, the grenade is launched and functions, as the flash from the grenade cartridge passes from the

rifle through orifices in the fuze to ignite the charge in the fuze. The igniting charge ignites the starter mixture charge, which ignites the smoke charge. The smoke charge begins to burn, generating colored smoke. Air entering the air hole in the nose of the grenade forces smoke out of holes in the base of the body, producing streamers of colored smoke. The smoke charge continues to burn, producing smoke over the entire trajectory of the grenade, and for a few seconds after striking the ground. The total burning time is approximately 12 seconds (Army, 1994b).

3.6.2.3 Probability of Functioning

It is unlikely that M20, M22, M23, or T6E1 smoke rifle grenades would function through casual contact (i.e., inadvertent and unintentional contact). This is supported by the following reasons: (1) the M20 and M22 smoke rifle grenades were designed to be functioned by a hard, nose-on impact with the ground or other hard target, and (2) the smoke rifle grenades would have been exposed to moisture, degradation, and weathering for many years, which would decrease the effectiveness of the components that cause it to function (Army, 1994b).

In the unlikely event that an M20, M22, M23, or T6E1 smoke rifle grenade was to function through casual contact, it would not be expected to result in serious injury or death. The type of injuries that could potentially be sustained from the functioning of a smoke rifle grenade would be burns from the burning smoke charge.

3.6.3 Illumination Signals

3.6.3.1 Description

Ground signals M17A1 to M22A1 series and M17A1B2 to M22A1B2 series were used for signaling by ground units. The signals are of the type that is launched from a rifle or carbine fitted with a launcher. They produce either a colored star supported by a parachute or a cluster of five free-falling stars. All of the signals are similar in appearance. The M17A1 to M22A1 series have aluminum bodies while the M17A1B2 to M22A1B2 series have steel bodies. The body is a cylinder with a closing cap at one end and a tail and fuze housing at the other end, which contains an expelling charge, a delay element, and a propelling charge. The tail is a hollow cylinder fitted with a circular fin. A cork plug with pull tape closes the finned end of the stabilizing tail. The pyrotechnic charge consists of a candle and its suspending parachute, or five-star charges. Quickmatch (a fast-burning fuse) carries ignition from the expelling charge to the candle or star charges (Navy, 1957).

The M125A1 green star cluster ground illumination signal consists of a five-star illuminant assembly and a rocket motor propulsion assembly contained in a hand-held aluminum launching tube. The base of the launching tube contains primer and an initiating charge (Army, 1994a).

3.6.3.2 Design for Functioning

Ground signals M17A1 to M22A1 series and M17A1B2 to M22A1B2 series are launched by grenade launcher M7 or M7A1 attached to a service rifle using Rifle Grenade Cartridge Caliber .30, M3, or they may be launched by Grenade Launcher M8 attached to a carbine using Carbine Grenade Cartridge Caliber .30, M6. When the grenade-launching cartridge is fired, the signal is projected and, to propel the signal higher, the propelling charge is ignited by flame from the fired cartridge. The delay element is ignited by the propelling charge and burns through to the expelling charge, which ignites the pyrotechnic charge and expels it from the body of the signal. The illuminant burns for 5 to 7 second (M18, M20 and M22 series) or 20 to 30 second (M17, M19, and 21 series) (Navy, 1957).

The M125A1 green star cluster ground illumination signal functions when the firing cap is placed on the initiator end in preparation for firing the signal, and the firing pin is aligned with the primer. Striking the primer with the firing pin fires the initiating charge to ignite the rocket propellant. As the rocket emerges from the launching tube, the fins extend for flight stability. Before rocket motor burnout at 200 ft, the black powder expelling charge is ignited, performing the two-fold function of expelling and igniting the five-star illuminant assemblies. Burning time is 6 to 10 seconds with burnout occurring at 250 to 300 ft above the ground (Army, 1994a).

3.6.3.3 Probability of Functioning

It is unlikely that M17A1 to M22A1 series and M17A1B2 to M22A1B2 series ground signals or the M125A1 green star cluster ground illumination signal would function through casual contact (i.e., inadvertent and unintentional contact) because the signals require a deliberate act to function. If fired and duded unburned, they would require a flame/heat source to initiate burning.

In the unlikely event that an M17A1 to M22A1 series and M17A1B2 to M22A1B2 series ground signal or M125A1 green star cluster ground illumination signal were to function through casual contact, it would not be expected to result in serious injury or death. The type of injuries that could potentially be sustained from the functioning of an illumination signal would be burns or blinding.

3.6.4 MKII Hand Grenades

3.6.4.1 Description

The MKII hand grenade was used to supplement small arms fire against the enemy in close combat. The grenade produces casualties by high velocity projections of fragments. The MKII grenade is pineapple shaped with deep serrations in its body. These serrations delineate fragmentation of the body when the grenade explodes. No safety clip was authorized for use with this grenade. The grenade body is made of cast iron and contains an HE filler. Assembled

to the body are a striker, striker spring, safety lever, safety pin with pull ring, and detonator assembly. The split end of the safety pin has an angular spread or diamond crimp (Army, 1977).

3.6.4.2 Design for Functioning

Removal of the safety pin permits release of the safety lever. When the safety lever is released, it is forced away from the grenade body by a striker acting under the force of a striker spring. The striker rotates on its axis and strikes the percussion primer. The primer emits a small, intense spit of flame, igniting the delay element. The delay element burns for 4 to 5 seconds and then sets off the detonator. The detonator explodes, thus igniting the explosive charge. The explosive charge explodes, rupturing the body and projecting fragments (Army, 1977).

3.6.4.3 Probability of Functioning

The MKII fragmentation grenade is designed to produce casualties by high velocity projections of fragments. In the unlikely event that an MKII fragmentation grenade was subjected to casual contact (i.e., inadvertent and unintentional contact), the contact may cause a hung cocked striker to impact the primer and initiate the firing train. Attempts to pull the safety pin of a discovered MKII fragmentation grenade could cause a detonation, resulting in serious injury or death. Additionally, attempts to disassemble a discovered MKII fragmentation grenade could cause a detonation from powder or explosive filler being trapped in the fuze threads. These grenades are well sealed and their contents are not likely to deteriorate over long time periods, depending upon climatic factors. Incidental contact with a MKII fragmentation grenade could cause serious injury or death (Army, 1977).

4.0 Site Evaluation

The available data (e.g., archival and reconnaissance data) regarding MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1, was reviewed and evaluated according to procedures described in the *Final Plan for Evaluation of Previous Work* (HLA, 2000). The evaluation process is documented through the completion of a series of checklists ([Appendix A](#)). This section presents a summary of the results of the checklist evaluation. It is divided into three sections: literature review, sampling methods review, and site walk review.

4.1 Literature Review

4.1.1 Type of Training and Military Munitions Expected

Two historical features in MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1, are identified from Fort Ord facilities and training maps:

- MRS-24A – Practice Rifle Grenade Training Area, and
- MRS-24C – Live Grenade Training Area.

No additional training areas involving the use of military munitions were identified within MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1 during the literature review. However, several MRSs were identified outside of the parcel during the literature review: the Impact Area (MRS-SEA.4) to the south; MRS-44 EDC to the east (Parcel E20c.2); MRS-49 (Parcels E20c.2.1, L31, and L23.5.1) to the north; and MRS-24B to the north.

4.1.1.1 MRS-24A, Practice Rifle Grenade Training Area

The Practice Rifle Grenade training area is identified on a 1945 facility map. Munitions expected at MRS-24A include practice rifle grenades and possibly smoke rifle grenades.

4.1.1.2 MRS-24C, Live Grenade Training Area

The Live Grenade training area is identified on a 1945 facility map. Although the ASR identified the boundary of MRS-24C outside of Parcel E20c.1, it is believed the boundary may have been incorrectly transposed to later maps and the actual training range is located south of the MRS-24C boundary identified during the literature review. Munitions expected at the Live Grenade training area include MKII hand grenades.

4.1.2 Subsequent Use of the Area

MRS-24A and the remainder of Parcel E20c.1 remain undeveloped. Military housing (Fitch Park housing development) was constructed immediately adjacent to the north of the parcel, overlapping a portion of MRS-24C, in the late 1950s and early 1960s. The ASR located

MRS-24C in the area of the Fitch Park housing development; however, interpretation of aerial photographs indicated the training area (“Investigation Area”) was located south of the development and partially within the boundary of Parcel E20c.1. Parcel E20c.1 is slated for future development.

4.1.3 Establishment of Boundaries

The establishment of the Parcel E20c.1 boundary is not based on any defined area of use. Instead, the boundary was established in the planning of future land transfers. The boundaries of MRS-24A and MRS-24C were identified from historical training area maps.

Investigations at MRS-24A were conducted within the boundary of the MRS as identified in the ASR. MEC and MD finds within the MRS-24A ASR boundary were consistent with what would be expected in a practice rifle grenade training area, confirming the ASR boundary. Although the boundary of the MRS appears to be larger than the primary range area, no recommendations are made to change the boundary of MRS-24A.

Initial investigations at MRS-24C were conducted within the boundary of the MRS as identified in the ASR; however, a review of historical aerial photography indicated the live grenade training area associated with MRS-24C was likely located to the south of the MRS within the Investigation Area, partially overlapping the boundary of Parcel E20c.1. Initial grid investigations conducted within the ASR boundary of MRS-24C indicated the presence of MKII hand grenade fragments. MKII hand grenade fragments were also identified outside of the ASR MRS boundary, primarily within the Investigation Area. Based on literature available from previous investigations, it is recommended the boundary of MRS-24C incorporate the boundaries of the Investigation Area as identified from historical aerial photography.

4.1.4 Summary of Literature Review Analysis

Based on the literature review, practice rifle grenade training was conducted at MRS-24A and live grenade training was conducted at MRS-24C or the Investigation Area during the 1940s and early 1950s. By the late 1950s, the area to the north of Parcel E20c.1 was developed for residential housing and the nearby training areas were located in the Impact Area south of Eucalyptus Road. No additional training areas involving the use of military munitions were identified within Parcel E20c.1.

Based on a review of available literature, no recommendations are made to change the boundary of MRS-24A. However, based on available literature for MRS-24C, a recommendation is made to modify the boundary to incorporate the limits of the Investigation Area.

4.2 Sampling Review

Previous investigations at MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1, include grid sampling conducted in 1996, 1997, and 2000; a grid

investigation conducted in 2004; a grid inspection conducted in 2006; a DGM survey conducted in 2007; an anomaly investigation and test plot conducted in 2008; and DGM surveys conducted in 2009 and 2010.

4.2.1 Sampling Results (Items Found)

As summarized in [Section 2.4](#), various investigations have been conducted in grids in MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1.

MEC items identified in MRS-24A during various investigations include one M43 series practice mortar 81 mm projectile, one M83 series illumination mortar 60 mm projectile, and M2 series ignition cartridge ([Appendix B, Figure 17](#)). The use of these projectiles is not consistent with past rifle grenade training practices at the MRS. However, the Impact Area is located across Eucalyptus Road to the south, and it is possible that the projectile items are related to training activities at the Impact Area because of the high quantities of similar items found within the Impact Area ([Section 2.6.3](#)). MD items found within the MRS-24A boundary include: MKII practice and fragmentation hand grenades and fragments, M11 and M29 series practice antitank rifle grenades, M181 series practice subcaliber 14.5 mm projectile, M7 series practice 2.36-inch rockets, M29 series practice 3.5-inch rockets, M17 series parachute rifle ground signals, a flame thrower igniter cartridge¹, and unknown fragments¹ ([Appendix B, Figure 18](#)). Based on review of available data, there is no evidence that the M19A1 WP rifle grenade was used at MRS-24A.

No MEC was found within the boundary of MRS-24C as identified on historical training area maps. During investigation of two grids located within the MRS-24C ASR boundary, 19 hand grenade fragments were found in each of the two grids. South of MRS-24C and within the Investigation Area, MD items included grenade fragments. To the south of the Investigation Area, three signals were found in a “trash pit” ([Appendix B, Figure 18](#)). A DGM investigation conducted within the Investigation Area identified seven empty grenade bodies and hundreds of grenade fragments (Shaw, 2010). No intact “live” grenades have been found in any investigation in MRS-24C or the Investigation Area.

During USA’s 1997 investigation of MRS-24C and surrounding areas, a portion of E20c.1 was investigated. Within the grid overlapping the Investigation Area, three expended signals (M125 series ground illumination signal, M19 series rifle grenade parachute ground illumination signal, and AN-MK13 marine smoke and illumination signal) were identified in a “trash pit” in the remainder of Parcel E20c.1 ([Appendix B, Figure 18](#)). During Shaw’s 2004 grid investigation in the center of Parcel E20c.1, MD included an M17 series parachute rifle ground signal, M721 illumination mortar 60 mm projectile, and MKII hand grenade fragments. During USACE’s 2006 grid inspection, MKII fragments were identified in ten grids, and six of the ten grids contained 10 or more MKII grenade fragments. One fuze, two levers, and three pins (all MD) were found in one grid in the western cluster near the Investigation Area. Shaw’s 2007 DGM

survey identified isolated anomalies, but no indication of widespread or concentrated grenade fragments. In 2008, USACE investigated anomalies from Shaw's 2007 DGM survey. Of 35 investigated anomalies, one piece of MKII fragment was found, in addition to cultural debris. The MD found during sampling activities are generally consistent with what would be expected based on past training practices at the parcel.

4.2.2 Data Management

Contractors performing MEC investigations or removals at Fort Ord are generally required to perform a 100% QC review of data before it is submitted to the Fort Ord MMRP Database. This review includes confirmation against grid records and review of terminology for consistency with MMRP database conventions. USACE then follows the QC review with a quality assurance (QA) review as detailed in Standard Operating Procedures provided in the *Final Track 1 Ordnance and Explosives Remedial Investigation/Feasibility Study* (MACTEC, 2004). Discrepancies are then researched and corrections made, if appropriate, prior to loading the data into the MMRP Database. During the QA/QC process, original field-assigned descriptions are assigned an "MMRP Description" in the MMRP Database. The MMRP Description assigns standard nomenclature (including a model series number) to original item descriptions. MEC items are reviewed closely and assigned an "MMRP Description"; MD items are not necessarily reviewed to the same level. In a proportion of cases there is no standard MMRP Description that can be applied to an item (typically MD) as described in a report, and the MMRP Database will contain only the original field description.

All MEC and MD listings presented in this Approval Memorandum were obtained from the Fort Ord MMRP Database. These are all standard MMRP Descriptions except where footnoted.

4.2.2.1 USA Environmental

USA collected data using SS/GS and grid sampling, as specified in work plans (USA, 2000a, 2000b). During SS/GS, the team was required to maintain a data log that contained findings relative to each anomaly dug. The data log included the location, nature, and any other data that could assist in the identification of MEC at the site.

During 100% grid sampling, the UXO supervisor followed behind the sweep line inspecting and verified the identification of the flagged items and recorded data on the type, nomenclature, and location of the MEC (USA, 2000a, 2000b).

UXO supervisors prepared individual records for each operating grid in the investigation area. The record consists of a series of sheets that are used to record data on the excavation of anomalies and to record data on MEC items encountered. The data was forwarded through the Senior UXO Supervisor to the Geographic Information System (GIS) Manager, who entered the data into the GIS and updated the project database. Data recorded in the field was done so in

accordance with standard survey practice. Copies of all field books, layout sheets, computation sheets, abstracts, and computer printouts were bound and labeled with USA's contact information as well as the number of the individual item (USA, 2000a, 2000b).

4.2.2.2 Shaw Environmental, Inc.

Shaw's geophysical records management plan for the investigations included four components: field survey records managements, DGM (sensor and survey data) data managements, GIS records management, and data processing/analysis records management (Shaw, 2004, 2007).

GPS methods were used to document field work and survey locations of MEC and MD. Data was collected in a database consistent with the existing Fort Ord GIS and data was provided in electronic deliverables compatible with the installation's existing software and hardware configurations. The GIS was developed using the ArcView™ system and used an Access database to control all developed site information. The ArcView™ GIS was used on a regular basis as the project proceeded and was delivered to the Government at the completion of each operation.

Positional information was captured through use of a Trimble survey-grade real time kinematic GPS or compatible systems. Data was referenced to the existing Fort Ord Master Grid System, which consists of medium and small grids (1,000-ft by 1,000-ft and 100-ft by 100-ft, respectively). Data collected and added to the GIS included:

- Grid boundaries,
- Location/description of MEC,
- MD recorded by weight by grid, and
- Other/unusual features (targets, drums, small arms, etc.) (Shaw, 2004, 2007).

4.2.2.3 USACE

During USACE's 2006 grid inspection, it was determined that the inspection in each grid would end when one MKII fragmentation hand grenade (MEC) or ten pieces of MKII fragmentation hand grenade fragments (MD) were identified in each grid. Ten 100-ft by 100-ft grids were established using a GPS, and quantities of grenade fragments were recorded for each grid. Individual MD locations were not recorded in the MMRP database (Army, 2006b).

Following completion of the Shaw DGM survey conducted in 2007, USACE investigated 35 anomalies within the survey area in 2008. The selection of the anomalies to be investigated was conducted by the MR BRAC Cleanup Team (BCT), with agency input. Investigated anomalies consisted primarily of cultural debris.

4.2.3 Site Boundaries Review

During previous investigations, the location of the training area within MRS-24A was confirmed. Grid sampling conducted within the boundary of MRS-24C as noted on training maps in the

ASR did not confirm the location of a grenade range, although hand grenade fragments were identified in two grids located within the MRS boundary ([Appendix B, Figure 16](#)). However, the finds of grenade safety levers in addition to review of aerial photography indicated that the range area of MRS-24C was located at the Investigation Area. Several investigations have been conducted in the Investigation Area including the 2009/2010 DGM survey during which all anomaly targets were intrusively investigated. The results of these investigations, as well as investigation conducted with the ASR boundary of MRS-24C, suggest that the MRS-24C boundary should be modified to incorporate the boundaries of the Investigation Area.

4.2.4 Equipment Review

The Schonstedt Model GA-52/Cx magnetometer was used during several of the sampling efforts. The Schonstedt instruments are passive dual flux-gate magnetometers that are highly sensitive magnetic locators that detect ferrous (iron) metal objects; however, they cannot detect non-ferrous metal objects (e.g., lead, brass, copper, and aluminum). Magnetometers make passive measurements of the earth's natural magnetic field; ferrous metal objects and rocks are detected because they produce localized distortions (anomalies) in the magnetic field. The Schonstedt magnetometers actually detect slight differences in the magnetic field (the "gradient") by means of two sensors mounted at a fixed distance apart within the instruments' staff. Because the magnetic response falls off (changes) greatly even over a short distance, a gradient magnetometer like the Schonstedt GA-52/Cx is especially sensitive to smaller, near-surface ferro-metal objects (Breiner, 1973).

The performance of the Schonstedt GA-52Cx magnetometer was evaluated as part of the Ordnance Detection and Discrimination Study (ODDS; Parsons, 2002). Studies were performed as part of ODDS to evaluate:

- Signatures of inert military munitions items suspended in air at varying orientations and distances from the geophysical sensor (static tests).
- The ability of various geophysical instruments to detect and discriminate between different military munitions items buried at various depths and orientations (seeded tests).
- Geophysical instrument performance at actual munitions response sites (field trial site testing).

The Schonstedt tools were not evaluated during the static tests. Therefore, only the seeded test results and field trial results were reviewed. During the seeded test, the Schonstedt Model GA-52/Cx detected between 64% and 85% of Type II items (Type II items included the M9 rifle grenade) buried up to 1 ft below the calculated penetration depth. Detection percentages for Type I items (Type I items included MKII hand grenades and signal illumination flares) buried up to 1 ft below the calculated penetration depth were 67% to 96%. The detection rate

percentages described in the ODDS vary according to the search radius used for the study (1.6 or 3.3 ft) and search lane widths (3 or 5 ft).

The detection rates for the Schonstedt Model GA-52/Cx were calculated for four of the six ODDS field trial sites. The calculated detection rates for the combined sites ranged from 97% to 99% depending on the search radius used for the calculation. A 5-ft lane width was used during the field trials.

Although not directly comparable to MRS-24A, MRS-24C and the Investigation Area, and Parcel E20c.1, the results of the ODDS indicate that the Schonstedt Model GA-52/Cx is capable of detecting ferrous surface and subsurface MEC if present in the surface or shallow subsurface.

Both EM61 MK2 and EM61 MK2A metal detectors were also used during the sampling efforts. The EM61 is a 4-channel high-sensitivity time-domain electromagnetic (EM) sensor designed to detect shallow ferrous and non-ferrous metallic objects with good spatial resolution and minimal interference from adjacent metallic features. Total domain EM sensors work by using an EM transmitter that generates a pulsed primary magnetic field in the earth, which induces eddy currents in nearby metallic objects. The eddy current decay produces a secondary magnetic field measured by the receiver coil of the EM61 MK2. Measurements are taken a relatively long time after the primary pulse at specified time gates that allows the current induced in the ground to have dissipated, leaving only the current in the metal to continue producing a significant secondary field (Geonics Limited, 2006). The EM61 MK2A is an updated version of the MK2 and operates on the same principles.

Shaw's 2008 test plot was conducted to evaluate the effectiveness of different methods for detecting intact grenades under Parcel E20c.1 field conditions. Inert intact grenades and grenade fragments were blind-seeded in a test plot adjacent to one of the grids where grenade fragments have been found in previous investigations. Three geophysical methods were compared. Two methods, Schonstedt "mag and dig" and DGM using the EM61, have been employed previously at Parcel E20c.1. The third method involved DGM with a G-858 cesium vapor magnetometer that, compared with the EM61, employs a high sensitivity magnetometer with the sensor closer to the ground (Shaw, 2009).

Prior to the survey, Shaw's QC geophysicist buried the seed items within the test plot and recorded locations with a GPS unit. The nature and locations of the seeded items were not disclosed to the survey team. All three survey methods produced target lists that resulted in the excavation of the six seeded MKII inert grenades.

The test plot survey showed that the EM61, G-858, and Schonstedt can reliably detect intact MKII hand grenades at their expected depths (up to 12 inches bgs). The Schonstedt can reliably detect MKII hand grenade fragments at their expected depths (up to 6 inches bgs). The G-858

detected some hand grenade fragments; the EM61 did not detect any hand grenade fragments during the survey (Shaw, 2009).

4.2.5 Sampling Methods Discussion

4.2.5.1 MRS-24A

Approximately 47% of the acreage comprising MRS-24A has been investigated by USA and Shaw. The methods used for sampling were sufficient to identify the expected munitions.

USA Environmental

USA conducted sampling in MRS-24A in 1996 and 2000 by establishing 5-ft-wide search lanes within 100-ft by 100-ft grids, using 100% grid sampling. For surface searches, all surface sweeps were performed under the direct supervision of a qualified UXO supervisor. Sweepers were spaced approximately 5 ft apart across the grid. When an item was encountered, the individual called out “hold the line,” and held up his/her hand. The line stopped while the UXO specialist inspected the item to determine if it was MEC or scrap and marked the item with the appropriate colored pin flag. As the team moved forward using the grid stakes as one sweep lane boundary, the person on the opposite end of the line marked the limit of the sweep lane with white pin flags. The flags became the guide for the return sweep and defined the limits of the previously cleared lane. This procedure was continued until the grid was completely swept. The UXO supervisor followed behind the sweep line inspecting and verifying the identification of the flagged items and recording data on the type, nomenclature, and location of the MEC. Upon completion of the grid sweep, the sweep team, under the direct supervision of the UXO supervisor, recovered and stockpiled metal scrap at a central location in the grid. Items marked with red pin flags were left in place for the Treatment Team (USA, 2000b).

For magnetometer searches, UXO technicians walked each search lane with a magnetometer. When an anomaly or metallic surface object was encountered, the technician stopped to investigate the anomaly. At sites where the team performed less than a 4-ft-deep removal, an anomaly detected deeper than 4 ft was flagged and left in place. Near-surface anomalies were excavated by carefully removing the overburden by using hand tools. Throughout the excavation, the UXO technician used a magnetometer to verify the location of the anomaly. When the overburden was removed to within 6 inches of the anomaly, the UXO technician removed the remaining earth using a trowel or other small digging implement. Some anomalies were more deeply buried and required excavation using heavy equipment. Prior to the arrival of the heavy equipment, the UXO supervisor ensured that a cleared entrance and egress path was available for the heavy equipment. Once on site, the heavy equipment was used to excavate the overburden to a depth not closer than 12 inches from the anomaly. The distance to the anomaly was checked during the excavation with a hand-held magnetometer. A UXO technician using hand tools removed the final 12 inches of overburden (USA, 2000b).

Shaw Environmental, Inc.

Shaw conducted a DGM survey in the northeast corner of MRS-24A, outside of the practice rifle grenade training area, in 2007. As per Shaw's work plan (Shaw, 2007), the survey was conducted in 100-ft by 100-ft grids, extending from Parcel E20c.1 into MRS-24A, using EM61 MK2. Because the grids are not oriented in the same direction as the MRS-24A boundary, some grids overlap the boundary of MRS-24A and Parcel E20c.1. As a result, the portions of the grids located at the boundary within MRS-24A are not standard 100-ft by 100-ft grids. Prior to the DGM survey, Schonstedt GA-52/Cx magnetometers were used after vegetation clearance and grid staking to remove items that would impede DGM surveys or pose an explosive hazard to personnel.

For the DGM survey, the area was investigated with an EM61 MK2 to locate MEC and MEC-like targets equivalent to the diameter of a MKII hand grenade. The survey was conducted using the EM61 MK2 connected to a GPS receiver to collect data in sub-parallel survey lines spaced 3 ft apart. Surveys were performed either north-south or east-west as the survey area dictated. All data traverses were brought into the GIS for verification of full coverage. The site geophysicist reviewed sensor and navigation data for accuracy, completeness, and data fidelity and verified that the data were complete and fell within the prescribed survey area. Geophysical data analysis began after execution of standard data pre-processing steps where field data were verified, cataloged, reviewed, and converted into XYZ files in North American Datum 83, California State Plane coordinates, Zone IV, US survey feet. All activities were documented on a Data Processing Log.

Targets were then detected via a two-step process: initial automated detection and operator-aided detection by a qualified geophysicist. The first step was automated target detection based on threshold analyses. Parameters controlling the selection of targets included proximity of adjacent targets, collocation of targets on other channels of data, size, and distribution of anomaly amplitudes. The second step was manual detection based on systematic visual search of raw and filtered data. At that stage, automatic target detections were modified, deleted, and/or added by the operator based on the proximity to surface features, utilities, and any non-MEC object whose response was seen in the data. The automated and operator target detection steps resulted in a target list and a set of target parameters, including X and Y coordinates, area, proximity to other targets, and signal strength statistics.

4.2.5.2 MRS-24C and Investigation Area

ASR MRS Location

Approximately 5% of the acreage comprising the MRS-24C boundary as shown in the ASR was investigated by USA Environmental, using SS/GS sampling. The methods used for sampling were sufficient to identify the expected munitions types.

USA conducted sampling in MRS-24C in 1997 using SS/GS. SS/GS is a statistical computer program that was used to characterize sites/grids through the use of only a percentage of the anomalies at a site/grid. Excavation of anomalies was performed in accordance with the direction on the GridStats computer program. Only 32% to 40% of flagged anomalies were investigated using this technique.

Based on an EPA review of the SS/GS methodology, several concerns were identified regarding the assumptions and design of the methodologies and their ability to adequately characterize MEC at a given site and assess associated risks. The main concerns identified included: (1) the conclusions tended to change from one statistical iteration to the next, (2) the rules regarding when to stop sampling were faulty, (3) the statistics were not effective in identifying MEC clusters within a sector, and (4) sector homogeneity versus MEC distribution should be verified (National Exposure Research Laboratory, 2000).

Although there were problems identified regarding the methodologies that guided the MEC characterization approach at a given site, the site-specific data that was collected during the SS/GS sampling at MRS-24C still provided valuable information that identified the presence and type of military munitions items at the site.

Investigation Area

A review of aerial photography indicated the range associated with MRS-24C was likely located south of the ASR MRS boundary, and further investigations were focused in the Investigation Area. One hundred percent of the acreage comprising the Investigation Area, likely the live grenade training area associated with MRS-24C, was investigated by USA, USACE, and Shaw. The methods used for sampling were sufficient to identify the expected munitions.

USA Environmental

USA conducted sampling in a portion of the Investigation Area south of MRS-24C in 1997 using SS/GS sampling, as described above for the ASR MRS-24C location. Sampling was conducted in a single grid that comprised a large portion of the southern half of the Investigation Area, and extended outside of the southwest corner of the Investigation Area.

USACE

USACE conducted a grid inspection in 2006 within three 100-ft by 100-ft grids comprising a portion of the Investigation Area. The grids were staked using GPS, and were searched by UXO technicians using Schonstedt magnetometers. Once 10 pieces of hand grenades fragments were identified in a single grid, the investigation within that grid stopped and the results were reported to the BCT (Army, 2006b).

Shaw Environmental, Inc.

Shaw conducted a DGM survey encompassing the entire acreage of the cleared area in 2009/2010. The survey was conducted using an EM61 MK2A in multiple passes in parallel lines spaced 2 ft apart. Traffic cones were placed at either end of each survey line and at three locations within the grid for guidance. Targets were initially selected automatically using Geosoft's Oasis Montaj target selection routine using a sum threshold of 14 millivolts (mV). Targets were then merged and adjusted manually. A total of 397 targets were selected from the EM61 MK2A data. Target reacquisition included two steps:

- Locating and flagging the original target using the GPS in areas where coverage was possible and using local coordinates where quality GPS coverage was unavailable.
- Using the EM61 MK2A to find the target peak and relocating the target to that peak.

Targets were reacquired using the four-channel sum, which was observed and recorded in the field. A radius of approximately 4 to 5 ft was searched during reacquisition. Once the final peak was located, pin flags used to mark anomalies were moved to the peaks. The offset between the original anomaly location and the reacquired location along with the final response values were recorded. Final reacquisition results were reviewed by Shaw QC. Seventy-two targets had a reacquisition value below 14 mV. Fourteen of these targets were chosen as QC digs. Four targets were the result of multiple picks on the same targets and were removed from the dig list.

Targets were excavated with the aid of Schonstedt magnetometers to pinpoint the source anomaly. Once items were recovered from the hole, their descriptions were logged. Targets were either denoted as MD, cultural debris, or other. Depths, weights, and item dimensions were logged. Then the item was removed and the hole was checked with the EM61 MK2A.

4.2.5.3 Remainder of Parcel E20c.1

Approximately 25% of the remainder of Parcel E20c.1 was investigated by Shaw and USACE.

Shaw Environmental, Inc.

Shaw conducted a grid investigation in the central portion of Parcel E20c.1 in 2004. Per Shaw's work plan (Shaw, 2003), sampling was conducted in ten 100-ft by 100-ft grids using Schonstedt GA-52/Cx magnetometers. UXO technicians conducted sweeps in approximately 5-ft-wide search lanes covering the entirety of each grid. Search lane boundaries were recorded by GPS. The UXO technicians surveyed the assigned search lanes using the Schonstedt magnetometers on the highest sensitivity setting. As anomalous areas were encountered, the technician placed a pin flag in the ground at the location of the anomaly, and then continued along the line until the search lane was complete. After the search lanes were completed, the GPS coordinates were recorded for each anomaly. All anomalies were then investigation by hand excavation.

Shaw conducted a DGM survey in the central portion of Parcel E20c.1 in 2007. The non-standard shape of the investigation area was based on the identification of grenade fragments in two grids during Shaw's 2004 investigation. Sampling procedures were conducted as described in [Section 4.2.5.1](#) for MRS-24A.

USACE

USACE conducted a grid inspection using Schonstedt magnetometers in 2006 within several grids located along the fuel break at the north and northwest boundaries of Parcel E20c.1. The work was conducted as described above for the Investigation Area ([Section 4.2.5.2](#)).

Thirty-five anomalies identified by Shaw during the DGM investigation were selected for investigation by USACE with agency input. The anomalies were located within three separate areas of Shaw's DGM investigation area. The anomalies were reacquired and excavated.

4.2.6 Quality Assurance/Quality Control

Various sampling methods have been employed at MRS-24A, MRS-24C including the Investigation Area, and Parcel E20c.1 by different contractors with different data quality objectives.

USA used procedures for controlling and measuring quality of all work performed during site activities (USA, 2000a, 2000b). All QC activities were performed and documented in accordance with applicable professional and technical standards, USACE requirements, and specific project goals and objectives. All site activities were monitored and documented for precision, accuracy, and completeness. Upon the completion of each job site activities, USA submitted an After Action Report (AAR). Each AAR includes a description of the site location, authorization for work performed, and information regarding the work accomplished on the site including type of MEC suspected versus what was encountered, a summary of MEC encountered, and a summary of QC results. The AARs contained, as a minimum, the following information:

- All original survey and mapping data.
- Detailed accounting of all disposed MEC and MEC-related materials.
- A description by grid or larger geographic area that documented either:
 - All potential MEC items located by magnetometer were excavated, or
 - Whether some potential MEC items located by magnetometer were, upon direction by the USACE OESS, not removed.
- Daily journals of all activities associated with the job site.
- A recapitulation of exposure data.
- All scrap turn-in documentation.

- All QC documentation.
- Color photographs depicting major action items and MEC discoveries.

The Shaw investigations at Parcel E20c.1 were conducted according to work plans approved by the BCT (consisting of the Army, EPA, and DTSC). The BCT also reviewed and provided comments on the investigation reports. In general, Shaw’s QC procedures included:

- Daily pre- and post-operation sensor instrument verification to ensure readings within manufacturer’s specifications.
- Checks of personnel to ensure that they are “magnetically clean.”
- Target reacquisition accuracy testing via repetitive acquisition of selected anomalies.
- Post-operation equipment checks to ensure equipment is serviceable, with damaged or malfunctioning gear identified.
- Independent review of anomalies and the resulting dig sheets prior to intrusive activity.
- Audit of field and records management procedures.
- Review of excavation results.
- Feedback from excavation results communicated at daily project status meetings.

QA was provided by USACE to assure that Shaw’s QC system was functioning as stated. Areas of QA included:

- Monitoring contractor field practices including announced and extemporaneous, unobtrusive observations.
- Reviewing and observing field ground control and GPS procedures to avoid georeferencing incompatibilities.
- Independently examining data files and anomaly maps.

4.3 Site Walk Review

As discussed in [Section 2.4](#), various site walks have been conducted at MRS-24A, the Investigation Area near MRS-24C, and the remainder of Parcel E20c.1. The USACE site walks were typically conducted by a 3-person team that included UXO-qualified personnel. The Shaw site walks were conducted by a 2-person team that included a UXO technician. The site walk teams visually searched the open, accessible portions of E20c.1 and the MRSs while operating geophysical detection instruments to locate subsurface geophysical anomalies.

During site walks, the teams performed a visual inspection of the area and typically recorded their path with a GPS unit. When an anomaly or site feature was encountered, the team created a new entry. At the end of each day of the site walks, the data collected in the field was

downloaded into a working GIS database file. The site walk data was downloaded and stored in the Fort Ord MMRP database.

The site walks were conducted to provide supplemental information regarding signs of training or the potential presence of munitions-related items. Items found during site walks include MD from practice rifle grenades, grenade fragments, grenade safety levers and safety pins, signaling pyrotechnics, and practice rockets (2.36-inch and 3.5-inch). In addition, two M306 series 57 mm projectiles (one HE, one target practice; [Appendix B, Figure 17](#)) were identified during site walks (one associated with the Eucalyptus Road realignment). The use of the projectiles is not consistent with practices in the MRSs in and near the parcel; therefore, it is presumed that the projectile items are related to training activities at the Impact Area located across Eucalyptus Road to the south.

Based on the items found during site walks, the walks were conducted in the appropriate accessible areas for MRS-24A, the Investigation Area near MRS-24C, and the remainder of Parcel E20c.1 using equipment that was capable of detecting the types of MEC expected in the area if present. Based on the site walks, no recommendations are made for changing the boundary of MRS-24A. The identification of grenade levers in the Investigation Area during a January 2006 site walk, in addition to sampling conducted in the area, indicates that the boundary of MRS-24C should be expanded to include the boundaries of the Investigation Area. No recommendations are made for changing the boundary of Parcel E20c.1 because it was established for land transfer purposes.

4.4 Conclusions

4.4.1 Use and Development

Based on the literature review and sampling results, MRS-24A was used for practice rifle grenade training and the Investigation Area south of MRS-24C was used for live grenade training. The Investigation Area was likely the range associated with MRS-24C, and it is recommended that the boundary of MRS-24C be modified to incorporate the Investigation Area. Within the remainder of Parcel E20c.1, an area of grenade fragments is located east of MRS-24A. Parcel E20c.1 is currently unoccupied and undeveloped, but it is adjacent to residential land (Fitch Park housing development). The parcel is slated for future development.

4.4.2 MEC Hazards

The following section addresses the potential hazards associated with MEC items found or suspected to be present at the parcel.

4.4.2.1 Training Items

Practice rifle grenades – No explosive charge is associated with the M11A2 practice antitank rifle grenade. The item is inert.

Smoke rifle grenades – It is highly unlikely that an M20, M22, M23, or T6E1 smoke rifle grenade would function through casual contact (i.e., inadvertent and unintentional contact). The smoke rifle grenades are designed to be functioned by a hard, nose-on impact with the ground or other target, and the grenades would have been exposed to moisture, degradation, and weathering for many years that could decrease the effectiveness of the components that cause them to function. In the unlikely event that one of the smoke rifle grenades was to function through casual contact, it would not be expected to result in serious injury or death. The types of injuries that could be sustained from the functioning would be burns from the burning smoke charge.

Illumination signals - It is unlikely that M17A1 to M22A1 series and M17A1B2 to M22A1B2 series ground signals or the M125A1 green star cluster ground illumination signal would function through casual contact (i.e., inadvertent and unintentional contact) because the signals require a deliberate act to function, and if fired and dudged unburned they would require a flame/heat source to initiate burning. In the unlikely event that an M17A1 to M22A1 series and M17A1B2 to M22A1B2 series ground signal or M125A1 green star cluster ground illumination signal were to function through casual contact, it would not be expected to result in serious injury or death. The type of injuries that could potentially be sustained from the functioning of an illumination signal would be burns or temporary blinding.

4.4.2.2 Projectiles

MEC items identified in MRS-24A and the remainder of Parcel E20c.1 during various investigations and site walks include two M306 series 57 mm projectiles (one HE, one target practice), one M43 series practice mortar 81 mm projectile, one M83 series illumination mortar 60 mm projectile, and one M2 series ignition cartridge ([Appendix B, Figure 17](#)). The presence of these projectiles is not consistent with past training practices suspected or known to have occurred at the MRS or parcel. These items are suspected to have originated from training conducted in the Impact Area because of the proximity to the Impact Area and the similarity to items found within the Impact Area. Given the extent of investigations conducted within MRS-24A, MRs-24C including the Investigation Area, and the remainder of Parcel E20c.1, it is considered unlikely that additional projectiles are present.

4.4.2.3 MKII Hand Grenades

Munitions debris from MKII hand grenades was found at various locations in MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1 (a portion of which overlaps MRS-24A). It is likely that a live grenade training range existed south of MRS-24C as identified in the ASR (the Investigation Area) because of the presence of grenade fragments and grenade items found during grid investigations; however, no intact grenades were found. An intact “live” MKII hand grenade would be very dangerous if encountered, however, the presence of intact grenades is unlikely as discussed below.

Fragments from MKII grenades were found at locations throughout MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1. These could appear to be densely distributed in some areas on maps ([Appendix B, Figure 9](#)) but the density is at most one fragment per 63 square ft. The areas where the fragments were found in the central portion of Parcel E20c.1 (“Grenade Frag” Area partially overlapping MRS-24A) is not suspected to be a training area because it has always been heavily vegetated and it is not likely that training with live grenades occurred in that type of terrain. The distribution of the fragments is not indicative of fragmentation from detonation of grenades within a “range” type use. A possible explanation for the presence of these fragments is that soil containing fragments was been removed from the Investigation Area near MRS-24C during construction activities and scattered in the heavily vegetated area.

The Shaw test plot investigated in 2008 demonstrated that an intact grenade would have been detected by the various geophysical surveys conducted at Parcel E20c.1. Approximately 70% of the 10-acre “Grenade Frag” Area, including the surrounding area where the fragments were found during previous sampling, was surveyed by Schonstedt or EM61 methods. No intact grenades were found.

The Investigation Area near MRS-24C suspected to have been used for live grenade training was fully investigated by grid sampling and site walks. Safety pins and levers indicative of grenade training were found; however, the items could be associated with either practice grenades or live grenades. The 2009/2010 DGM investigation identified seven empty MKII grenade bodies and hundreds of grenade fragments. The presence of grenade fragments within the Investigation Area, combined with the aerial photograph indicating absence of vegetation in the area and possible berms, indicates that live grenade training was likely conducted in this location. No intact HE grenades were found and it is considered unlikely that any are present given that the range would have been policed at the time of use. No live grenades were found during the 2009/2010 DGM investigation within the Investigation Area or any of the previous investigations in the vicinity.

5.0 Recommendations

This section presents recommendations for MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1. These recommendations are based on an evaluation of historical information and field investigation information from the subject areas, which is provided in [Section 4.0](#).

5.1 MRS-24A

Based on review of existing information, MEC is not expected in MRS-24A and NFA Related to MEC is appropriate for this MRS. MRS-24A, Practice Rifle Grenade Training Area, meets the Track 1, Category 3 criteria because historical research and field investigations identified evidence of past training involving military munitions, but training at this site involved only the use of practice and pyrotechnic items that are not designed to cause injury ([Appendix B, Figure 19](#)).

5.2 MRS-24C

MRS-24C as originally identified on maps in the ASR lies outside Parcel E20c.1. It is likely the range location as drawn on historical training maps was incorrectly transposed to later maps, and the boundary did not encompass the location of the “Live Grenade” training area associated with the MRS. The “Live Grenade” training area is believed to be located to the south of MRS-24C ([Section 5.3](#)). Therefore, the original ASR boundary of MRS-24C meets the Track 1, Category 1 criteria because there is no evidence to indicate military munitions were used at the site (suspected training did not occur) ([Appendix B, Figure 19](#)).

5.3 Investigation Area

A “Live Grenade” area is identified on a 1945 training area map. Historical aerial photographs show a cleared area south of MRS-24C in a size that corresponds with the size of a typical grenade range of the era, indicating the cleared area is likely the location meant to be encompassed by MRS-24C. One hundred percent of this area was intrusively investigated with no MEC items found. This area is referred to as the Investigation Area in this document. Evaluation of the Investigation Area is based on the following:

- In conjunction with empty bodies from MKII hand grenades, hundreds of pieces of grenade fragments were found during the 2009/2010 DGM investigation. Considered with the configuration of the cleared area visible on historical aerial photographs, there is sufficient evidence to indicate the Investigation Area was the location used for grenade training. The range is the suspected source for the grenade fragments found in Parcel E20c.1. The current interpretation is that soil containing the fragments was removed from the range and scattered in the heavily vegetated areas of the parcel.

- Live hand grenade ranges were operated in a controlled manner that recognized the hazards presented by dud or discarded grenades. Grenade training would have occurred in accordance with Army Standard Operating Procedures, under strict supervision in a well-defined area and all grenades would have been accounted for and policed. It is not likely that live grenades would have been left on the range.
- The cleared area identified on aerial photographs was investigated multiple times, most recently by a 100% DGM survey and intrusive investigation of all detected anomaly targets, completed in February 2010. No intact hand grenades (MEC) were found in this area, or in any other part of Parcel E20c.1. Geophysical detection technologies were tested to demonstrate that intact grenades would have been found if they were present.

Based on the information collected and the investigation work conducted to date, the Investigation Area is a variant from the track definitions ([Section 1.1](#)). Track 1 designation is normally applied to sites where the munitions used, if any, did not pose an explosive hazard or were not designed to cause injury. Track 2 applies to sites where MEC items were present and a MEC removal action was conducted; however, based on the understanding of how the range would have been operated and the 100% investigation that revealed no MEC, there is no evidence MEC is or was present after the timeframe of the identified training. Track 3 applies to areas where MEC items are known or suspected to be present, but MEC investigations have not been completed; however, MEC investigations are complete in the Investigation Area and no MEC items were found.

Based on this analysis, the Investigation Area is a Track 1, Category 3 variant site. The results of historical research and field investigations indicate previous training with military munitions at the site; however, per Army policies observed at the time, any dud or discarded grenades would have been removed and destroyed, therefore it is unlikely a MEC hand grenade would be present at the site. During the most recent investigation that covered the entire Investigation Area, no MEC item was found, while MD from HE hand grenades (fragments and empty grenade bodies) was found. Field investigations identified evidence of past training involving military munitions, but MEC is not expected to be present in the site ([Appendix B, Figure 19](#)).

Although MRS-24C and the Investigation Area have different recommendations for Track 1 categories, it is recommended the boundary of MRS-24C be modified to incorporate the Investigation Area, resulting in a total size of 10.1 acres for MRS-24C.

5.4 Remainder of Parcel E20c.1

Parcel E20c.1 includes MRS-24A and a portion of the Investigation Area, which are considered Track 1, Category 3 sites as described above. Within the remaining portion of Parcel E20c.1, no evidence of past training involving military munitions was found. Based on review of existing information, MEC is not expected in the remaining portion of Parcel E20c.1 and NFA Related to

MEC is appropriate. The remainder of Parcel E20c.1 meets the Track 1, Category 1 criteria because there is no evidence to indicate military munitions were used at the site ([Appendix B, Figure 19](#)).

5.5 Future Reuse

Existing information from various investigations indicates that MEC is not expected to be found within the boundaries of Parcel E20c.1 and NFA Related to MEC is appropriate for the areas evaluated. The planned reuse of Parcel E20c.1 is development, and MRS-24C including a portion of the Investigation Area is part of the Fitch Park housing development; therefore, digging and intrusive activities may occur in the future. No actionable risk was identified through the RI process; however, in the interest of safety, reasonable and prudent precautions should be taken when conducting intrusive operations in this area. As a basewide effort to promote safety and because of Fort Ord's history as a military base, the Army provides "MEC recognition and safety training" to anyone who requests that training. Construction personnel involved in intrusive operations at the former Fort Ord may attend the Army's "MEC recognition and safety training" to increase their awareness of and ability to identify MEC items. Section 1.3.1 (Description of the Remedy) of the Track 1 ROD describes the scope of the safety training. Construction personnel will contact an appropriate local law enforcement agency if a potential MEC item is encountered. The local law enforcement agency will arrange a response by the Army.

For MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1, the Army recommends construction personnel involved in intrusive operations attend the Army's "MEC recognition and safety training." To accomplish this objective, the Army will request notice from the future landowner of planned intrusive activities, and in turn provide MEC recognition and safety training to construction personnel prior to the start of intrusive work. The Army will provide MEC recognition and safety refresher training as appropriate.

Because MEC recognition and safety training is recommended for MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1, at the time of the next 5-year review (2012), the Army, in accordance with the Track 1 ROD, will assess whether the education program should continue. If information indicates that no MEC items have been found in the course of development or redevelopment of the area, it is expected that the education program may, with the concurrence of the regulatory agencies, be discontinued, subject to reinstatement if a MEC item is encountered in the future.

In the future, should any military munitions-related item be found within the parcel, the Army will take an appropriate immediate action (i.e., removing the item, recording the incident), and within 90 days of the discovery, submit a plan for appropriate follow-on action to EPA and DTSC for consultation, pursuant to Section 7.7(b) of the Fort Ord FFA.

6.0 References

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Appendix A Evaluation Checklists

**EVALUATION OF PREVIOUS WORK: MRS-24A
EVALUATION CHECKLIST PART 1: LITERATURE REVIEW**

TYPE OF TRAINING AND MILITARY MUNITIONS EXPECTED

1. Is there evidence that the site was used as an impact area (i.e., fired military munitions such as mortars, projectiles, rifle grenades or other launched ordnance)?

Yes	No	Inconclusive
X		

Sources reviewed and comments:
MRS-24A was identified as a practice rifle grenade training area (impact area).

References:
Revised Archives Search Report for Former Fort Ord, CA, U.S. Army Corps of Engineers (USACE), St. Louis District, 1997.

2. Is there historical evidence that training involved High Explosive (HE) or low explosive (LE) items?

Yes	No	Inconclusive
		X

Sources reviewed and comments:
Practice rifle grenades used at MRS-24A were inert grenades similar in shape and weight to HE antitank grenades, but did not contain HE or LE. The ASR discusses discovery of an item that was believed to be from a warhead of an HE rifle grenade, which prompted initial sampling.

References:
Revised Archives Search Report for Former Fort Ord, CA, USACE, St. Louis District, 1997.

3. Is there historical evidence that training involved use of pyrotechnic and/or smoke producing items (e.g. simulators, flares, smoke grenades) but not explosives?

Yes	No	Inconclusive
X		

Sources reviewed and comments:
Historical evidence indicates that training at MRS-24A Involved the use of pyrotechnic and smoke-producing items, as well as explosives.

References:
Revised Archives Search Report for Former Fort Ord, CA, USACE, St. Louis District, 1997.

Final OE Sampling After Action Report, Site OE-24A, USA Environmental, 2000.

**EVALUATION OF PREVIOUS WORK: MRS-24A
EVALUATION CHECKLIST PART 1: LITERATURE REVIEW**

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw Environmental, Inc. (Shaw), 2004.

DEVELOPMENT AND USE OF THE SURROUNDING AREA

4. Does subsequent development or use of the area indicate that military munitions would have been used at the site?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

MRS-24A is currently undeveloped and unused. However, several investigations have identified MEC and MD items at the site.

References:

Final OE Sampling After Action Report, Site OE-24A, USA Environmental, 2000.

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

5. Does use of the area surrounding the site indicate that military munitions would have been used at the site?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The Impact Area is located to the south of MRS-24A, across Eucalyptus Road. Firing at the Impact Area was to the south, away from the MRS.

References:

Final Technical Information Paper, MRS-SEA.1-4, Time-Critical Removal Action and Phase I Geophysical Operations, Parsons, 2006.

ESTABLISHMENT OF SITE BOUNDARIES

6. Is there evidence of training areas on aerial photographs that could be used to establish boundaries?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The training area within MRS-24A was identified on historical aerial photographs. The training area is located within the MRS boundary.

References:

Aerial photographs dated 1941, 1949, and 1951.

**EVALUATION OF PREVIOUS WORK: MRS-24A
EVALUATION CHECKLIST PART 1: LITERATURE REVIEW**

7. Is there evidence of training on historical training maps that could be used to establish boundaries?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The boundary MRS-24A was identified on an August 1945 map of Training Areas, and transposed to future maps.

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

8. Should current boundaries be revised?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The MRS-24A boundary should not be revised.

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

Aerial photographs dated 1941, 1949, and 1951.

RESULTS OF LITERATURE EVALUATION

Does the literature review provide sufficient evidence to warrant further investigation?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Based on the literature review for MRS-24A, the area was used for practice rifle grenade training. Due to the historical discovery of a possible “warhead of an HE rifle grenade,” further investigation may be necessary.

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

Aerial photographs dated 1941, 1949, and 1951.

**EVALUATION OF PREVIOUS WORK: MRS-24A
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

1. Is there evidence that the site was used as an impact area (i.e., fired military munitions such as mortars, projectiles, rifle grenades or other launched ordnance)?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

MRS-24A was identified as a Practice Rifle Grenade Training Area where launched practice items were used, and therefore was used as an impact area. Items consistent with practice rifle grenade training were identified during various sampling events.

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

Fort Ord Data MMRP Database.

2. Is there evidence that training involved High Explosive (HE) or Low Explosive (LE) items?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Sampling at MRS-24A identified practice rifle grenades. No explosive charge was associated with practice rifle grenades used at MRS-24A. There was no evidence of the high explosive version.

References:

Final OE Sampling After Action Report, Site OE-24A, USA Environmental, 2000.

Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California, Shaw, 2007.

3. Is there evidence that training involved use of pyrotechnic and/or smoke-producing items (e.g. simulators, flares, smoke grenades) but not explosives?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

MD from practice items identified at MRS-24A included signal pyrotechnics.

References:

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Fort Ord MMRP Database.

**EVALUATION OF PREVIOUS WORK: MRS-24A
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

4. Was sampling and/or reconnaissance performed within the appropriate area?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Sampling has occurred in portions of MRS-24A where training was likely conducted (based on historical aerial photographs) and where items were identified during site walks.

References:

Final OE Sampling After Action Report, Site OE-24A, USA Environmental, 2000.

Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California, Shaw, 2007.

5. Does sampling indicate MEC and/or MD are present at the site?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Three MEC items have been identified at MRS-24A: an M83 series 60mm illumination mortar projectile, an M43 series 81mm practice mortar projectile, and an M2 series ignition cartridge. MD items at MRS-24A include MKII practice and fragmentation hand grenade fragments, M11 and M29 series practice antitank rifle grenades, M181 14.5mm practice subcaliber projectile, M7 series 2.36-inch practice rockets, M29 series 3.5-inch practice rockets, M17 series parachute rifle ground signals, a flamethrower igniter cartridge, and unknown fragments.

References:

Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California, Shaw, 2007.

Fort Ord MMRP Database.

6. Were the type(s) of items found consistent with the type of training identified for the site?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The majority of the MD items found during site walks were consistent with the type of training identified for MRS-24A (practice rifle grenade training in the 1940s). The 60mm illumination and 81mm practice mortar projectiles (MEC) identified at MRS-24A are not consistent with past training activities at the MRS. However, the parcel is located near the Impact Area and these items are considered incidental items possibly related to training activities at the Impact Area.

EVALUATION OF PREVIOUS WORK: MRS-24A
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California, Shaw, 2007.

7. Were the type(s) of items found consistent with the era(s) in which training was identified?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The items found were consistent with the era of training.

References:

Final OE Sampling After Action Report, Site OE-24A. USA Environmental, Inc, 2000.

Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California, Shaw, 2007.

8. Was HE fragmentation found?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Fragments from MKII fragmentation (HE) and practice hand grenades (MD) were found at MRS-24A.

References:

Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California, Shaw, 2007.

9. Was HE found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

No HE items have been identified at MRS-24C.

References:

Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California, Shaw, 2007.

Fort Ord MMRP Database.

10. Was LE found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

LE was not found during the investigations.

References:

Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California, Shaw, 2007.

Fort Ord MMRP Database.

**EVALUATION OF PREVIOUS WORK: MRS-24A
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

11. Were pyrotechnics found?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

MD from an M17 series parachute rifle ground signal was found at MRS-24A.

References:

Final OE Sampling After Action Report, Site OE-24A, USA Environmental, 2000.

Fort Ord MMRP Database.

12. Were smoke-producing items found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Smoke-producing items were not found at MRS-24A.

References:

Fort Ord MMRP Database.

13. Were explosive items (e.g. rocket motors with explosive components, fuzes with explosive components) found?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

MEC items identified at MRS-24A included M83 series 60mm illumination mortar projectile, M43 series 81mm practice mortar projectile, and M2 series ignition cartridge.

References:

Fort Ord MMRP Database.

14. Do items found in the area indicate training would have included use of training with other energetic components?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The items found in MRS-24A do not indicate that training occurred with items containing other energetic components.

References:

Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California, Shaw, 2007.

Fort Ord MMRP Database.

15. Were items found in a localized area (possibly the remnants of a cleanup action)?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Items were not found in localized areas within MRS-24A.

**EVALUATION OF PREVIOUS WORK: MRS-24A
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

References:

Final OE Sampling After Action Report, Site OE-24A, USA Environmental, 2000.

Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California, Shaw, 2007.

Fort Ord MMRP Database.

16. Has the site been divided into sectors to focus on areas of common usage, similar topography and vegetation, and/or other unique site features?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Initial investigations were primarily conducted in the cleared area of MRS-24A. Otherwise, investigations were not conducted by sectors.

References:

Final OE Sampling After Action Report, Site OE-24A, USA Environmental, 2000.

Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California, Shaw, 2007.

17. Should current site boundaries be revised?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The current boundary of MRS-24A lines up within the approximate historical location, and the range area is located within the MRS boundary.

References:

Final OE Sampling After Action Report, Site OE-24A, USA Environmental, 2000.

Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California, Shaw, 2007.

18. Was equipment used capable of detecting items suspected at the site at the maximum expected depth?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The Schonstedt GA/52-Cx magnetometer was evaluated during seeded test in the ODDS. During the seeded test, the Schonstedt Model GA-52/Cx detected between 64% and 85% of Type II items (Type II items included rifle grenades) buried up to 1 ft below the calculated penetration depth. The EM61 metal detector was also evaluated during the ODDS. Seeded test results indicated that it is capable of detecting Type I items at shallow depths.

**EVALUATION OF PREVIOUS WORK: MRS-24A
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

USA investigated grids within MRS-24A to 4 feet using Schonstedts. Shaw conducted the DGM investigation in the northeast portion of the MRS using EM61.

References:

Final OE Sampling After Action Report, Site OE-24A, USA Environmental, 2000.

Final Ordnance Detection and Discrimination Study (ODDS) Report, Parsons, 2002.

Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California, Shaw, 2007.

19. Was equipment used capable of detecting the types of items (e.g., non-ferrous) suspected at the site?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Investigations at MRS-24A were conducted using Schonstedt magnetometers and EM61, which were determined to be capable of detecting rifle grenades during the ODDS.

References:

Final OE Sampling After Action Report, Site OE-24A, USA Environmental, 2000.

Final ODDS Report, Parsons, 2002.

Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California, Shaw, 2007.

20. Do the results of the ODDS indicate that items suspected at the site would have been detected by the instrument used at the time of investigation?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Although MRS-24A was not an ODDS test area, the results of the ODDS seeded test indicate that the items suspected at the site (practice rifle grenades) were detectable using a Schonstedt GA-52C/x. The ODDS seeded test also indicated that the suspected items were detectable using the EM61.

References:

Final ODDS Report, Parsons, 2002.

**EVALUATION OF PREVIOUS WORK: MRS-24A
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

21. Do results of the investigation indicate that suspected items could be detected with a high level of confidence at observed and expected depth ranges?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The suspected items are penetrating, but would be expected to be found at or near the ground surface based on the penetration study. The ODDS indicated that practice rifle grenades were detectable using a Schonstedt GA-52C/x and EM61.

References:

Final ODDS Report, Parsons, 2002.

22. Were all the instruments used to evaluate the site maintained and calibrated in accordance with associated work plan and manufacturer's specifications?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Field QC procedures for the detection instruments were documented in accordance with the work plans and manufacturer's specifications for activities conducted by USA Environmental, Shaw, and USACE.

References:

Final OE Sampling After Action Report, Site OE-24A. USA Environmental, Inc, 2000.

Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California, Shaw, 2007.

23. Based on the appropriate target density (UXO items per acre) has the minimal amount of sampling acreage been completed in accordance with the scope of work or contractor work plan?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Approximately 47% of MRS-24A has been investigated.

References:

Final OE Sampling After Action Report, Site OE-24A. USA Environmental, Inc, 2000.

Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California, Shaw, 2007.

Draft Final Technical Information Paper, E20c.1 Test Plot, Shaw, 2009.

Fort Ord MMRP Database.

**EVALUATION OF PREVIOUS WORK: MRS-24A
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

24. Based on sampling procedure (e.g., grids, transects, and/or random walks) was a percentage of the site completed to provide 95% confidence in a UXO density estimate, and if so provide total area investigated and the UXO density estimate.

Yes	No	Inconclusive
		X

Total Area:	13.9 Acres
UXO Density:	Not Calculated

Sources reviewed and comments:

Approximately 47% of MRS-24A has been investigated during all investigations. Three MEC items were identified: one M43 series 81mm practice mortar projectile, one M83 series 60mm illumination mortar projectile, and one M2 series ignition cartridge. The items were considered incidental items and not related to training activities at MRS-24A. A UXO density was not calculated.

References:

Final OE Sampling After Action Report, Site OE-24A.
USA Environmental, Inc, 2000.

Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California, Shaw, 2007.

Draft Final Technical Information Paper, E20c.1 Test Plot, Shaw, 2009.

25. What percentage of the anomalies were intrusively investigated?

Total % of Anomalies Investigated:	Unknown
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Sources reviewed and comments:

The percentage of anomalies intrusively investigated was not calculated. During USA's 100% grid sampling investigation, all anomalies were investigated intrusively. Following Shaw's 2007 DGM investigation, a total of 35 anomalies were selected for investigation by USACE, with agency input.

References:

Final OE Sampling After Action Report, Site OE-24A.
USA Environmental, Inc, 2000.

Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California, Shaw, 2007.

26. Was the appropriate data processing scheme used for the site, and how was the data processed?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The majority of the work was done with Schonstedts and EM61-MK2, which would essentially require recording descriptions of items encountered, depths,

EVALUATION OF PREVIOUS WORK: MRS-24A
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

locations, and other related information. The information was recorded by the contractor on a spreadsheet. The data has since been transferred to the Fort Ord MMRP database.

References:

Fort Ord MMRP Database.

27. Has the field data been collected and managed in accordance with the quality control standards established for the project?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

USA Environmental, Shaw, and USACE recorded the pertinent data in spreadsheets and the data has since been transferred to the Fort Ord MMRP database. Parsons UXOQC has performed QC of the data generated during USA's investigation. Shaw performed 100% QC review of data before submitting to the Fort Ord MMRP Database. USACE then performed QA of investigation data.

References:

Fort Ord MMRP Database.

RESULT OF SAMPLING EVALUATION

Does the sampling evaluation provide sufficient evidence to warrant further investigation?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

MRS-24A has been sufficiently Investigated to identify site boundaries, confirm types of training practices, and identify types of MEC and MD that could potentially be present. No further investigation is recommended.

References:

Final OE Sampling After Action Report, Site OE-24A.
 USA Environmental, Inc, 2000.

Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California, Shaw, 2007.

**EVALUATION OF PREVIOUS WORK: MRS-24A
EVALUATION CHECKLIST PART 3: SITE WALK EVALUATION**

TYPE OF TRAINING AND MILITARY MUNITIONS EXPECTED

1. Is there evidence that the site was used as an impact area (i.e., fired military munitions such as mortars, projectiles, rifle grenades or other launched ordnance)?

Yes	No	Inconclusive
X		

Sources reviewed and comments:
MRS-24A was identified as a practice rifle grenade range. Evidence of practice rifle grenade MD was observed during site walks.

2. Is there historical evidence that training involved High Explosive (HE) or low explosive (LE) items?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
Only MD from practice rifle grenades, which do not contain HE or LE, was identified during site walks.

3. Is there historical evidence that training involved use of pyrotechnic and/or smoke producing items (e.g. simulators, flares, smoke grenades) but not explosives?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
Only MD from practice rifle grenades (not pyrotechnic or smoke producing items) was identified during site walks.

DEVELOPMENT AND USE OF THE SURROUNDING AREA

4. Does subsequent development or use of the area indicate that military munitions would have been used at the site?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
Site walks confirmed that MRS-24A is undeveloped and did not produce any indication of subsequent activity related to the use of military munitions.

5. Does use of the area surrounding the site indicate that military munitions would have been used at the site?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
The Impact Area is located to the south of MRS-24A, across Eucalyptus Road. Firing at the Impact Area was to the south, away from the MRS.

**EVALUATION OF PREVIOUS WORK: MRS-24A
EVALUATION CHECKLIST PART 3: SITE WALK EVALUATION**

ESTABLISHMENT OF SITE BOUNDARIES

6. Is there evidence of training areas on aerial photographs that could be used to establish boundaries?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

A cleared area on aerial photographs from 1941, 1949, and 1951 appears to correspond to the training area for MRS-24A, although the cleared area is smaller than the MRS boundary.

7. Is there evidence of training on historical training maps that could be used to establish boundaries?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The boundary of MRS-24A was identified on an August 1945 map of Training Areas, and transposed to future maps.

8. Was the site walk performed within appropriate area?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Reconnaissance of MRS-24A was conducted throughout the MRS, and identified several MD items.

9. Does reconnaissance (site walk) indicate MEC and/or MD are present at the site?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Only MD from practice rifle grenades has been identified at MRS-24A during site walks.

10. Were the type(s) of items found consistent with the type of training identified for the site?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The MD items found at MRS-24A during site walks were consistent with the type of training identified for MRS-24A (practice rifle grenades in the 1940s).

11. Were the type(s) of items found consistent with the era(s) in which training was identified?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The items found were consistent with the era of training.

**EVALUATION OF PREVIOUS WORK: MRS-24A
EVALUATION CHECKLIST PART 3: SITE WALK EVALUATION**

12. Was HE fragmentation found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
No HE fragmentation was identified at MRS-24A during site walks.

13. Was HE found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
No HE was identified at MRS-24A during site walks.

14. Was LE found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
No LE was identified at MRS-24A during site walks.

15. Were pyrotechnics found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
No pyrotechnics were identified at MRS-24A during site walks.

16. Were smoke-producing items found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
No smoke-producing items were identified at MRS-24A during site walks.

17. Were explosive items found (e.g. rocket motors with explosive components, fuzes with explosive components)?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
No explosive items were identified at MRS-24A during site walks.

18. Do items found in the area indicate training would have included use of training items with energetic components?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
The items found in MRS-24A do not indicate that training occurred with items containing other energetic components.

19. Were items found in a localized area (possible the remnants of a cleanup action)?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
Items were not found in a localized area within MRS-24A.

EVALUATION OF PREVIOUS WORK: MRS-24A
EVALUATION CHECKLIST PART 3: SITE WALK EVALUATION

20. Is it appropriate to divide the site into sectors to focus on areas of common usage, similar topography and vegetation, and/or unique site features?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
 Division of the MRS is not needed.

21. Should site boundaries be revised?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
 The boundary of MRS-24A lines up within the approximate historical location, and the range area is located within the MRS boundary.

22. Has the field data been collected and managed in accordance with quality control standards established for the project?

Yes	No	Inconclusive
X		

Sources reviewed and comments:
 Site reconnaissance by USACE and Shaw was conducted in accordance with EM-1110-1-4009, and MD locations are recorded in the Fort Ord database.

RESULT OF RECONNAISSANCE EVALUATION

Does the site walk evaluation provide sufficient evidence to warrant further investigation?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
 Based on the site walk review for MRS-24A, the area was used for practice rifle grenade training. The information coincides with interpretation of aerial photographs and investigations, and the results of the site walk review do not indicate that any additional investigation is necessary.

**EVALUATION OF PREVIOUS WORK: MRS-24C
EVALUATION CHECKLIST PART 1: LITERATURE REVIEW**

TYPE OF TRAINING AND MILITARY MUNITIONS EXPECTED

1. Is there evidence that the site was used as an impact area (i.e., fired military munitions such as mortars, projectiles, rifle grenades or other launched ordnance)?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
MRS-24C was not used as an impact area (identified as a live grenade training area).

References:
Revised Archives Search Report for Former Fort Ord, CA, U.S. Army Corps of Engineers (USACE), St. Louis District, 1997.

2. Is there historical evidence that training involved High Explosive (HE) or low explosive (LE) items?

Yes	No	Inconclusive
X		

Sources reviewed and comments:
MKII fragmentation (HE) grenades were likely used at the live grenade training area associated with MRS-24C (the Investigation Area), and sampling reports indicate that grenade fragments have been identified with the boundary of MRS-24C.

References:
Revised Archives Search Report for Former Fort Ord, CA, USACE, St. Louis District, 1997.

Technical Manual, Army Ammunition Data Sheets for Grenades. TM 43-0001-29, U.S. Department of the Army. 1977.

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw Environmental, Inc. (Shaw), 2004.

3. Is there historical evidence that training involved use of pyrotechnic and/or smoke producing items (e.g. simulators, flares, smoke grenades) but not explosives?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
Historical evidence does not indicate that pyrotechnic and/or smoke-producing items were used at MRS-24C.

**EVALUATION OF PREVIOUS WORK: MRS-24C
EVALUATION CHECKLIST PART 1: LITERATURE REVIEW**

References:

Revised Archives Search Report for Former Fort Ord, CA, USACE, St. Louis District, 1997.

DEVELOPMENT AND USE OF THE SURROUNDING AREA

4. Does subsequent development or use of the area indicate that military munitions would have been used at the site?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

A portion of MRS-24C overlaps the Fitch Park Housing Development (military housing).

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

5. Does use of the area surrounding the site indicate that military munitions would have been used at the site?

Yes	No	Inconclusive
		X

Sources reviewed and comments:

Other historical grenade training ranges were identified near MRS-24C. MRS-24A, a practice rifle grenade training area, is located to the south. MRS-24B, a practice hand grenade training area, is located to the east. Therefore, it is possible that military munitions would have been used at MRS-24C as well.

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

ESTABLISHMENT OF SITE BOUNDARIES

6. Is there evidence of training areas on aerial photographs that could be used to establish boundaries?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The training areas likely associated with MRS-24C was identified on historical aerial photographs. A cleared area (the Investigation Area) south of MRS-24C is visible on historical aerial photographs and corresponds with the size of a grenade range, which is the designation for MRS-24C; however, with the exception of a small corner, it is not located within the

**EVALUATION OF PREVIOUS WORK: MRS-24C
EVALUATION CHECKLIST PART 1: LITERATURE REVIEW**

boundary of MRS-24C. No other cleared areas of size corresponding to a grenade range are visible within the boundary of MRS-24C.

References:

Aerial photographs dated 1941, 1949, and 1951.

7. Is there evidence of training on historical training maps that could be used to establish boundaries?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The boundary of MRS-24C was identified on an August 1945 map of Training Areas and was transposed to future maps.

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

8. Should current boundaries be revised?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Based on aerial photograph interpretation, an apparent training area (Investigation Area) is identified to the south of MRS-24C, outside the MRS boundary. The size of the training area on historical aerial photographs corresponds to the size of a grenade range, which is the designation for MRS-24C from the ASR. The boundary of MRS-24C should be revised to include the Investigation Area to the south.

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

Aerial photographs dated 1941, 1949, and 1951.

RESULTS OF LITERATURE EVALUATION

Does the literature review provide sufficient evidence to warrant further investigation?

Yes	No	Inconclusive
		X

Sources reviewed and comments:

Based on the literature review for MRS-24C, the area was used for live hand grenade training. However, the location of the range as identified on training maps does not correspond to the location as identified through aerial photograph interpretation. Additional investigation for MRS-24C should be concentrated in the cleared area (Investigation Area).

EVALUATION OF PREVIOUS WORK: MRS-24C
EVALUATION CHECKLIST PART 1: LITERATURE REVIEW

References:

Revised Archives Search Report for former Fort Ord,
CA, USACE, St. Louis District, 1997.

Aerial photographs dated 1941, 1949, and 1951.

**EVALUATION OF PREVIOUS WORK: MRS-24C
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

1. Is there evidence that the site was used as an impact area (i.e., fired military munitions such as mortars, projectiles, rifle grenades or other launched ordnance)?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

MRS-24C was identified as a Live Hand Grenade Training area where items were not launched, and therefore was not an impact area.

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

2. Is there evidence that training involved High Explosive (HE) or Low Explosive (LE) items?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

MD from MKII fragmentation hand grenades indicates that they were likely used at MRS-24C, but at the location of the Investigation Area to the south of the MRS boundary.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Technical Information Paper, E20c.1 Test Plot, Shaw, 2009.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

3. Is there evidence that training involved use of pyrotechnic and/or smoke-producing items (e.g. simulators, flares, smoke grenades) but not explosives?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Sampling at MRS-24C did not indicate the presence of pyrotechnic and/or smoke-producing items within the footprint of MRS-24C.

**EVALUATION OF PREVIOUS WORK: MRS-24C
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

4. Was sampling and/or reconnaissance performed within the appropriate area?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Within MRS-24C, initial sampling efforts were conducted within the MRS boundary and outside to the south at the Investigation Area.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

5. Does sampling indicate MEC and/or MD are present at the site?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

No MEC items have been identified at MRS-24C. MD Items identified within the boundaries of MRS-24C are consistent with grenade training.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

Fort Ord MMRP Database.

6. Were the type(s) of items found consistent with the type of training identified for the site?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

MD items found during sampling were consistent with the type of training identified for MRS-24C; however, the items were not found in high quantities within the MRS boundary.

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

Fort Ord MMRP Database.

7. Were the type(s) of items found consistent with the era(s) in which training was identified?

Yes	No	Inconclusive
X		

**EVALUATION OF PREVIOUS WORK: MRS-24C
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

Sources reviewed and comments:

The items found at MRS-24C were consistent with the era of training (live grenade training in the 1940s).

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

8. Was HE fragmentation found?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Fragments from MKII fragmentation (HE) hand grenades (MD) were found at MRS-24C.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

Fort Ord MMRP Database.

9. Was HE found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

No HE was found during sampling at MRS-24C.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

Fort Ord MMRP Database.

10. Was LE found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

LE was not found during sampling at MRS-24C.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

Fort Ord MMRP Database.

11. Were pyrotechnics found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Pyrotechnics were not found during sampling within the footprint of MRS-24C.

**EVALUATION OF PREVIOUS WORK: MRS-24C
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

Fort Ord MMRP Database.

12. Were smoke-producing items found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Smoke-producing items were not found during sampling within MRS-24C.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

Fort Ord MMRP Database.

13. Were explosive items (e.g. rocket motors with explosive components, fuzes with explosive components) found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Explosives items were not found during sampling at MRS-24C.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

Fort Ord MMRP Database.

14. Do items found in the area indicate training would have included use of training with other energetic components?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The items found in MRS-24C during sampling do not indicate that training occurred with items containing other energetic components.

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

Fort Ord MMRP Database.

15. Were items found in a localized area (possibly the remnants of a cleanup action)?

Yes	No	Inconclusive
	X	

**EVALUATION OF PREVIOUS WORK: MRS-24C
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

Sources reviewed and comments:

Items were not found in localized areas within MRS-24C.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

Fort Ord MMRP Database.

16. Has the site been divided into sectors to focus on areas of common usage, similar topography and vegetation, and/or other unique site features?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The site was not divided into sectors for investigation.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

Fort Ord MMRP Database.

17. Should current site boundaries be revised?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The Investigation Area should be incorporated in the boundary of MRS-24C. The Investigation Area corresponds to a cleared area identified in aerial photographs that is the size of a live grenade range (the designation for MRS-24C).

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

Draft Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

18. Was equipment used capable of detecting items suspected at the site at the maximum expected depth?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The Schonstedt GA/52-Cx magnetometer was evaluated during seeded test in the ODDS. Detection percentages for Type I items (Type I items included MKII hand grenades) buried up to 1 ft below the calculated penetration depth were 67% to 96%. The EM61 metal detector was also evaluated during the ODDS. Seeded test results indicated that it is capable of detecting Type I items.

**EVALUATION OF PREVIOUS WORK: MRS-24C
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

A test plot was performed by Shaw to verify that the Schonstedt GA/52-Cx magnetometer and EM61 metal detectors are capable of detecting intact grenades expected at the site.

References:

Final Ordnance Detection and Discrimination Study (ODDS) Report, Parsons, 2002.

Draft Final Technical Information Paper, E20c.1 Test Plot, Shaw, 2009.

19. Was equipment used capable of detecting the types of items (e.g., non-ferrous) suspected at the site?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Investigations at MRS-24C were conducted using Schonstedt magnetometers, which were determined to be capable of detecting MKII grenades during the ODDS. In addition, Shaw conducted a test plot to confirm that the Schonstedt magnetometers could detect MKII grenades to expected depths. The test plot included the use of the Schonstedt GA/52-Cx, which detects ferrous metallic objects, and the EM61 metals detector, which is designed to detect ferrous and non-ferrous metallic objects.

References:

Final ODDS Report, Parsons, 2002.

Draft Final Technical Information Paper, E20c.1 Test Plot, Shaw, 2009.

20. Do the results of the ODDS indicate that items suspected at the site would have been detected by the instrument used at the time of investigation?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Shaw performed a test plot analysis to verify that the selected instruments used at the time of the investigation could detect the suspected items (intact grenades) under E20c.1 field conditions.

References:

Draft Final Technical Information Paper, E20c.1 Test Plot, Shaw, 2009.

21. Do results of the investigation indicate that suspected items could be detected with a high level of confidence at observed and expected depth ranges?

Yes	No	Inconclusive
X		

**EVALUATION OF PREVIOUS WORK: MRS-24C
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

Sources reviewed and comments:

The test plot indicated that the Schonstedt GA/52-Cx magnetometer, EM61, and G858 magnetometer can detect the suspected items (intact grenades) to their expected depth. The test plot also indicated that the Schonstedt can reliably detect grenade fragments.

References:

Draft Final Technical Information Paper, E20c.1 Test Plot, Shaw, 2009.

22. Were all the instruments used to evaluate the site maintained and calibrated in accordance with associated work plan and manufacturer's specifications?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Field QC procedures for the detection instruments were documented in accordance with the work plans and manufacturer's specifications for activities conducted by USA Environmental.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

23. Based on the appropriate target density (UXO items per acre) has the minimal amount of sampling acreage been completed in accordance with the scope of work or contractor work plan?

Yes	No	Inconclusive
		X

Sources reviewed and comments:

Approximately 5% of MRS-24C has been investigated; however, not all of the detected anomalies within SS/GS sampling grids were investigated. SS/GS was used to design and implement sampling at this site. Subsequent to the work, the use of this program was questioned. It appears that the data are of good quality; however, it is not possible to statistically evaluate the adequacy of the sampling at this site. UXO density was not calculated because no MEC items were found.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

**EVALUATION OF PREVIOUS WORK: MRS-24C
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

24. Based on sampling procedure (e.g., grids, transects, and/or random walks) was a percentage of the site completed to provide 95% confidence in a UXO density estimate, and if so provide total area investigated and the UXO density estimate.

Yes	No	Inconclusive
		X
Total Area:		9.7 acres
UXO Density:		Not calculated

Sources reviewed and comments:

Approximately 5% of MRS-24C was investigated by USA Environmental (USA). The Fitch Park housing development overlaps a large portion of the MRS, and the ground was disturbed during development. Only limited areas were available for sampling. Subsequent investigations focused on the Investigation Area to the south of MRS-24C. UXO density was not calculated because no MEC items were found.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

25. What percentage of the anomalies were intrusively investigated?

Total % of Anomalies Investigated:	14%
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Sources reviewed and comments:

1,850 anomalies were identified and 265 (14%) were sampled.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

26. Was the appropriate data processing scheme used for the site, and how was the data processed?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The majority of the work was done with Schonstedts, which would essentially require recording descriptions of items encountered, depths, locations, and other related information. The information was recorded by the contractor on a spreadsheet. The data has since been transferred to the Fort Ord MMRP database.

References:

Fort Ord MMRP Database.

**EVALUATION OF PREVIOUS WORK: MRS-24C
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

27. Has the field data been collected and managed in accordance with the quality control standards established for the project?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

USA recorded the pertinent data in spreadsheets and the data has since been transferred to the Fort Ord MMRP database. Parsons UXOQC has performed QC of this data.

References:

Fort Ord MMRP Database.

RESULT OF SAMPLING EVALUATION

Does the sampling evaluation provide sufficient evidence to warrant further investigation?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Initial investigations at MRS-24C indicated that the cleared area south of MRS-24C is likely the training area ("Investigation Area"). The ASR boundary of MRS-24C was sufficiently investigated to identify site boundaries, confirm types of training practices. No further investigation is recommended within the ASR boundary of MRS-24C.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental, 2000.

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

**EVALUATION OF PREVIOUS WORK: Investigation Area
EVALUATION CHECKLIST PART 1: SITE WALK EVALUATION**

TYPE OF TRAINING AND MILITARY MUNITIONS EXPECTED

1. Is there evidence that the site was used as an impact area (i.e., fired military munitions such as mortars, projectiles, rifle grenades or other launched ordnance)?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
MD identified during site walks was from MKII fragmentation hand grenades, indicating that the site was not used as an impact area.

2. Is there historical evidence that training involved High Explosive (HE) or low explosive (LE) items?

Yes	No	Inconclusive
X		

Sources reviewed and comments:
MD identified during site walks and 2006 surface inspection was from MKII fragmentation hand grenades. MKII fragmentation grenades are HE items.

3. Is there historical evidence that training involved use of pyrotechnic and/or smoke producing items (e.g. simulators, flares, smoke grenades) but not explosives?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
There is no historical evidence that training involved use of pyrotechnic and/or smoke producing items.

DEVELOPMENT AND USE OF THE SURROUNDING AREA

4. Does subsequent development or use of the area indicate that military munitions would have been used at the site?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
Site walks confirmed that the Investigation Area is currently undeveloped. Military housing was built in the late 1950s immediately adjacent to the Investigation Area and overlapping a portion of MRS-24C.

5. Does use of the area surrounding the site indicate that military munitions would have been used at the site?

Yes	No	Inconclusive
		X

Sources reviewed and comments:
Other historical grenade training ranges were identified near MRS-24C. MRS-24A, a practice rifle grenade training area, is located to the south. MRS-24B, a practice hand grenade training area, is located to the east. Therefore,

**EVALUATION OF PREVIOUS WORK: Investigation Area
EVALUATION CHECKLIST PART 1: SITE WALK EVALUATION**

it is possible that military munitions would have been used at the Investigation Area as well.

ESTABLISHMENT OF SITE BOUNDARIES

6. Is there evidence of training areas on aerial photographs that could be used to establish boundaries?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The Investigation Area south of MRS-24C is the cleared area visible on historical aerial photographs and corresponds with the size of a live grenade range, which is the designation for MRS-24C. With the exception of a small corner, the Investigation Area is not located within the boundary of MRS-24C.

7. Is there evidence of training on historical training maps that could be used to establish boundaries?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The boundary of the Investigation Area is not identified on historical training maps.

8. Was the site walk performed within appropriate area?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Reconnaissance of the Investigation Area was performed in the area that was visible on historical aerial photographs. Three (whole or partial) grids of the ten 2006 grid inspection grids are located within the Investigation Area.

9. Does reconnaissance (site walk) indicate MEC and/or MD are present at the site?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

MD related to grenades (safety levers and fragments) were identified in the Investigation Area during site walks and 2006 grid inspection.

10. Were the type(s) of items found consistent with the type of training identified for the site?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The MD items found during site walks and 2006 grid inspection were consistent with the type of training identified for MRS-24C, and the Investigation Area is presumed to be the training area associated with MRS-24C (Live Grenade Training Range).

EVALUATION OF PREVIOUS WORK: Investigation Area
EVALUATION CHECKLIST PART 1: SITE WALK EVALUATION

11. Were the type(s) of items found consistent with the era(s) in which training was identified?

Yes	No	Inconclusive
X		

Sources reviewed and comments:
 The items found were consistent with the era of training (live grenade training in the 1940s).

12. Was HE fragmentation found?

Yes	No	Inconclusive
X		

Sources reviewed and comments:
 Fragments from HE fragmentation hand grenades were found during 2006 grid inspection.

13. Was HE found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
 No HE items were found in the Investigation Area.

14. Was LE found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
 No LE was identified during site walks or 2006 grid inspection.

15. Were pyrotechnics found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
 No pyrotechnics were identified during site walks or 2006 grid inspection.

16. Were smoke-producing items found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
 No smoke-producing items were identified during site walks or 2006 grid inspection.

17. Were explosive items found (e.g. rocket motors with explosive components, fuzes with explosive components)?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
 Explosive items were not found during site walks or 2006 grid inspection.

18. Do items found in the area indicate training would have included use of training items with energetic components?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
 The items found in the Investigation Area do not indicate that training occurred with items containing other energetic components.

EVALUATION OF PREVIOUS WORK: Investigation Area
EVALUATION CHECKLIST PART 1: SITE WALK EVALUATION

19. Were items found in a localized area (possible the remnants of a cleanup action)?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Grenade items (MD) were found throughout the Investigation Area during site walks and 2006 grid inspection.

20. Is it appropriate to divide the site into sectors to focus on areas of common usage, similar topography and vegetation, and/or unique site features?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

There is no indication that the Investigation Area should be divided.

21. Should site boundaries be revised?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

There is no indication that the boundary of the Investigation Area should be revised.

22. Has the field data been collected and managed in accordance with quality control standards established for the project?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Site reconnaissance by the U.S. Army Corps of Engineers (USACE) was conducted in accordance with EM-1110-1-4009, and MD locations are recorded in the Fort Ord database.

RESULT OF RECONNAISSANCE EVALUATION

Does the site walk evaluation provide sufficient evidence to warrant further investigation?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The Investigation Area was not identified as a training area in the ASR. However, the area was identified on historical aerial photographs and USACE conducted site walks in the site.

**EVALUATION OF PREVIOUS WORK: Investigation Area
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

1. Is there evidence that the site was used as an impact area (i.e., fired military munitions such as mortars, projectiles, rifle grenades or other launched ordnance)?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Sampling at the Investigation Area identified MD from MKII fragmentation and practice hand grenades, indicating that the area was not used as an impact area.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA Environmental (USA), 2000.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw Environmental, Inc. (Shaw), 2010.

2. Is there evidence that training involved High Explosive (HE) or Low Explosive (LE) items?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Items identified at the Investigation Area include MD from MKII fragmentation hand grenades. MKII fragmentation hand grenades are HE items.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA, 2000.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

Fort Ord MMRP Database.

3. Is there evidence that training involved use of pyrotechnic and/or smoke-producing items (e.g. simulators, flares, smoke grenades) but not explosives?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

No pyrotechnic and/or smoke-producing items have been identified at the Investigation Area.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA, 2000.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

Fort Ord MMRP Database.

**EVALUATION OF PREVIOUS WORK: Investigation Area
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

4. Was sampling and/or reconnaissance performed within the appropriate area?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Sampling has been conducted throughout the entire Investigation Area.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA, 2000.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

5. Does sampling indicate MEC and/or MD are present at the site?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

No MEC items have been identified at the Investigation Area. MD items identified at the Investigation Area include fragments from MKII fragmentation hand grenades.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA, 2000.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

Fort Ord MMRP Database.

6. Were the type(s) of items found consistent with the type of training identified for the site?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The types of items identified were consistent with what was anticipated for the site, based on the range designation (Live Grenade Training Area).

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA, 2000.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

Fort Ord MMRP Database.

**EVALUATION OF PREVIOUS WORK: Investigation Area
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

7. Were the type(s) of items found consistent with the era(s) in which training was identified?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The items found were consistent with the era of training (live grenade training in the 1940s).

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

8. Was HE fragmentation found?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

MD from MKII fragmentation (HE) hand grenades was found at the Investigation Area.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA, 2000.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

Fort Ord MMRP Database.

9. Was HE found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

No HE has been identified at the Investigation Area.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA, 2000.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

Fort Ord MMRP Database.

10. Was LE found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

LE was not found during the investigations.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA, 2000.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

**EVALUATION OF PREVIOUS WORK: Investigation Area
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

Fort Ord MMRP Database.

11. Were pyrotechnics found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Pyrotechnics were not found within the Investigation Area during the investigations.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA, 2000.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

Fort Ord MMRP Database.

12. Were smoke-producing items found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

No smoke-producing items were found within the Investigation Area during the investigations.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA, 2000.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

Fort Ord MMRP Database.

13. Were explosive items (e.g. rocket motors with explosive components, fuzes with explosive components) found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

No explosive items were found at the Investigation Area.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA, 2000.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

Fort Ord MMRP Database.

**EVALUATION OF PREVIOUS WORK: Investigation Area
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

14. Do items found in the area indicate training would have included use of training with other energetic components?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The items found the Investigation Area do not indicate that training occurred with items containing other energetic components.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA, 2000.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

Fort Ord MMRP Database.

15. Were items found in a localized area (possibly the remnants of a cleanup action)?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Grenade items were found throughout the Investigation Area, but were more abundant in the northern portion, which is likely the side of the range where the grenades were thrown during training. The localization of items is not indicative of a cleanup action.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA, 2000.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

Fort Ord MMRP Database.

16. Has the site been divided into sectors to focus on areas of common usage, similar topography and vegetation, and/or other unique site features?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The entire Investigation Area was investigated in two grids.

References:

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

Fort Ord MMRP Database.

**EVALUATION OF PREVIOUS WORK: Investigation Area
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

17. Should current site boundaries be revised?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The site boundary for the Investigation Area is based on a cleared area identified in historical aerial photographs. Based on sampling data, the Investigation Area is the live grenade training area associated with MRS-24C. The Investigation Area should be included in the boundary of MRS-24C.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA, 2000.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

Fort Ord MMRP Database.

18. Was equipment used capable of detecting items suspected at the site at the maximum expected depth?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

A test plot was performed to verify that the Schonstedt GA/52-Cx magnetometer and EM61 metal detector are capable of detecting intact grenades expected at the site.

References:

Draft Final Technical Information Paper, E20c.1 Test Plot, Shaw, 2009.

19. Was equipment used capable of detecting the types of items (e.g., non-ferrous) suspected at the site?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Investigations at MRS-24C were conducted using Schonstedt magnetometers, which were determined to be capable of detecting MKII grenades during the ODDS. In addition, Shaw conducted a test plot to confirm that the Schonstedt magnetometers could detect MKII grenades to expected depths. The test plot included the use of the Schonstedt GA/52-Cx, which detects ferrous metallic objects, and the EM61 metal detector, which is designed to detect ferrous and non-ferrous metallic objects.

References:

Final Ordnance Detection and Discrimination Study (ODDS) Report, Parsons, 2002.

**EVALUATION OF PREVIOUS WORK: Investigation Area
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

Draft Final Technical Information Paper, E20c.1 Test Plot, Shaw, 2009.

20. Do the results of the ODDS indicate that items suspected at the site would have been detected by the instrument used at the time of investigation?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Although the Investigation Area was not an ODDS test area, the results of the ODDS seeded test indicate that the items suspected at the site were detectable using a Schonstedt GA-52C/x. The ODDS seeded test also indicated that the suspected items were detectable using the EM61. Shaw performed a test plot analysis to verify that the selected instruments used for the investigations could detect the suspected items(intact grenades) under field conditions.

References:

Final ODDS Report, Parsons, 2002.

Draft Final Technical Information Paper, E20c.1 Test Plot, Shaw, 2009.

21. Do results of the investigation indicate that suspected items could be detected with a high level of confidence at observed and expected depth ranges?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The test plot indicated that the Schonstedt GA/52-Cx magnetometer and EM61 metal detector can reliably detect the suspected items (intact grenades) to their expected depth.

References:

Draft Final Technical Information Paper, E20c.1 Test Plot, Shaw, 2009.

22. Were all the instruments used to evaluate the site maintained and calibrated in accordance with associated work plan and manufacturer's specifications?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Field QC procedures for the detection instruments were documented in accordance with the work plans and manufacturer's specifications for activities conducted by USA Environmental, Shaw, and USACE.

**EVALUATION OF PREVIOUS WORK: Investigation Area
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA, 2000.

Draft Final Technical Information Paper, E20c.1 Test Plot, Shaw, 2009.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

23. Based on the appropriate target density (UXO items per acre) has the minimal amount of sampling acreage been completed in accordance with the scope of work or contractor work plan?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

100% of the Investigation Area has been investigated. UXO density was not calculated because no MEC items were found.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA, 2000.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

24. Based on sampling procedure (e.g., grids, transects, and/or random walks) was a percentage of the site completed to provide 95% confidence in a UXO density estimate, and if so provide total area investigated and the UXO density estimate.

Yes	No	Inconclusive
X		

Total Area:	0.8 acres
UXO Density:	Not Calculated

Sources reviewed and comments:

100% of the Investigation Area has been investigated. UXO density was not calculated because no MEC items were found.

References:

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

25. What percentage of the anomalies were intrusively investigated?

Total % of Anomalies Investigated:	100%
-------------------------------------------	-------------

Sources reviewed and comments:

During Shaw's 2010 DGM investigation, all anomalies were intrusively investigated if detected above 14 millivolts.

**EVALUATION OF PREVIOUS WORK: Investigation Area
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

References:

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

26. Was the appropriate data processing scheme used for the site, and how was the data processed?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The majority of the work was done with Schonstedts and EM61-MK2, which would essentially require recording descriptions of items encountered, depths, locations, and other related information. The information was recorded by a contractor on a spreadsheet. The data has since been transferred to the Fort Ord MMRP database.

References:

Fort Ord MMRP Database.

27. Has the field data been collected and managed in accordance with the quality control standards established for the project?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

USA Environmental and Shaw recorded the pertinent data in spreadsheets and the data has since been transferred to the Fort Ord MMRP database. Parsons UXOQC has performed QC of the data generated during USA's investigation. Shaw performed 100% QC review of data before submitting to the Fort Ord MMRP Database. USACE then performed QA of investigation data.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-39, USA, 2000.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

Fort Ord MMRP Database.

RESULT OF SAMPLING EVALUATION

Does the sampling evaluation provide sufficient evidence to warrant further investigation?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The entire Investigation Area has been investigated, and no MEC item was found. No further investigation is recommended.

**EVALUATION OF PREVIOUS WORK: Investigation Area
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

References:

Final After Action Report, SiteStats/GridStats OE Sampling,
Sites OE-24B-E and OE-39, USA, 2000.

Technical Information Paper, E20c.1 Additional
Investigation Area, Shaw, 2010.

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20c.1
 EVALUATION CHECKLIST PART 1: LITERATURE REVIEW

TYPE OF TRAINING AND MILITARY MUNITIONS EXPECTED

1. Is there evidence that the site was used as an impact area (i.e., fired military munitions such as mortars, projectiles, rifle grenades or other launched ordnance)?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Excluding MRS-24A and the live grenade training area (the Investigation Area), no other training areas were identified within Parcel E20c.1. There is no evidence that the site was used as an impact area.

References:

Revised Archives Search Report for Former Fort Ord, CA, U.S. Army Corps of Engineers (USACE), St. Louis District, 1997.

2. Is there historical evidence that training involved High Explosive (HE) or low explosive (LE) items?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

There is no evidence that there were other training areas within Parcel E20c.1 (outside of MRS-24A and live grenade training area [Investigation Area]), and therefore no evidence that training involving HE or LE items occurred. Previous reports indicated that fragments (MD) of MKII fragmentation hand grenades (HE) were identified in the remainder of Parcel E20c.1, but the fragments are believed to be from grenade training activities at the Investigation Area.

References:

Revised Archives Search Report for Former Fort Ord, CA, USACE, St. Louis District, 1997.

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw Environmental, Inc. (Shaw), 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord Munitions Response Site (MRS) Security Program, Annual Report 2008, U.S. Department of the Army (Army), Base Realignment and Closure (BRAC) Office, 2008.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20c.1
 EVALUATION CHECKLIST PART 1: LITERATURE REVIEW

3. Is there historical evidence that training involved use of pyrotechnic and/or smoke producing items (e.g. simulators, flares, smoke grenades) but not explosives?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

There is no evidence that there were other training areas within Parcel E20c.1 (outside of MRS-24A and live grenade training area [Investigation Area]). However, pyrotechnic and/or smoke producing items may have been used at MRS-24A. MD from pyrotechnic and smoke munitions were identified within the remainder of Parcel E20c.1 during previous investigations. A smoke rifle grenade was found in a foxhole in 1993 in the northeastern portion of the parcel. This item is considered incidental.

References:

Explosive Ordnance Incident Report, DA Form 3266-R, 20 Feb 93.

Revised Archives Search Report for Former Fort Ord, CA, USACE, St. Louis District, 1997.

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

DEVELOPMENT AND USE OF THE SURROUNDING AREA

4. Does subsequent development or use of the area indicate that military munitions would have been used at the site?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The remainder of Parcel E20c.1 is currently undeveloped and unused. Several investigations have identified MEC and MD items at the site.

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20c.1
 EVALUATION CHECKLIST PART 1: LITERATURE REVIEW

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

5. Does use of the area surrounding the site indicate that military munitions would have been used at the site?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The Impact Area is located to the south of Parcel E20c.1, across Eucalyptus Road. Firing at the Impact Area was to the south, away from the parcel.

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

Track 1 Plug-In Approval Memorandum, Multiple Sites, Groups 1-5, Former Fort Ord, California, Army, 2006.

ESTABLISHMENT OF SITE BOUNDARIES

6. Is there evidence of training areas on aerial photographs that could be used to establish boundaries?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Boundaries of E20c.1 were established for land transfer purposes and are not visible on aerial photographs.

References:

Aerial photographs dated 1941, 1949, and 1951.

7. Is there evidence of training on historical training maps that could be used to establish boundaries?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The boundary of Parcel E20c.1 is a property boundary and is not based on evidence of the use of military munitions.

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20c.1
 EVALUATION CHECKLIST PART 1: LITERATURE REVIEW

8. Should current boundaries be revised?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The boundary of Parcel E20c.1 is a property boundary and is not based on evidence of the use of military munitions, therefore the boundary should not be revised.

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

Aerial photographs dated 1941, 1949, and 1951.

RESULTS OF LITERATURE EVALUATION

Does the literature review provide sufficient evidence to warrant further investigation?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Based on the literature review further investigation is not warranted for the remainder of Parcel E20c.1.

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

Aerial photographs dated 1941, 1949, and 1951.

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20c.1
 EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

1. Is there evidence that the site was used as an impact area (i.e., fired military munitions such as mortars, projectiles, rifle grenades or other launched ordnance)?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Excluding MRS-24A and live grenade training area (Investigation Area), no other training areas were identified within the remainder of Parcel E20c.1. There is no evidence that the site was used as an impact area.

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

2. Is there evidence that training involved High Explosive (HE) or Low Explosive (LE) items?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

There is no evidence that there were other training areas within Parcel E20c.1 (outside of MRS-24A and live grenade training area [Investigation Area]), and therefore no evidence that training involving HE or LE items occurred. Various site investigations indicated that fragments from MKII hand grenades were located in Parcel E20c.1 just east of MRS-24A. The current interpretation is that the grenade fragments were removed from the range (Investigation Area) and scattered in the heavily vegetated area of Parcel E20c.1.

References:

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

3. Is there evidence that training involved use of pyrotechnic and/or smoke-producing items (e.g. simulators, flares, smoke grenades) but not explosives?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Within the remainder of Parcel E20c.1, MD from four different types of signals were identified during sampling efforts.

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20c.1
 EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-30, USA Environmental, 2000.

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

4. Was sampling and/or reconnaissance performed within the appropriate area?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Sampling has occurred in various portions of Parcel E20c.1 and where items were identified during site walks.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-30, USA Environmental, 2000.

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

Fort Ord MMRP Database.

5. Does sampling indicate MEC and/or MD are present at the site?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Within the remainder of E20c.1, MD items include MKII fragmentation hand grenade fragments, M11 series practice antitank rifle grenades, M721 series 60mm illumination mortar projectile, M7 series 2.36-inch practice rocket, M17 series parachute rifle ground signal, M125 series ground illumination signal, M19 series rifle parachute ground illumination signal, AN-MK13 marine smoke and illumination signal, and smoke rifle grenade. No MEC items were identified during sampling events.

References:

Final After Action Report, SiteStats/GridStats OE Sampling, Sites OE-24B-E and OE-30, USA Environmental, 2000.

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20c.1
 EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

Fort Ord MMRP Database.

6. Were the type(s) of items found consistent with the type of training identified for the site?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The majority of the MD items found during sampling were consistent with the type of training identified for nearby sites MRS-24A and MRS-24C. The MEC projectiles identified in Parcel E20c.1 are not consistent with past uses of the parcel, and their variety and number do not indicate their use in a training scenario. However, the parcel is located near the Impact Area (across Eucalyptus Road to the south). A smoke rifle grenade was found in a foxhole in the northeastern portion of the parcel. The MEC items are considered incidental.

References:

Explosive Ordnance Incident Report, DA Form 3266-R, 20 Feb 93.

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

Technical Information Paper, E20c.1 Additional Investigation Area, Shaw, 2010.

7. Were the type(s) of items found consistent with the era(s) in which training was identified?

Yes	No	Inconclusive
		X

Sources reviewed and comments:

The items found were consistent with the era of training in surrounding areas.

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20c.1
 EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

References:

Revised Archives Search Report for former Fort Ord,
 CA, USACE, St. Louis District, 1997.

8. Was HE fragmentation found?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Fragments from MKII fragmentation (HE) hand grenades (MD) was found at Parcel E20c.1. The distribution of the fragments is not indicative of fragmentation from detonation of grenades within a "range" type use. A possible explanation for the presence of these fragments is that soil containing fragments was been removed from the Investigation Area near MRS-24C during construction activities and scattered in the heavily vegetated area in the center of Parcel E20c.1.

References:

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

Fort Ord MMRP Database.

9. Was HE found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

HE was not found during sampling.

References:

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

Fort Ord MMRP Database.

10. Was LE found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

LE was not found during the investigations.

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20c.1
 EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

References:

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Fort Ord MMRP Database.

11. Were pyrotechnics found?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

MD from various signal pyrotechnics was found at MRS-24A and in the remainder of E20c.1.

References:

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

Fort Ord MMRP Database.

12. Were smoke-producing items found?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

MD from smoke-producing items were found within the remainder of E20c.1. No smoke-producing items were found within MRS-24C or the Investigation Area.

References:

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

Fort Ord MMRP Database.

13. Were explosive items (e.g. rocket motors with explosive components, fuzes with explosive components) found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Explosive items were not found during sampling.

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20c.1
 EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

References:

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

Fort Ord MMRP Database.

14. Do items found in the area indicate training would have included use of training with other energetic components?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The items found in Parcel E20c.1 do not indicate that training occurred with items containing other energetic components.

References:

Revised Archives Search Report for former Fort Ord, CA, USACE, St. Louis District, 1997.

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

Draft Final Technical Information Paper, E20c.1 Test Plot, Shaw, 2009.

15. Were items found in a localized area (possibly the remnants of a cleanup action)?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Aside from grenade fragments (MD) related to the Investigation Area, items were not found in localized areas within Parcel E20c.1. A possible explanation for the presence of these fragments is that soil containing fragments was been removed from the Investigation Area near MRS-24C during construction activities and scattered in the heavily vegetated area in the center of Parcel E20c.1.

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20c.1
 EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

References:

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

16. Has the site been divided into sectors to focus on areas of common usage, similar topography and vegetation, and/or other unique site features?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The parcel was not divided into sectors.

References:

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

17. Should current site boundaries be revised?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The boundary of Parcel E20c.1 is a property boundary and should not change based on sampling results.

References:

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

18. Was equipment used capable of detecting items suspected at the site at the maximum expected depth?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

A test plot was performed to verify that the Schonstedt GA/52-Cx magnetometer, EM61 metal detector, and G858 magnetometers are capable of detecting the items expected at the site.

References:

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Draft Final Technical Information Paper, E20c.1 Test Plot, Shaw, 2009.

19. Was equipment used capable of detecting the types of items (e.g., non-ferrous) suspected at the site?

Yes	No	Inconclusive
X		

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20c.1
 EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

Sources reviewed and comments:

Investigations at Parcel E20c.1 were conducted using Schonstedt magnetometers and EM61, both of which were determined to be capable of detecting MKII grenades during the ODDS. In addition, Shaw conducted a test plot to confirm that the Schonstedt magnetometers could detect MKII grenades to expected depths. The test plot included the use of the Schonstedt GA/52-Cx, which detects ferrous metallic objects, and the EM61 metal detector, which is designed to detect ferrous and non-ferrous metallic objects.

References:

Final Ordnance Detection and Discrimination Study (ODDS) Report, Parsons, 2002.

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Draft Final Technical Information Paper, E20c.1 Test Plot, Shaw, 2009.

20. Do the results of the ODDS indicate that items suspected at the site would have been detected by the instrument used at the time of investigation?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Shaw's sampling at E20c.1 was conducted using Schonstedt GA-52C/x magnetometers and EM61 metal detectors. Shaw performed a test plot analysis to verify that the selected instruments used at the time of the investigations could detect the types of military munitions items previously encountered in the area.

Although Parcel E20c.1 was not an ODDS test area, the results of the ODDS seeded test indicate that the items suspected at the site were detectable using a Schonstedt GA-52C/x. The ODDS seeded test also indicated that the suspected items were detectable using the EM61.

References:

Final Ordnance Detection and Discrimination Study (ODDS) Report, Parsons, 2002.

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20c.1
 EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Draft Final Technical Information Paper, E20c.1 Test Plot, Shaw, 2009.

21. Do results of the investigation indicate that suspected items could be detected with a high level of confidence at observed and expected depth ranges?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The ODDS and test plot indicated that the Schonstedt GA/52-Cx magnetometer and EM61 metal detector can detect the types of military munitions items previously encountered in the area.

References:

Final Ordnance Detection and Discrimination Study (ODDS) Report, Parsons, 2002.

Draft Final Technical Information Paper, E20c.1 Test Plot, Shaw, 2009.

22. Were all the instruments used to evaluate the site maintained and calibrated in accordance with associated work plan and manufacturer's specifications?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Field QC procedures for the detection instruments were documented in accordance with the work plans and manufacturer's specifications for activities conducted by USA Environmental and Shaw.

References:

Final OE Sampling After Action Report, Inland Range Contract, Former Fort Ord, California. USA Environmental, Inc, 2000.

Draft Final Work Plan, Ordnance and Explosives Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2003.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Draft Final Technical Information Paper, E20c.1 Test Plot, Shaw, 2009.

23. Based on the appropriate target density (UXO items per acre) has the minimal amount of sampling acreage been completed in accordance with the scope of work or contractor work plan?

Yes	No	Inconclusive
		X

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20c.1
 EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

Sources reviewed and comments:

Approximately 25% of the remainder of Parcel E20c.1 has been investigated. However, not all of the detected anomalies within SS/GS sampling grids were investigated. SS/GS was used to design and implement sampling at this site. Subsequent to the work, the use of this program was questioned. It appears that the data are of good quality; however, it is not possible to statistically evaluate the adequacy of the sampling at this site. UXO density was not calculated because no MEC items were identified during sampling. Following Shaw's 2007 DGM investigation, a total of 35 of 247 anomalies were selected for investigation by the USACE, with agency input.

References:

Final After Action Report, SiteStats/Grid Stats OE Sampling, Sites OE-24B-E and OE-39, USA, 2000.

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

24. Based on sampling procedure (e.g., grids, transects, and/or random walks) was a percentage of the site completed to provide 95% confidence in a UXO density estimate, and if so provide total area investigated and the UXO density estimate.

Yes	No	Inconclusive
		X

Total Area:	70.3 acres
UXO Density:	Not Calculated

Sources reviewed and comments:

Approximately 25% of the remainder of Parcel E20c.1 has been investigated. UXO density was not calculated because no MEC was identified at Parcel E20c.1 during sampling.

References:

Final After Action Report, SiteStats/Grid Stats OE Sampling, Sites OE-24B-E and OE-39, USA, 2000.

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20c.1
 EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

Draft Final Technical Information Paper, E20c.1 Test Plot, Shaw, 2009.

25. What percentage of the anomalies were intrusively investigated?

Total % of Anomalies Investigated:	2004 – 100% 2007 – 14%
-------------------------------------------	-----------------------------------------

Sources reviewed and comments:

During Shaw's 2004 grid investigation, 100% of anomalies identified with Schonstedts were intrusively investigated. During Shaw's 2007 DGM investigation, 247 targets were identified. With agency input, 35 anomalies (14%) were identified for investigation by USACE.

References:

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

26. Was the appropriate data processing scheme used for the site, and how was the data processed?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

The majority of the work was done with Schonstedts and EM61-MK2, which would essentially require recording descriptions of items encountered, depths, locations, and other related information. The information was recorded by a contractor on a spreadsheet. The data has since been transferred to the Fort Ord MMRP database.

References:

Fort Ord MMRP Database.

27. Has the field data been collected and managed in accordance with the quality control standards established for the project?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

USA Environmental and Shaw recorded the pertinent data in spreadsheets, and the data have since been transferred to the Fort Ord MMRP database. Parsons UXOQC has performed QC of the data generated during USA's investigation. Shaw performed 100% QC review of data before submitting to the Fort Ord MMRP Database. USACE then performed QA of investigation data.

References:

Fort Ord MMRP Database.

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20c.1
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

RESULT OF SAMPLING EVALUATION

Does the sampling evaluation provide sufficient evidence to warrant further investigation?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Parcel E20c.1 has been sufficiently investigated to identify the types of MEC and MD. No further investigation is recommended.

References:

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Draft Final Work Plan, E20c.1 Investigation, Shaw, 2007.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20C.1
 EVALUATION CHECKLIST PART 3: SITE WALK EVALUATION

TYPE OF TRAINING AND MILITARY MUNITIONS EXPECTED

1. Is there evidence that the site was used as an impact area (i.e., fired military munitions such as mortars, projectiles, rifle grenades or other launched ordnance)?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Although MEC projectiles were identified at Parcel E20c.1 during site walks, the items are considered incidental items likely related to training activities at surrounding areas (i.e., the Impact Area).

References:

Site Visit Report, Parcels E20c.1.1.1 and E20c.1.1.2, USACE, 2003.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

2. Is there historical evidence that training involved High Explosive (HE) or low explosive (LE) items?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Site walks at Parcel E20c.1 identified MKII fragmentation grenade (HE) fragments (MD) in various portions of the site, and one M306 series 57 mm HE projectile (MEC) in the eastern portion of E20c.1 (another 57mm projectile, M306 series target practice [MEC], was found during the Eucalyptus Road project). The grenade fragments are believed to be related to training at the Investigation Area, and the HE projectiles are considered to be incidental items related to training at surrounding areas (the Impact Area).

References:

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Site Visit Report, Parcels E20c.1.1.1 and E20c.1.1.2, USACE, 2003.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

3. Is there historical evidence that training involved use of pyrotechnic and/or smoke producing items (e.g. simulators, flares, smoke grenades) but not explosives?

Yes	No	Inconclusive
	X	

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20C.1
 EVALUATION CHECKLIST PART 3: SITE WALK EVALUATION

Sources reviewed and comments:

No evidence of pyrotechnic and/or smoke producing items was identified during site walks; however, there was evidence of explosives (MD from MKII hand grenades).

References:

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

DEVELOPMENT AND USE OF THE SURROUNDING AREA

4. Does subsequent development or use of the area indicate that military munitions would have been used at the site?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Site walks confirmed that the remainder of Parcel E20c.1 is currently undeveloped. Military housing was built in the late 1950s immediately adjacent to the Parcel E20c.1, overlapping a portion of MRS-24C.

5. Does use of the area surrounding the site indicate that military munitions would have been used at the site?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The Impact Area is located to the south of Parcel E20c.1, across Eucalyptus Road. Firing at the Impact Area was to the south, away from the MRS.

ESTABLISHMENT OF SITE BOUNDARIES

6. Is there evidence of training areas on aerial photographs that could be used to establish boundaries?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Aerial photography is not relevant for determining a boundary for Parcel E20c.1 because the boundaries of E20c.1 were established for land transfer purposes only.

7. Is there evidence of training on historical training maps that could be used to establish boundaries?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The boundary of Parcel E20c.1 is a property boundary and is not based on evidence of the use of military munitions.

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20C.1
 EVALUATION CHECKLIST PART 3: SITE WALK EVALUATION

8. Was the site walk performed within appropriate area?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Reconnaissance of Parcel E20c.1 were conducted throughout the site, and identified several MEC and MD items.

References:

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Site Visit Report, Parcels E20c.1.1.1 and E20c.1.1.2, USACE, 2003.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

9. Does reconnaissance (site walk) indicate MEC and/or MD are present at the site?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

MEC projectiles and MD items have been found in the remainder of Parcel E20c.1 during various site walks. The MEC projectiles are considered incidental items related to training at surrounding sites (i.e., the Impact Area).

References:

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Site Visit Report, Parcels E20c.1.1.1 and E20c.1.1.2, USACE, 2003.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

10. Were the type(s) of items found consistent with the type of training identified for the site?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

Parcel E20c.1 (excluding MRS-24A) was not identified as a training area. The majority of the MD items found during site walks were consistent with the type of training identified for nearby sites MRS-24A and MRS-24C. The MEC projectiles identified in Parcel E20c.1 are not consistent with past uses of the parcel, and their variety and number do not indicate their use in a training scenario. However, the parcel is located near the Impact Area (across Eucalyptus Road to the south), and the

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20C.1
 EVALUATION CHECKLIST PART 3: SITE WALK EVALUATION

items are considered incidental items related to the Impact Area.

References:

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

Site Visit Report, Parcels E20c.1.1.1 and E20c.1.1.2, USACE, 2003.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

11. Were the type(s) of items found consistent with the era(s) in which training was identified?

Yes	No	Inconclusive
		X

Sources reviewed and comments:

The items found were consistent with the era of training in surrounding areas.

12. Was HE fragmentation found?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Fragments from MKII fragmentation grenades were found in the remainder of Parcel E20c.1. The distribution of the fragments is not indicative of fragmentation from detonation of grenades within a "range" type use. A possible explanation for the presence of these fragments is that soil containing fragments was been removed from the Investigation Area near MRS-24C during construction activities and scattered in the heavily vegetated area in the center of Parcel E20c.1.

References:

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

13. Was HE found?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

One M306 series 57 mm HE projectile was identified in Parcel E20c.1 during USACE's site walk in 2003. Another 57mm projectile, M306 series target practice (MEC), was found during the Eucalyptus Road project.

References:

Site Visit Report, Parcels E20c.1.1.1 and E20c.1.1.2, USACE, 2003.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20c.1
 EVALUATION CHECKLIST PART 3: SITE WALK EVALUATION

14. Was LE found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
 No LE was identified during site walks.

15. Were pyrotechnics found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
 No pyrotechnics were identified during site walks at Parcel E20c.1.

16. Were smoke-producing items found?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
 No smoke-producing items were found at Parcel E20c.1 during site walks.

17. Were explosive items found (e.g. rocket motors with explosive components, fuzes with explosive components)?

Yes	No	Inconclusive
X		

Sources reviewed and comments:
 During a site walk, one M306 series 57 mm HE projectile (MEC) was identified at the eastern portion of Parcel E20c.1. Another 57mm projectile, M306 series target practice (MEC), was found during the Eucalyptus Road project.

References:
 Site Visit Report, Parcels E20c.1.1.1 and E20c.1.1.2, USACE, 2003.

Fort Ord MRS Security Program, Annual Report 2008, Army BRAC Office, 2008.

18. Do items found in the area indicate training would have included use of training items with energetic components?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
 The items found in Parcel E20c.1 do not indicate that training occurred with items containing other energetic components.

19. Were items found in a localized area (possible the remnants of a cleanup action)?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:
 Aside from grenade fragments (MD), items were not found in localized areas within the remainder of E20c.1. A possible explanation for the presence of these fragments is that soil containing fragments was been removed from

EVALUATION OF PREVIOUS WORK: Remainder of Parcel E20c.1
 EVALUATION CHECKLIST PART 3: SITE WALK EVALUATION

the Investigation Area near MRS-24C during construction activities and scattered in the heavily vegetated area in the center of Parcel E20c.1.

References:

Draft Final Field Investigation Report, Military Munitions Sampling, First Tee Site, Former Fort Ord, California, Shaw, 2004.

20. Is it appropriate to divide the site into sectors to focus on areas of common usage, similar topography and vegetation, and/or unique site features?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

There is no indication that the parcel should be divided other than by MRSs and remaining area of Parcel E20c.1.

21. Should site boundaries be revised?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

The boundary of Parcel E20c.1 is a property boundary and is not based on evidence of the use of military munitions.

22. Has the field data been collected and managed in accordance with quality control standards established for the project?

Yes	No	Inconclusive
X		

Sources reviewed and comments:

Site reconnaissance by USACE and Shaw was conducted in accordance with EM-1110-1-4009, and MEC and MD locations are recorded in the Fort Ord database.

RESULT OF RECONNAISSANCE EVALUATION

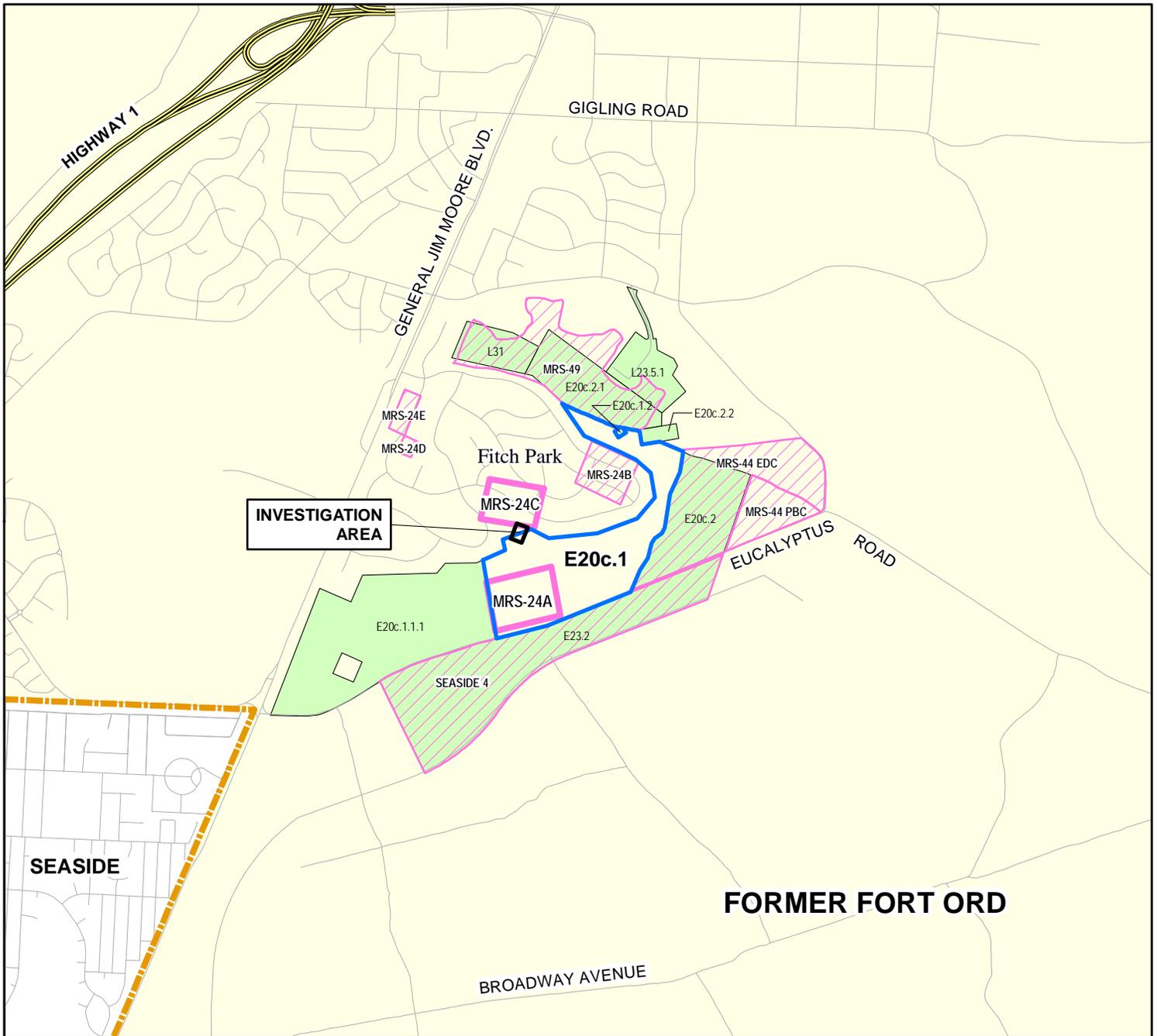
Does the site walk evaluation provide sufficient evidence to warrant further investigation?

Yes	No	Inconclusive
	X	

Sources reviewed and comments:

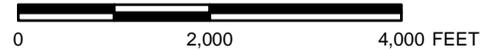
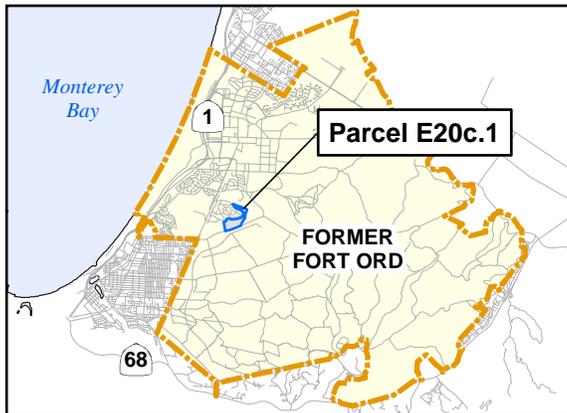
Further investigation is not warranted for Parcel E20c.1. Site walks sufficiently covered the parcel outside of sampling and DGM footprints to warrant no further investigation.

Appendix B
Figures

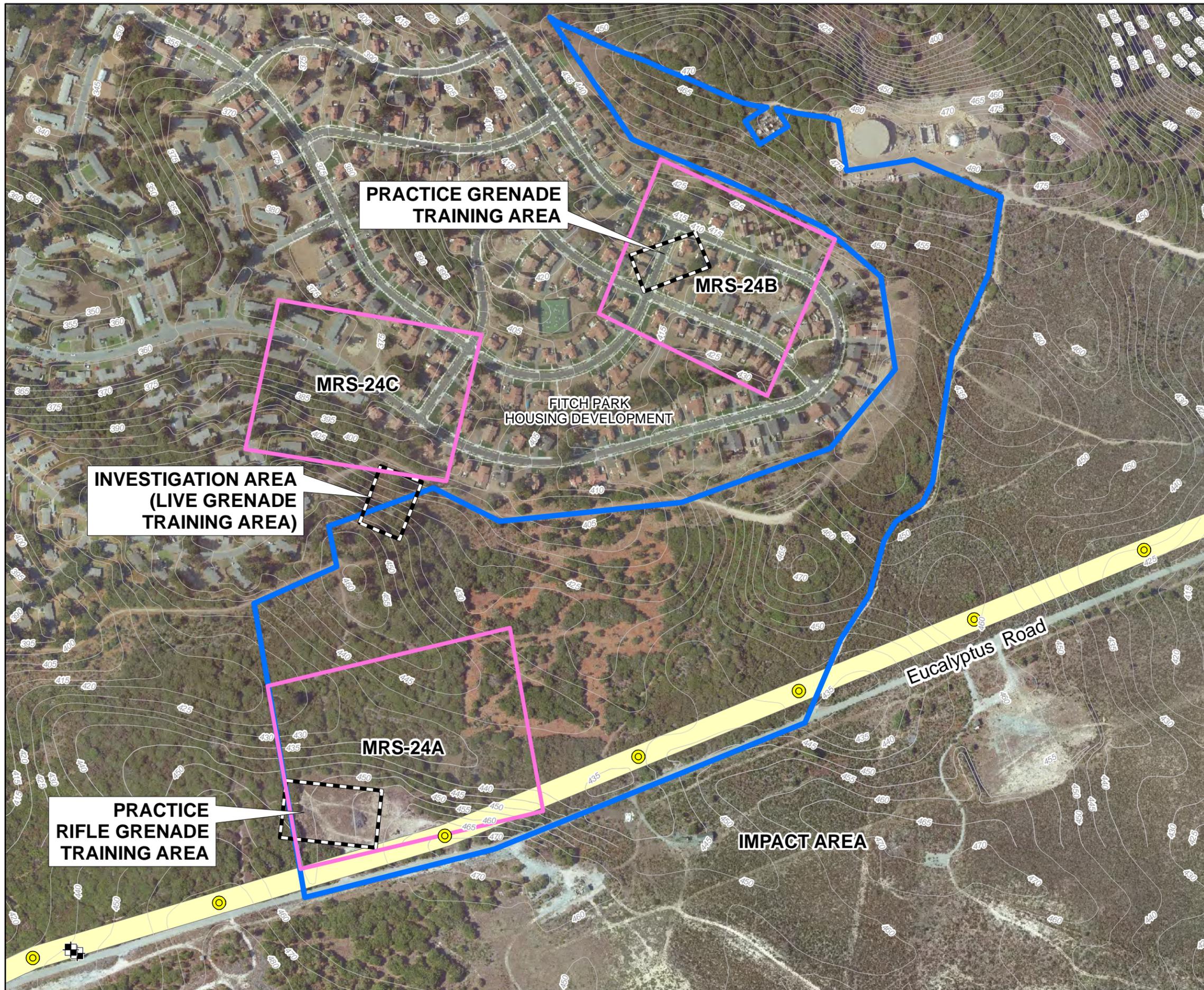


Legend

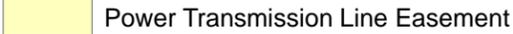
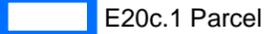
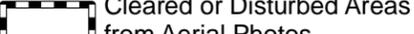
- Parcel E20c.1
- Munitions Response Site (from ASR)
- Boundary of Former Fort Ord
- Other Parcels
- Other Munitions Response Sites



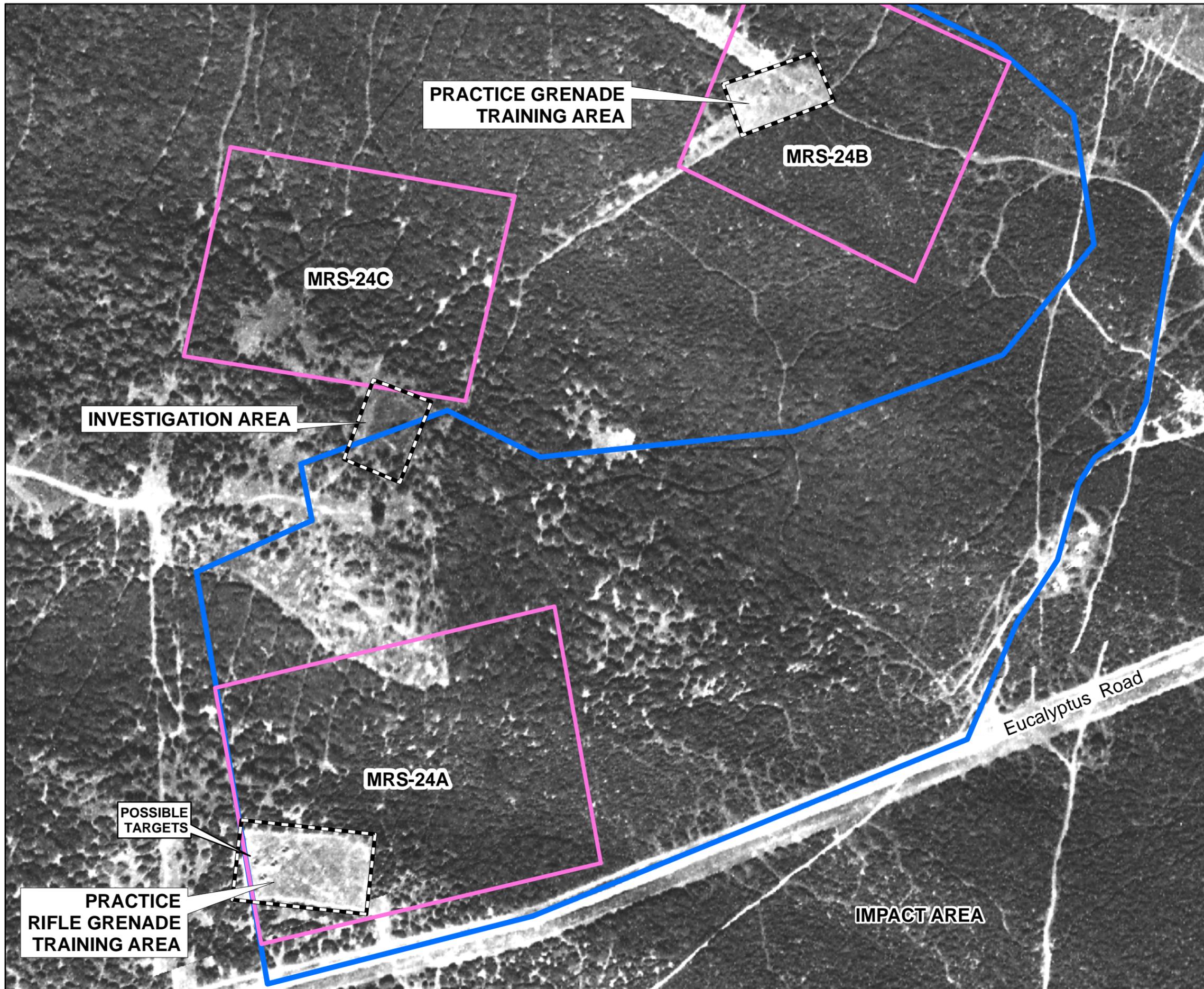
REVISION	DATE	DESCRIPTION	CHKD	APPR
Shaw Environmental, Inc.		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: C. BURNS		FIGURE 1 LOCATION MAP FORMER FORT ORD, CALIFORNIA		
DRAWN: K. BLACK				
CHECKED:				
SUBMITTED:		DATE	SCALE: SHEET	SPEC. No. FILE No. E20c1_location.mxd



Legend

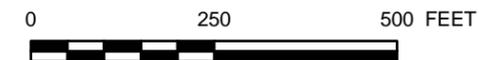
-  Monterey Water Management District Observation Well
-  Power Transmission Line Tower
-  Power Transmission Line Easement
-  Topographic Contour; 5-ft interval
-  E20c.1 Parcel
-  Munitions Response Site (from ASR)
-  Cleared or Disturbed Areas from Aerial Photos

REVISION	DATE	DESCRIPTION	CHKD	APPR
		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: C. BURNS		FIGURE 2 2007 AERIAL PHOTOGRAPH FORMER FORT ORD, CALIFORNIA		
DRAWN: K. BLACK				
CHECKED:				
SUBMITTED:		DATE:	SCALE:	SPEC. No.
		SHEET:	FILE No. E20c1_topo.mxd	

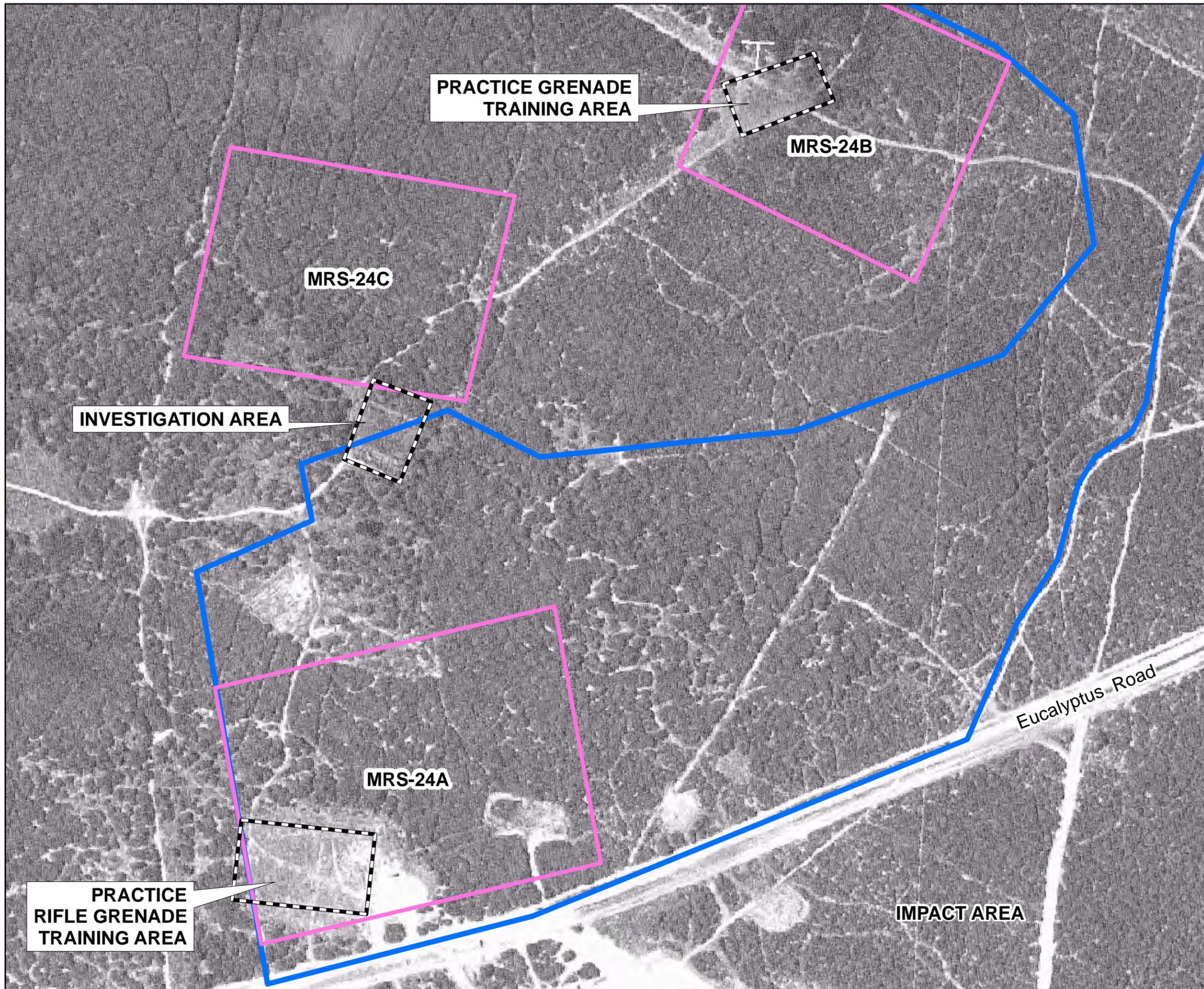


Legend

- E20c.1 Parcel
- Munitions Response Site (from ASR)
- Cleared or Disturbed Areas from Aerial Photos



REVISION	DATE	DESCRIPTION	CHKD	APPR
		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: C. BURNS		FIGURE 3 1941 AERIAL PHOTOGRAPH FORMER FORT ORD, CALIFORNIA		
DRAWN: K. BLACK				
CHECKED:				
SUBMITTED:		DATE:	SCALE:	SPEC. No.
			SHEET	FILE No. E20c1_1941_interpret.mxd



Legend

- E20c.1 Parcel
- Munitions Response Site (from ASR)
- Cleared or Disturbed Areas from Aerial Photos



REVISION	DATE	DESCRIPTION	CHKD	APPR
		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: C. BURNS	FIGURE 4 1949 AERIAL PHOTOGRAPH FORMER FORT ORD, CALIFORNIA			
DRAWN: K. BLACK				
CHECKED:				
SUBMITTED:	DATE	SCALE:	SPEC. No.	
		SHEET	FILE No.	
			E20c1_1949_interpret.mxd	

PRACTICE GRENADE TRAINING AREA

MRS-24B

16678

MRS-24C

INVESTIGATION AREA

ROAD NOT PRESENT IN 1941 OR 1949 AERIAL PHOTOS

MRS-24A

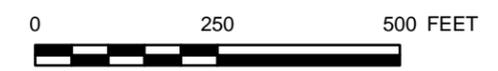
PRACTICE RIFLE GRENADE TRAINING AREA

Eucalyptus Road

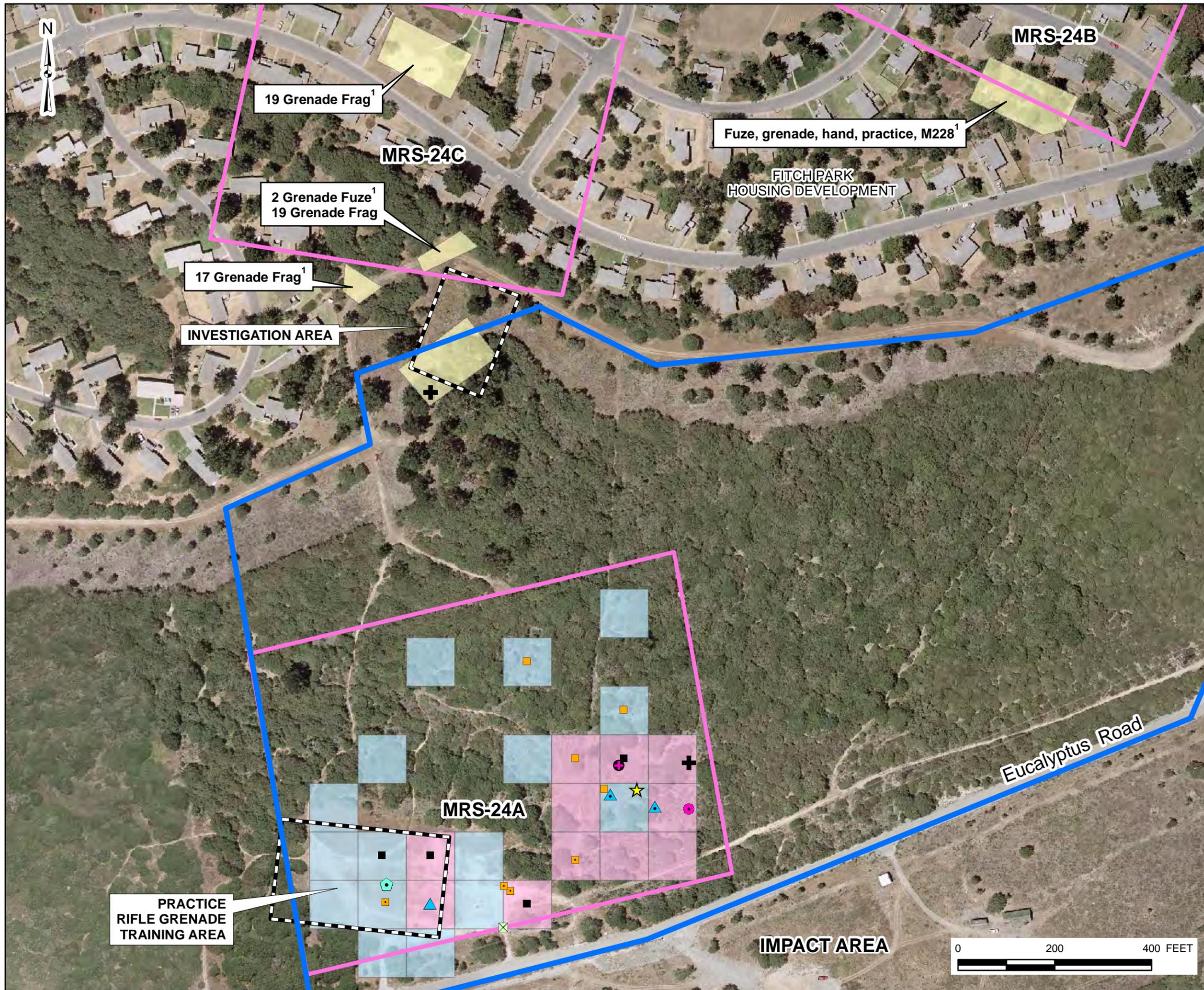
IMPACT AREA

Legend

-  E20c.1 Parcel
-  Munitions Response Site (from ASR)
-  Cleared or Disturbed Areas from Aerial Photos



REVISION	DATE	DESCRIPTION	CHKD	APPR
		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: C. BURNS		FIGURE 5 1951 AERIAL PHOTOGRAPH FORMER FORT ORD, CALIFORNIA		
DRAWN: K. BLACK				
CHECKED:				
SUBMITTED:		DATE	SCALE:	SPEC. No.
			SHEET	FILE No. E20c1_1951_interpret.mxd



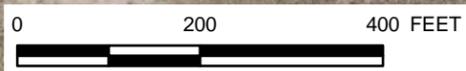
Legend

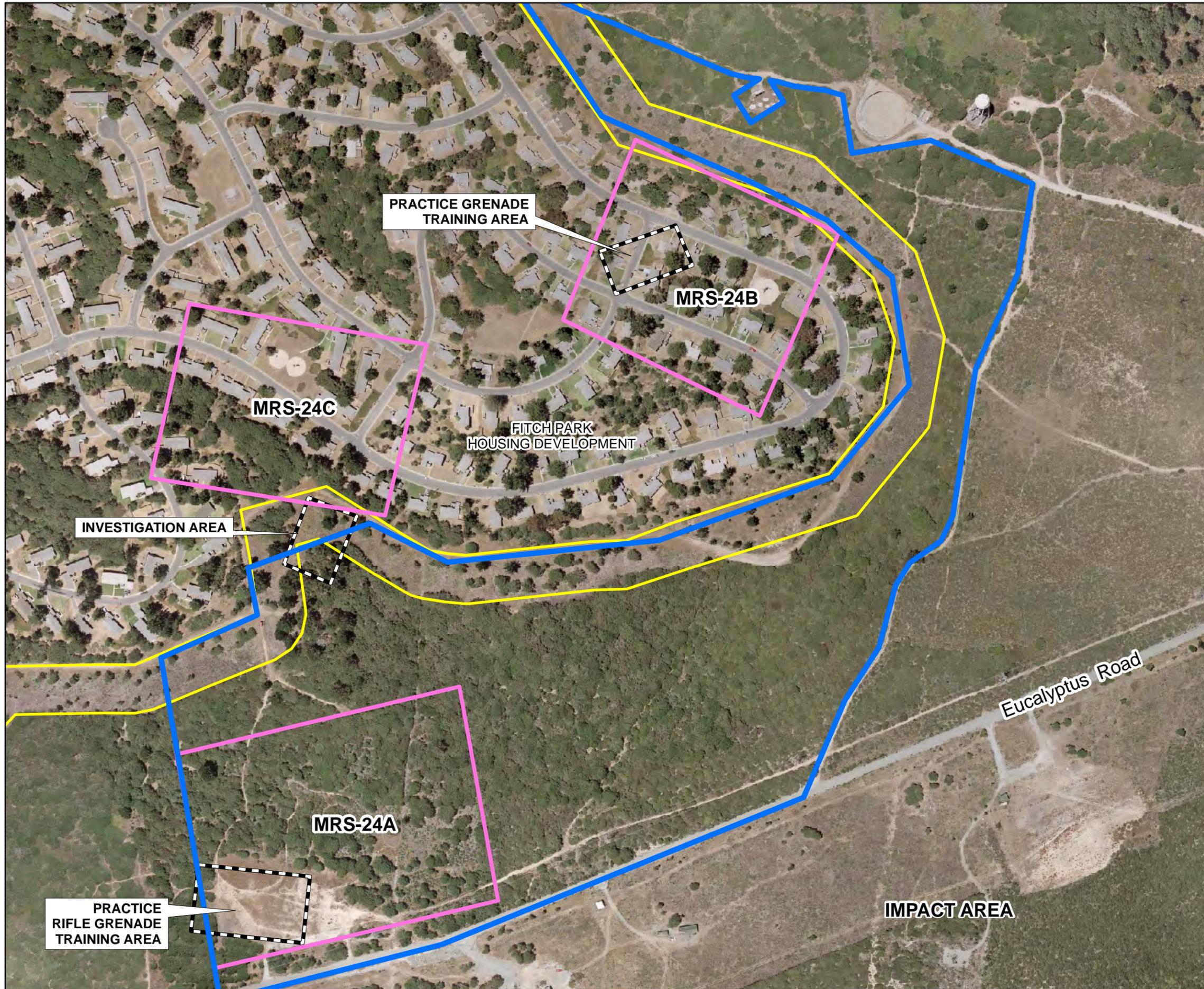
- E20c.1 Parcel
- Munitions Response Site (from ASR)
- Cleared or Disturbed Areas from Aerial Photos
- Grid sampled by USA (1996); Sampled with 100% Grid Sampling
- Grid Sampled by USA (1997); Sampled with SiteStats/GridStats
- Grid sampled by USA (2000); Sampled with 100% Grid Sampling
- Fragments, Unknown - MD²
- Cartridge, ignitor, flame thrower - MD²
- Grenade, hand, fragmentation, MK II - MD
- Grenade, hand, practice, MK II - MD
- Grenade, rifle, antitank, practice, M11 series - MD
- Grenade, rifle, antitank, practice, M29 series - MD
- Rocket, 2.36inch, practice, M7 series - MD
- Rocket, 3.5inch, practice, M29 series - MD
- Signal, ground, rifle, parachute, M17 series - MD
- Signal, illumination, ground, M125 series - MD
- Signal, illumination, ground, parachute, rifle, M19 series - MD
- Signal, smoke and illumination, marine, AN-MK13, MOD 0 - MD
- Projectile, 14.5mm, subcaliber, practice, M181 series - MD
- Cartridge, ignition, M2 series - MEC
- Projectile, 60mm, mortar, illumination, M83 series - MEC
- Projectile, 81mm, mortar, practice, M43 series - MEC

Notes:

- Items listed by grid are only associated with grid IDs in the Fort Ord MMRP Database, no coordinates available.
- No MMRP description available; original field description used instead.
- Aerial photograph from 2003.

REVISION	DATE	DESCRIPTION	CHKD	APPR
		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: C. BURNS	FIGURE 6			
DRAWN: K. BLACK	USA GRID INVESTIGATIONS 1996/1997/2000			
CHECKED:	FORMER FORT ORD, CALIFORNIA			
SUBMITTED:	DATE	SCALE:	SPEC. No.	
			SHEET	FILE No. E20c1_USA_1996.mxd





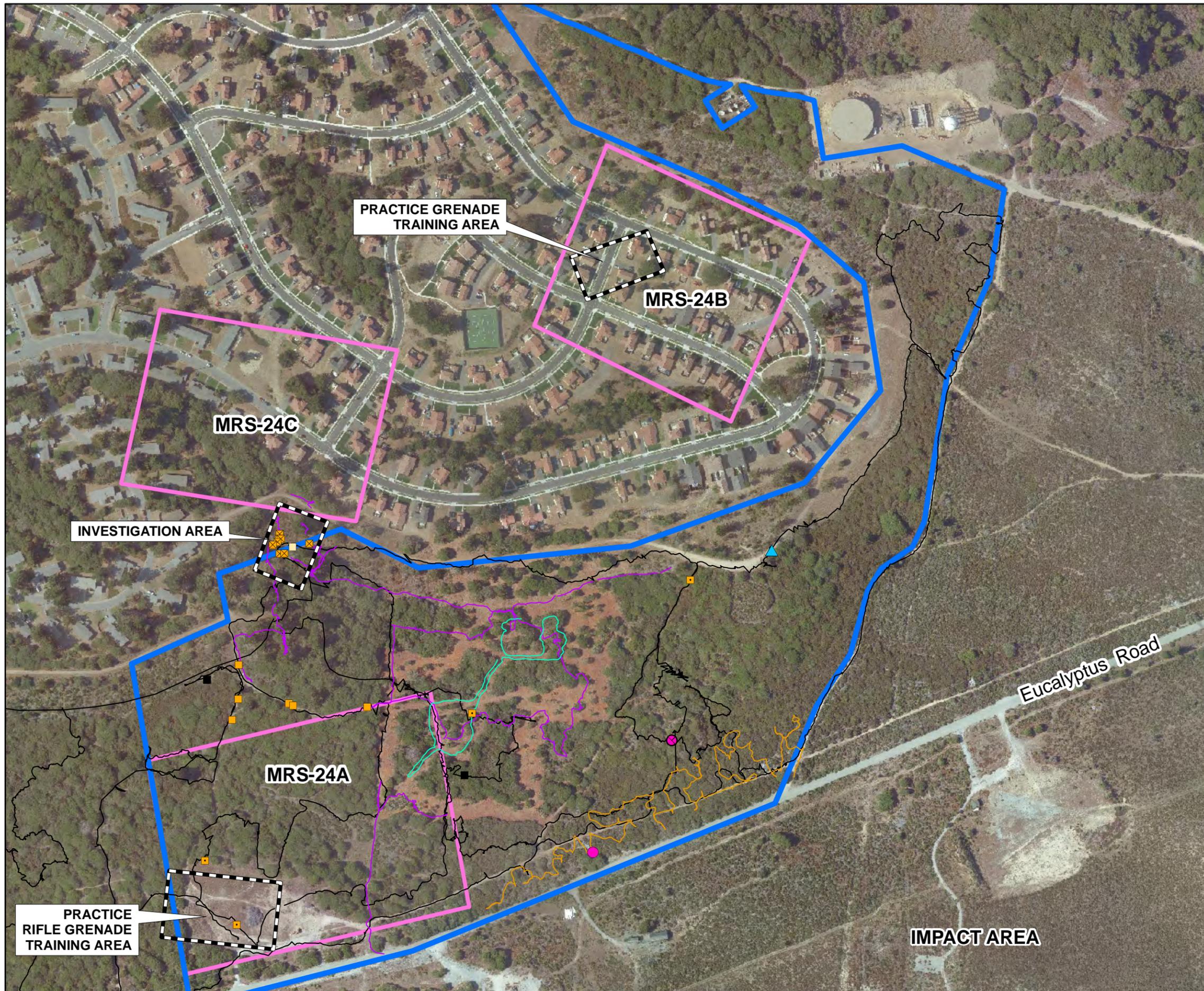
Legend

- E20c.1 Parcel
- Munitions Response Site (from ASR)
- Cleared or Disturbed Areas from Aerial Photos
- Fitch Park Fuel Break (Veg Removal)

Notes:
1. Aerial photograph from 2003.



REVISION	DATE	DESCRIPTION	CHKD	APPR
Shaw Environmental, Inc.		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: C. BURNS DRAWN: K. BLACK CHECKED:		FIGURE 7 FUEL BREAK 2002 FORMER FORT ORD, CALIFORNIA		
SUBMITTED:	DATE	SCALE:	SPEC. No.	
		SHEET	FILE No. E20c1_FB.mxd	



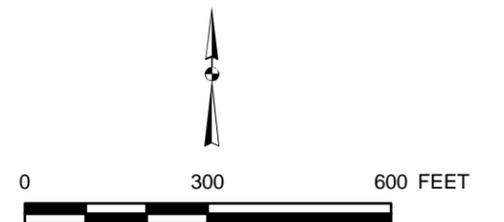
Legend

- E20c.1 Parcel
- Munitions Response Site (from ASR)
- Cleared or Disturbed Areas from Aerial Photos
- Feb.-Mar. 2003 Sitewalk (USACE)
- Dec. 2003 Sitewalk (Shaw)
- Jan. 2006 Sitewalk (USACE)
- Jan. 2008 Sitewalk (USACE)
- Frag 1-4 lbs - MD²
- Frag heavy case - MD²
- Grenade spoon - MD²
- Rifle Grenade Smoke - MD²
- Grenade Safety Lever - MD^{1,2}
- Grenade, hand, fragmentation, MK II - MD
- Grenade, rifle, antitank, practice, M11 series - MD
- Rocket, 2.36inch, practice, M7 series - MD
- Projectile, 57mm, target practice, M306 series - MEC
- Projectile, 57mm, high explosive, M306 series - MEC

Notes:

1. Grenade items found in Investigation Area during January 2006 sitewalk are not included in the MMRP database.
2. No MMRP description available; original field description used instead.
3. Aerial photograph from 2007.

N

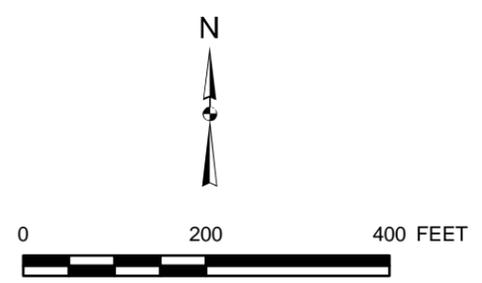


REVISION	DATE	DESCRIPTION	CHKD	APPR
		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: C. BURNS		FIGURE 8 SITE WALKS FORMER FORT ORD, CALIFORNIA		
DRAWN: K. BLACK				
CHECKED:				
SUBMITTED:		DATE:	SCALE:	SPEC. No.
		SHEET:	FILE No. E20c1_sitewalks.mxd	

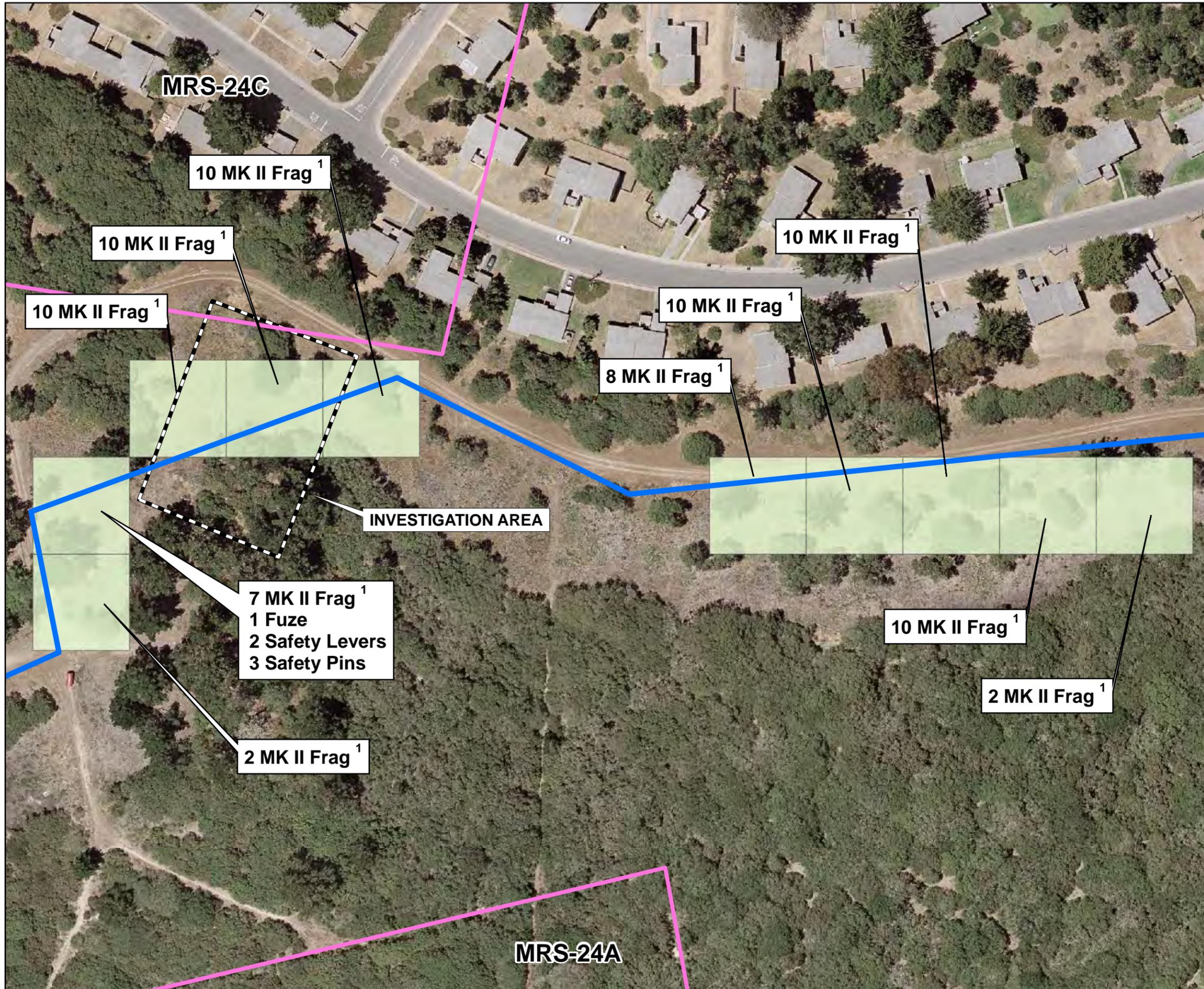


- ### Legend
- E20c.1 Parcel
 - Munitions Response Site (from ASR)
 - Cleared or Disturbed Areas from Aerial Photos
 - Grid Sampled by Shaw
 - Small arms, 30cal - Small Arms
 - Small arms, 50cal - Small Arms
 - Grenade, hand, fragmentation, MK II - MD
 - Projectile, 60mm, mortar, illumination, M721 - MD
 - + Signal, ground, rifle, parachute, M17 series - MD

Notes:
1. Aerial photograph from 2003.



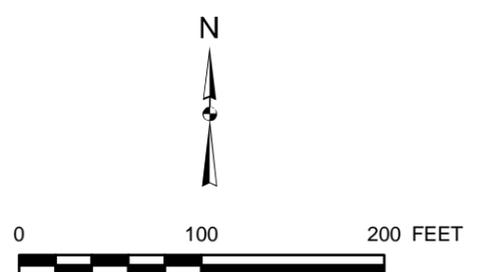
REVISION	DATE	DESCRIPTION	CHKD	APPR
		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: C. BURNS	FIGURE 9 SHAW GRID INVESTIGATION 2004 FORMER FORT ORD, CALIFORNIA			
DRAWN: K. BLACK				
CHECKED:				
SUBMITTED:	DATE	SCALE:	SPEC. No.	
		SHEET	FILE No.	
			E20c1_SHAW_2004.mxd	



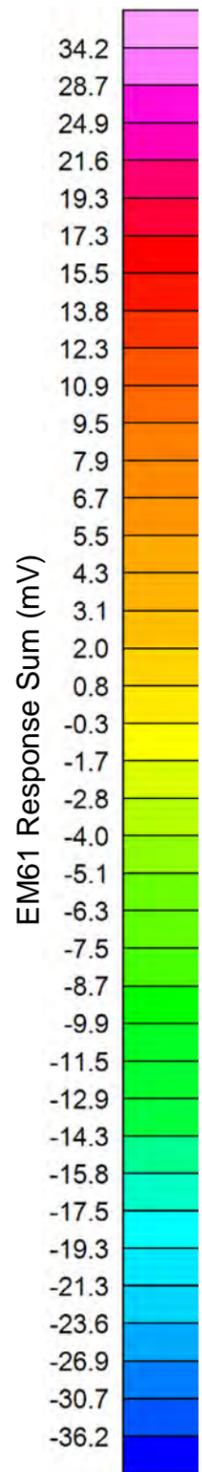
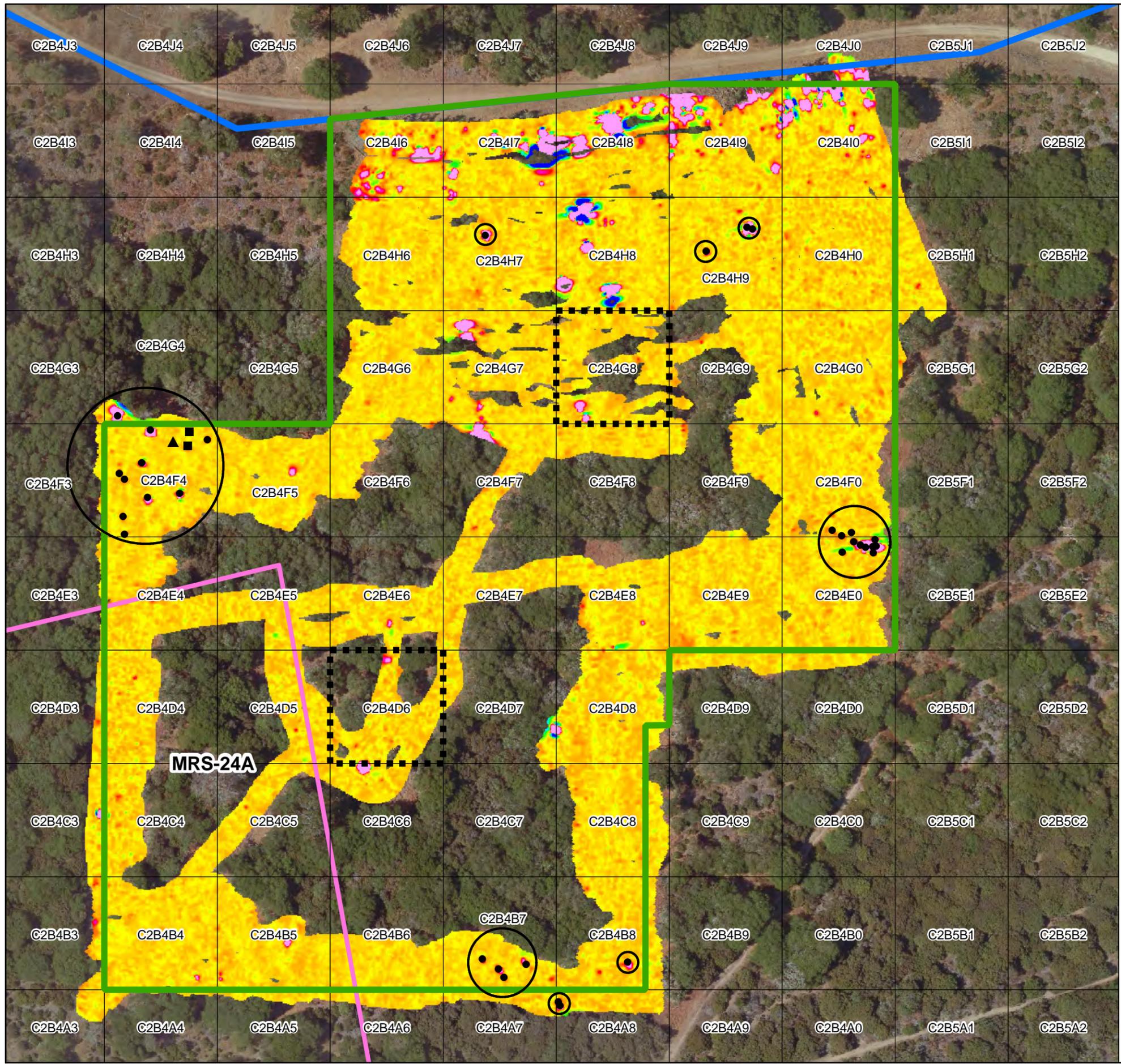
Legend

- E20c.1 Parcel
- Munitions Response Site (from ASR)
- Cleared or Disturbed Areas from Aerial Photos
- 2006 Schonstedt Inspection

Notes:
 1. No coordinates or MMRP descriptions available.
 2. Aerial photograph from 2003.



REVISION	DATE	DESCRIPTION	CHKD	APPR
Shaw Environmental, Inc.		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: C. BURNS	FIGURE 10 USACE GRID INSPECTION 2006 FORMER FORT ORD, CALIFORNIA			
DRAWN: K. BLACK				
CHECKED:				
SUBMITTED:	DATE	SCALE:	SPEC. No.	
		SHEET	FILE No. E20c1_USACE_2006.mxd	



Legend

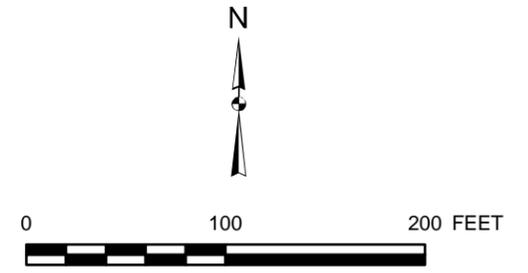
- Anomalies Reacquired and Excavated

Items Found 3/24/08

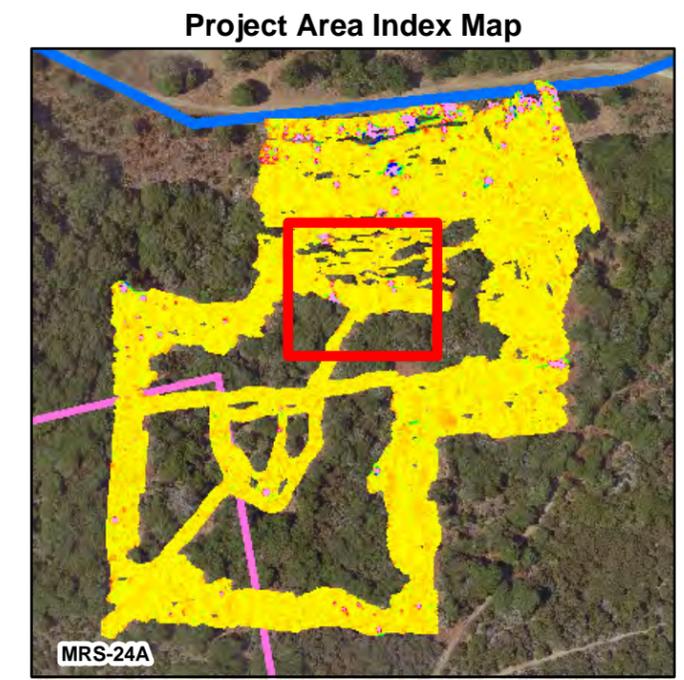
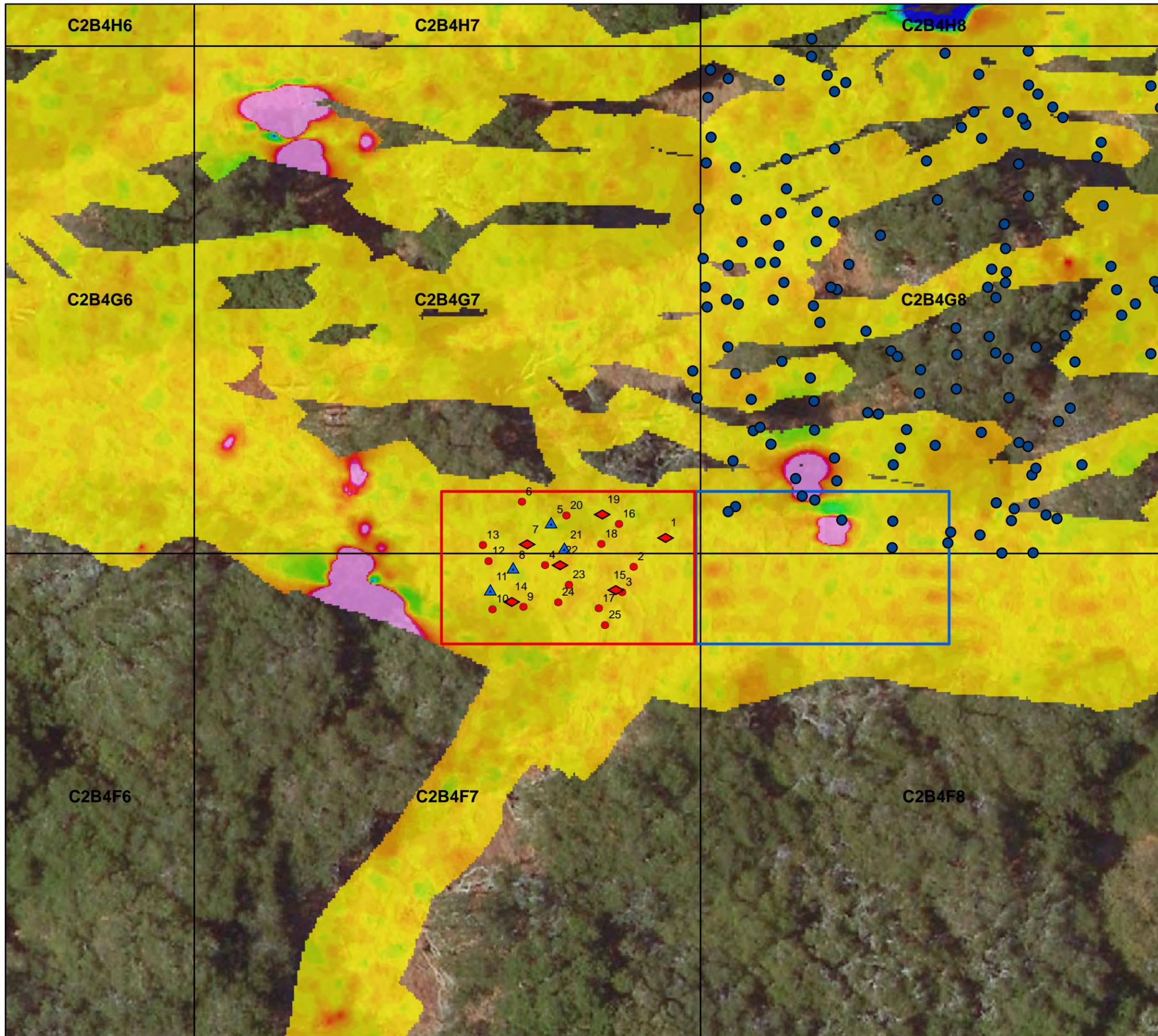
- Cultural Debris
- ▲ MKII grenade frag (neck) - MD¹
- Small Arms

- Master Grid
- ▤ Grid with Concentrated Frag (Shaw 2004)
- ▭ Grenade Frag Area (10.1 acres)
- ▭ Munitions Response Site (from ASR)
- ▭ E20c.1 Parcel

Note:
 1. No MMRP description available; original field description used instead.
 2. Aerial photograph from 2007.



REVISION	DATE	DESCRIPTION	CHKD	APPR
DESIGNED:		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DRAWN:		FIGURE 11 SHAW DGM SURVEY 2007 AND USACE ANOMALY INVESTIGATION 2008 FORMER FORT ORD, CALIFORNIA		
CHECKED:				
SUBMITTED:		DATE:	SCALE:	SPEC. No.
			SHEET	FILE No. E20c1_DGM.mxd

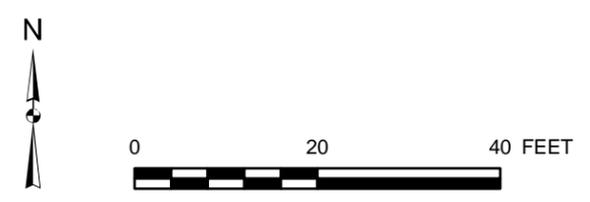


Legend

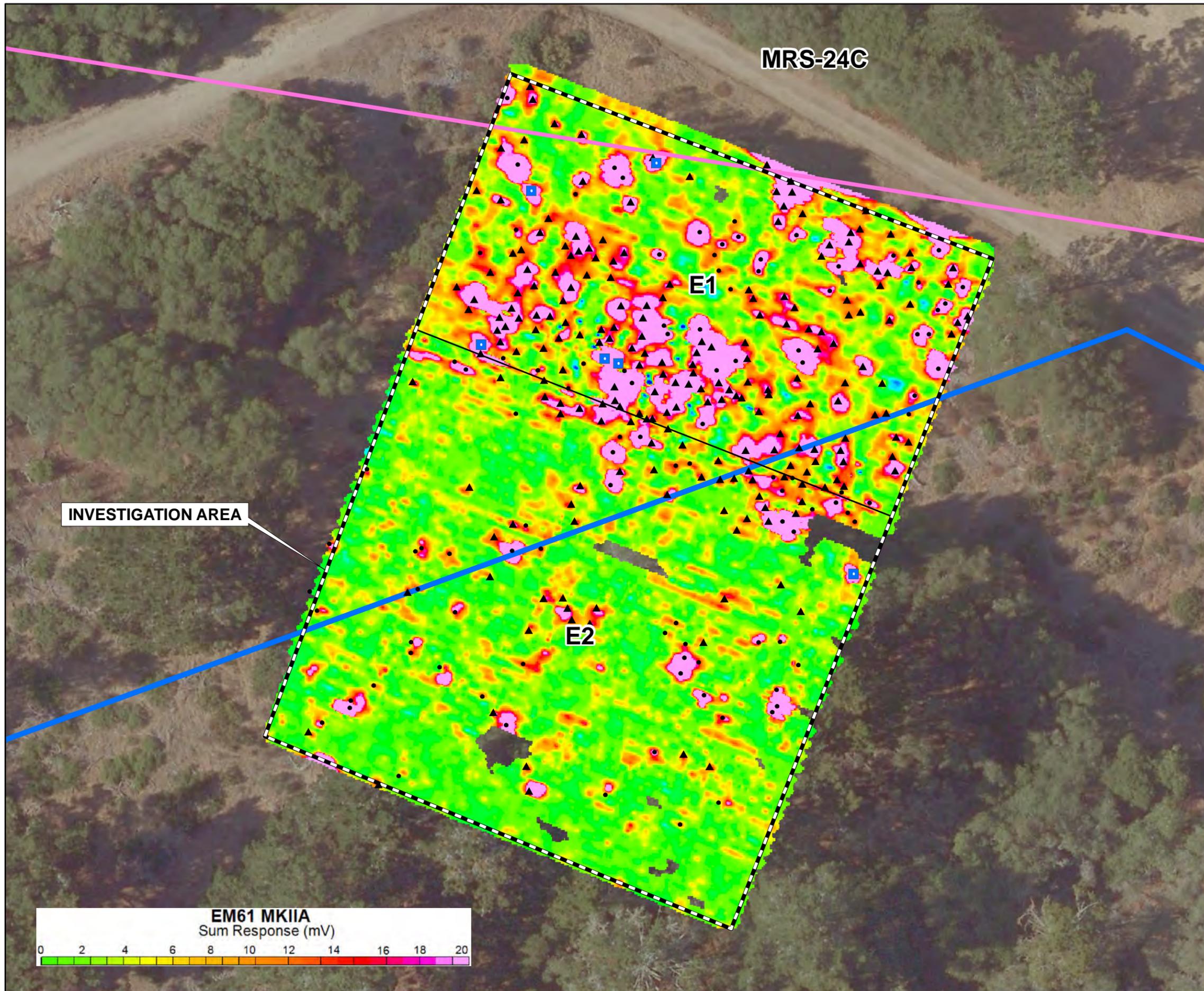
- Previously Located MD
- ▲ Cultural Debris
- ◆ Inert MKII Hand Grenade Seed
- MK II Hand Grenade Fragment Seed
- Test Plot Area
- Additional Survey Area

EM61 Response Sum (mV)

Note:
1. Aerial photograph from 2007.



REVISION	DATE	DESCRIPTION	CHKD	APPR
		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: J. FLEMMER		FIGURE 12 SHAW TEST PLOT 2008 FORMER FORT ORD, CALIFORNIA		
DRAWN: K. BLACK				
CHECKED: M. MIELE				
SUBMITTED:		DATE:	SCALE:	SPEC. No.
		SHEET	FILE No. E20c1_test_plot.mxd	



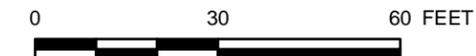
Legend

Items Found

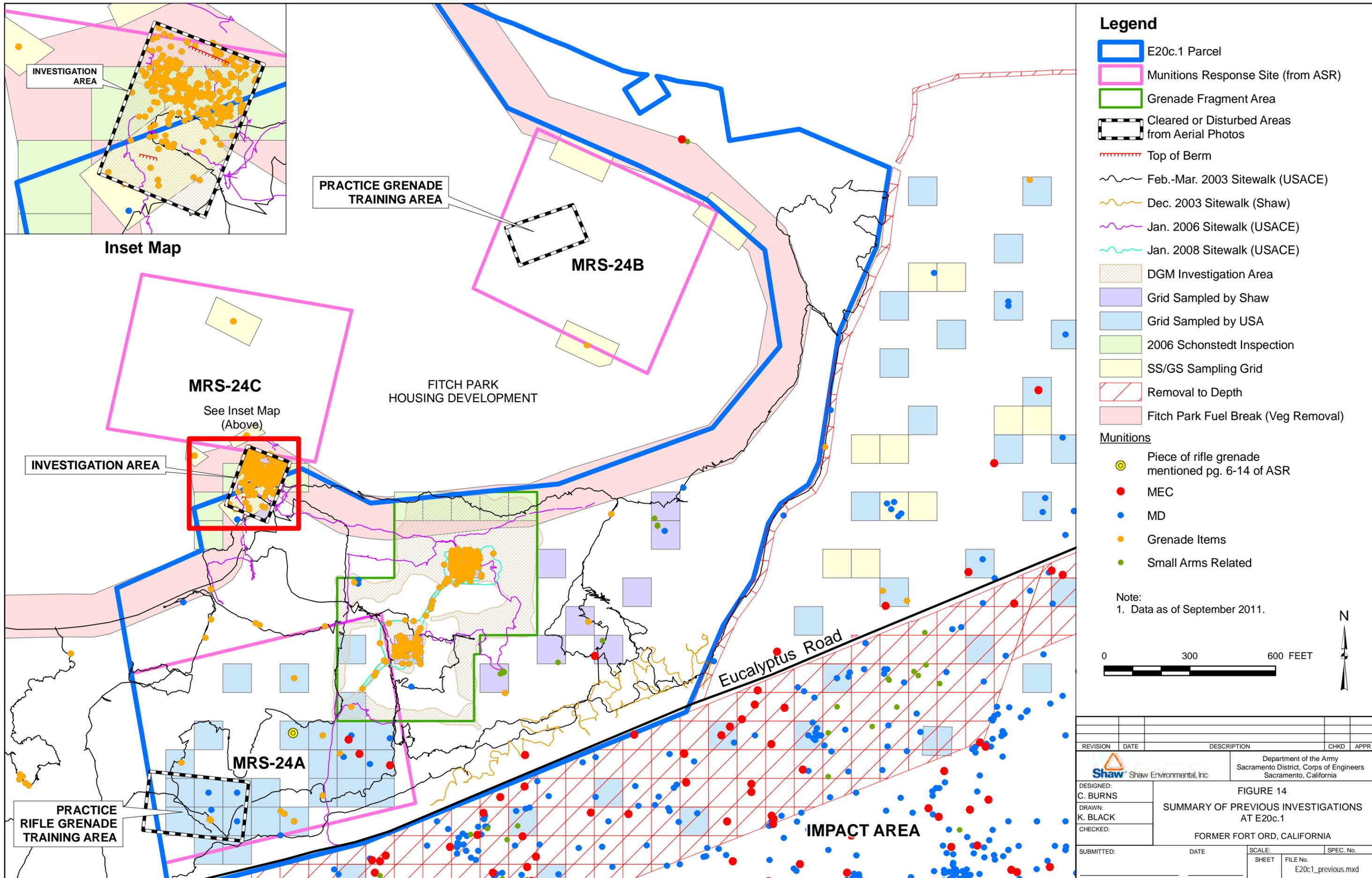
- Cultural Debris
- ▲ Munitions Debris
- Grenade Body
- E20c.1 Parcel
- Munitions Response Site (from ASR)
- Cleared or Disturbed Areas from Aerial Photos

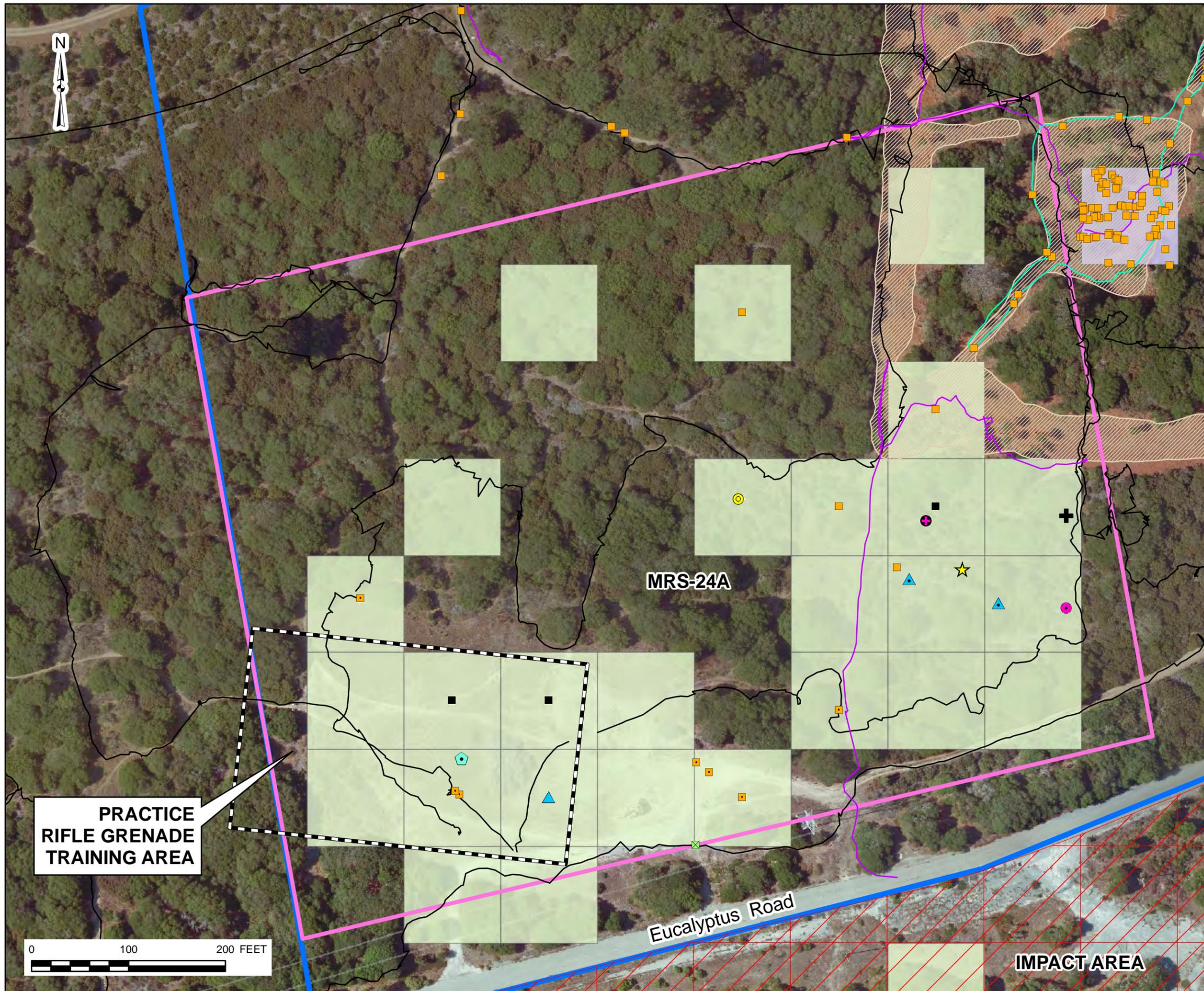
Notes:

1. Grid E1 surveyed October 2009.
2. Grid E2 surveyed February 2010.
3. Aerial photograph from 2007.



REVISION	DATE	DESCRIPTION	CHKD	APPR
		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: C. NYCUM	FIGURE 13 SHAW DGM SURVEY 2009/2010 FORMER FORT ORD, CALIFORNIA			
DRAWN: K. BLACK				
CHECKED:				
SUBMITTED:	DATE	SCALE:	SPEC. No.	
		SHEET	FILE No. E20c1_DGM_2009.mxd	





Legend

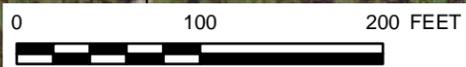
- E20c.1 Parcel
- Feb.-Mar. 2003 Sitewalk (USACE)
- Jan. 2006 Sitewalk (USACE)
- Jan. 2008 Sitewalk (USACE)
- DGM Investigation Area
- Grid Sampled by Shaw
- Grid Sampled by USA
- Parsons Removal to Depth
- Munitions Response Site (from ASR)
- Cleared or Disturbed Areas from Aerial Photos
- Piece of rifle grenade mentioned pg. 6-14 of ASR - MD
- Fragments, Unknown - MD¹
- ◊ Cartridge, ignitor, flame thrower - MD¹
- MK II Frag - MD¹
- Grenade, hand, fragmentation, MK II - MD
- Grenade, hand, practice, MK II - MD
- Grenade, rifle, antitank, practice, M11 series - MD
- Grenade, rifle, antitank, practice, M29 series - MD
- ▲ Rocket, 2.36inch, practice, M7 series - MD
- ▲ Rocket, 3.5inch, practice, M29 series - MD
- + Signal, ground, rifle, parachute, M17 series - MD
- Projectile, 14.5mm, subcaliber, practice, M181 series
- ★ Cartridge, ignition, M2 series - MEC
- Projectile, 60mm, mortar, illumination, M83 series - MEC
- ⊕ Projectile, 81mm, mortar, practice, M43 series - MEC

Note:
 1. No MMRP description available; original field description used instead.
 2. Aerial photograph from 2007.

PRACTICE RIFLE GRENADE TRAINING AREA

Eucalyptus Road

IMPACT AREA



REVISION	DATE	DESCRIPTION	CHKD	APPR
		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: C. BURNS		FIGURE 15 MRS-24A DATA SUMMARY FORMER FORT ORD, CALIFORNIA		
DRAWN: K. BLACK				
CHECKED:				
SUBMITTED:		DATE:	SCALE:	SPEC. No.
		SHEET	FILE No. E20c1_24A_summary.mxd	



Legend

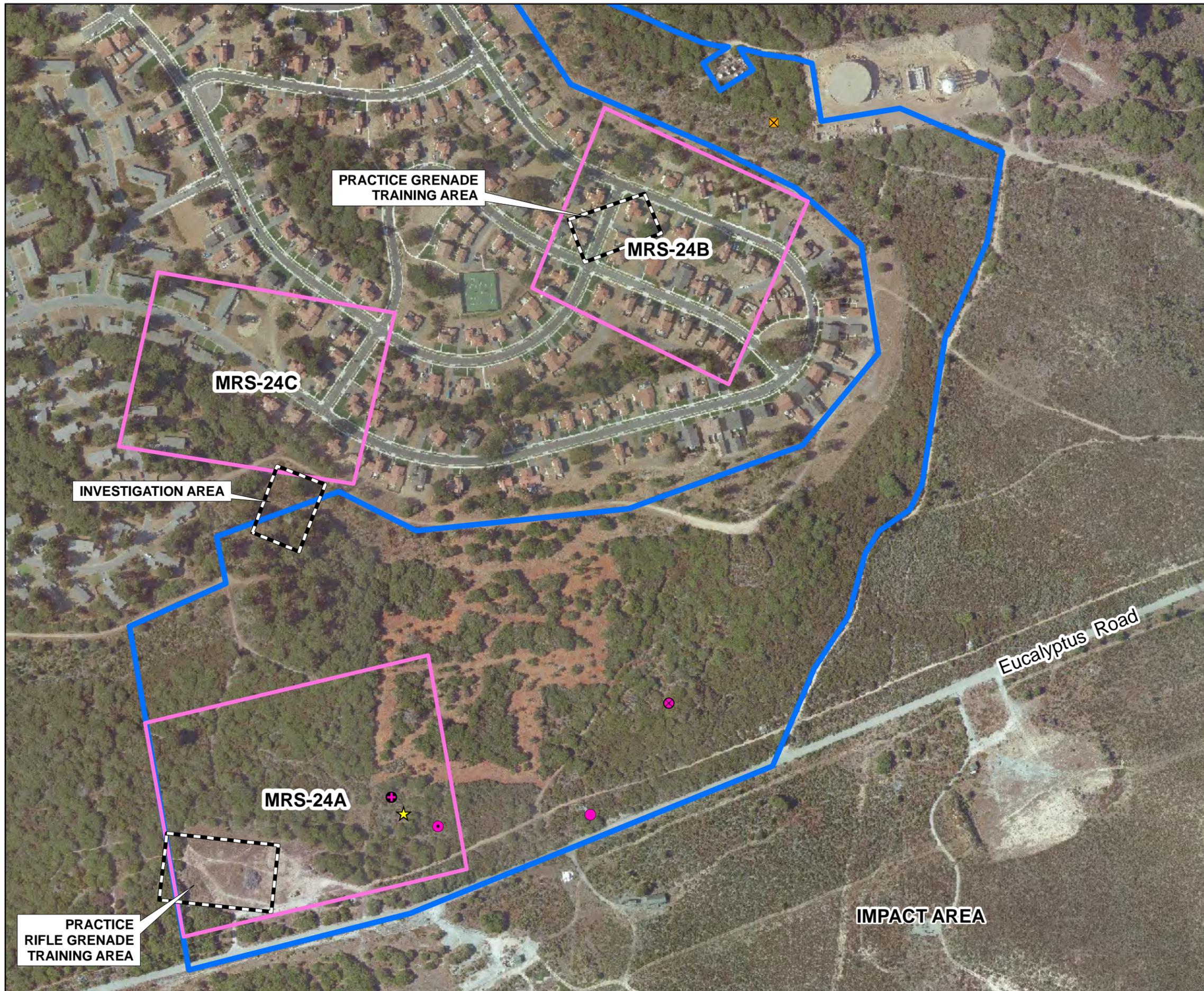
- E20c.1 Parcel
- Munitions Response Site (from ASR)
- Cleared or Disturbed Areas from Aerial Photos
- Top of Berm
- Feb.-Mar. 2003 Sitewalk (USACE)
- Jan. 2006 Sitewalk (USACE)
- DGM Investigation Area
- 2006 Schonstedt Investigation
- SS/GS Sampling Grid
- Fitch Park Fuel Break (Veg Removal)
- Grenade spoon - MD²
- Grenade Safety Lever - MD²
- Grenade Items - MD²

Notes:

1. Items listed by grid are only associated with grid IDs in the Fort Ord MMRP Database, no individual coordinates available.
2. No MMRP description available; original field description used instead.
3. No coordinates or MMRP descriptions available.
4. Aerial photograph from 2007.



REVISION	DATE	DESCRIPTION	CHKD	APPR
		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: C. BURNS	FIGURE 16 MRS-24C DATA SUMMARY FORMER FORT ORD, CALIFORNIA			
DRAWN: K. BLACK				
CHECKED:				
SUBMITTED:	DATE	SCALE:	SPEC. No.	
		SHEET	FILE No. E20c1_24C_summary.mxd	

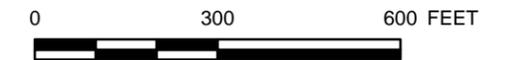


Legend

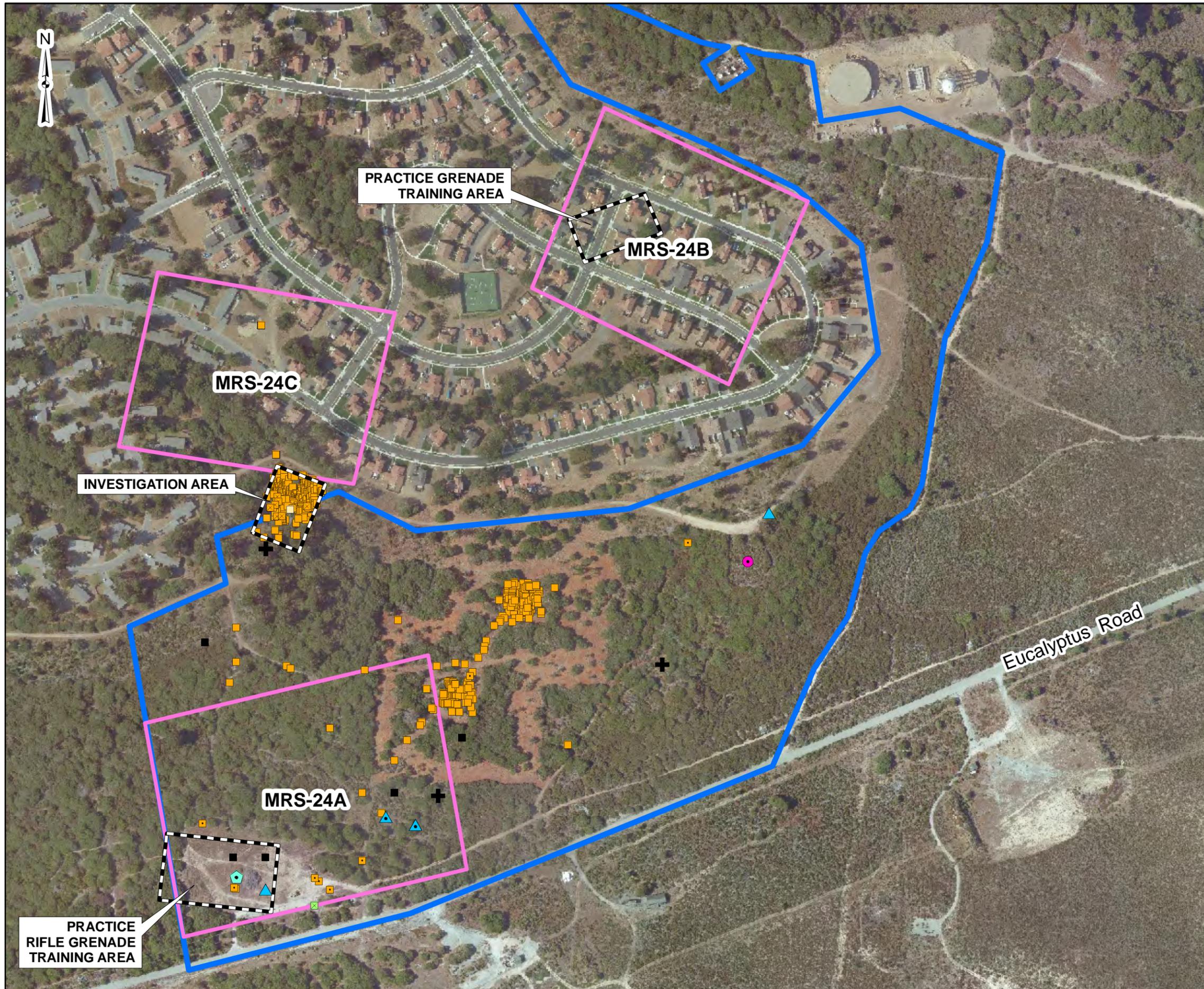
- E20c.1 Parcel
- Munitions Response Site (from ASR)
- Cleared or Disturbed Areas from Aerial Photos
- ✕ Grenade, rifle, smoke, M23A1
- ★ Cartridge, ignition, M2 series
- Projectile, 57mm, target practice, M306 series
- ⊗ Projectile, 57mm, high explosive, M306 series
- Projectile, 60mm, mortar, illumination, M83 series
- ⊕ Projectile, 81mm, mortar, practice, M43 series

Notes:

1. Only MEC from MRS-24A, MRS24C including the Investigation Area, and the remainder of Parcel E20c.1, is shown.
2. Aerial photograph from 2007.



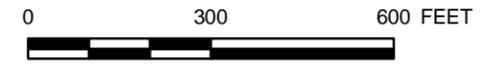
REVISION	DATE	DESCRIPTION	CHKD	APPR
		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: C. BURNS DRAWN: K. BLACK CHECKED:		FIGURE 17 IDENTIFIED MEC ITEMS FORMER FORT ORD, CALIFORNIA		
SUBMITTED: _____		DATE: _____	SCALE: _____	SPEC. No. _____
		SHEET _____	FILE No. E20c1_MEC.mxd	



Legend

- E20c.1 Parcel
- Munitions Response Site (from ASR)
- Cleared or Disturbed Areas from Aerial Photos
- Fragments, Unknown³
- Frag 1-4 lbs³
- Frag heavy case³
- ◆ Cartridge, ignitor, flame thrower - MD³
- Projectile, 14.5mm, subcaliber, practice, M181 series
- Grenade spoon³
- MK II Frag³
- MKII grenade frag (neck)³
- Rifle Grenade Smoke³
- Grenade, hand, fragmentation, MK II
- Grenade, hand, practice, MK II
- Grenade, rifle, antitank, practice, M11 series
- Grenade, rifle, antitank, practice, M29 series
- Projectile, 60mm, mortar, illumination, M721 series
- ▲ Rocket, 2.36inch, practice, M7 series
- ▲ Rocket, 3.5inch, practice, M29 series
- + Signal, ground, rifle, parachute, M17 series
- + Signal, illumination, ground, M125 series
- + Signal, illumination, ground, parachute, rifle, M19 series
- + Signal, smoke and illumination, marine, AN-MK13, MOD 0

- Notes:
1. Only MD from MRS-24A, MRS24C including the Investigation Area, and the remainder of Parcel E20c.1, are shown.
 2. This figure only displays individual items associated with coordinates in the Fort Ord MMRP Database.
 3. No MMRP description available; original field description used instead.
 4. Items found during sampling in MRS-24C are associated with grid IDs in MMRP database, no individual coordinates available.
 5. Aerial photograph from 2007.



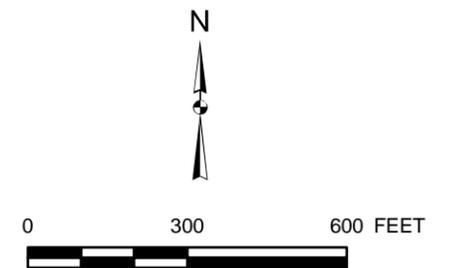
REVISION	DATE	DESCRIPTION	CHKD	APPR
		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: C. BURNS		FIGURE 18 IDENTIFIED MD ITEMS FORMER FORT ORD, CALIFORNIA		
DRAWN: K. BLACK				
CHECKED:				
SUBMITTED:		DATE:	SCALE:	SPEC. No.
		SHEET:	FILE No.	E20c1_MD.mxd



Legend

- E20c.1 Parcel
- Munitions Response Site
- Track Recommendations**
- Track 1, Category 1
- Track 1, Category 3
- Track 1, Category 3 variant

Notes:
 1. Aerial photograph from 2009.



REVISION	DATE	DESCRIPTION	CHKD	APPR
Shaw Environmental, Inc.		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: C. BURNS DRAWN: K. BLACK CHECKED:		FIGURE 19 TRACK 1 RECOMMENDATIONS FORMER FORT ORD, CALIFORNIA		
SUBMITTED: _____		DATE: _____	SCALE: _____	SPEC. No. _____
		SHEET _____	FILE No. E20c1_tracks.mxd	

Appendix C
Tables

**Table 1
MEC and MD Items Identified Within MRS-24A**

Site	Found Date	Contractor	Quantity	Depth (in)	Original Field Description	Model	MMRP Description	Type
MRS-24A	9/18/1996	USA	0	0	-	148	Grenade, hand, fragmentation, MK II	MD
MRS-24A	9/18/1996	USA	1	0	-	133	Grenade, hand, practice, MK II	MD
MRS-24A	9/18/1996	USA	1	0	-	358	Rocket, 3.5inch, practice, M29 series	MD
MRS-24A	9/18/1996	USA	1	0	-	1219	Cartridge, ignition, M2 series	MEC
MRS-24A	9/23/1996	USA	1	0	-	160	Grenade, rifle, antitank, practice, M29	MD
MRS-24A	9/23/1996	USA	1	0	CTG, IGNITOR, FLAME THROWER (Model Unknown)	-	-	MD
MRS-24A	9/30/1996	USA	0	0	-	148	Grenade, hand, fragmentation, MK II	MD
MRS-24A	8/10/2000	USA	0	0	-	133	Grenade, hand, practice, MK II	MD
MRS-24A	8/10/2000	USA	1	2	-	156	Grenade, rifle, antitank, practice, M11 series	MD
MRS-24A	8/10/2000	USA	0	4	-	156	Grenade, rifle, antitank, practice, M11 series	MD
MRS-24A	8/10/2000	USA	1	2	-	227	Projectile, 14.5mm, subcaliber, practice, M181 series	MD
MRS-24A	8/10/2000	USA	0	0	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24A	8/10/2000	USA	1	3	-	433	Projectile, 81mm, mortar, practice, M43 series	MEC
MRS-24A	8/14/2000	USA	1	0	-	302	Projectile, 60mm, mortar, illumination, M83 series	MEC
MRS-24A	8/14/2000	USA	0	0	-	156	Grenade, rifle, antitank, practice, M11 series	MD
MRS-24A	8/14/2000	USA	1	2	-	358	Rocket, 3.5inch, practice, M29 series	MD
MRS-24A	8/14/2000	USA	1	0	-	369	Signal, ground, rifle, parachute, M17 series	MD
MRS-24A	8/14/2000	USA	0	0	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24A	8/14/2000	USA	0	0	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24A	8/16/2000	USA	1	6	-	156	Grenade, rifle, antitank, practice, M11 series	MD
MRS-24A	8/16/2000	USA	0	0	-	353	Rocket, 2.36inch, practice, M7	MD
MRS-24A	8/16/2000	USA	0	0	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24A	2/24/2003	USACE	1	4	-	156	Grenade, rifle, antitank, practice, M11 series	MD
MRS-24A	2/24/2003	USACE	1	2	-	156	Grenade, rifle, antitank, practice, M11 series	MD
MRS-24A	1/9/2008	USACE	1	4	MK II Frag	-	-	MD
MRS-24A	1/9/2008	USACE	1	4	MK II Frag	-	-	MD
MRS-24A	1/9/2008	USACE	1	4	MK II Frag	-	-	MD
MRS-24A	1/9/2008	USACE	1	4	MK II Frag	-	-	MD
MRS-24A	1/9/2008	USACE	1	4	MK II Frag	-	-	MD
MRS-24A	1/9/2008	USACE	1	4	MK II Frag	-	-	MD

Note: List of items located within the MRS-24A boundary was generated from the Fort Ord Data MMRP Database. The "MMRP Description" is assigned after the "Original Field Description" has been through the quality control process to provide standard nomenclature. "MMRP Description" is blank if the "Original Field Description" could not be confirmed. Original Field description is blank if MMRP description is assigned. In cases where quantity is "0", a weight was typically recorded instead.

in - inches

MD - munitions debris

MEC - munitions and explosives of concern

USA - USA Environmental

USACE - U.S. Army Corps of Engineers

Table 2
MD Items Identified Within MRS-24C and the Investigation Area

Site	Found Date	Contractor	Quantity	Depth (in)	Original Field Description	Model	MMRP Description	Type
MRS-24C	4/28/1997	USA	1	6	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/28/1997	USA	1	4	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/28/1997	USA	1	2	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/28/1997	USA	1	6	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/28/1997	USA	1	3	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/28/1997	USA	1	4	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/28/1997	USA	1	4	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/28/1997	USA	1	1	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/28/1997	USA	1	1	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/28/1997	USA	1	3	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/28/1997	USA	1	2	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/28/1997	USA	1	2	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/28/1997	USA	1	2	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/28/1997	USA	1	2	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/28/1997	USA	1	3	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/28/1997	USA	1	4	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/28/1997	USA	1	2	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/28/1997	USA	1	4	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/29/1997	USA	1	6	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/29/1997	USA	1	5	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/29/1997	USA	1	5	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/29/1997	USA	1	12	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/29/1997	USA	1	6	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/29/1997	USA	1	10	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/29/1997	USA	1	5	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/29/1997	USA	1	3	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/29/1997	USA	1	4	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/29/1997	USA	1	3	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/29/1997	USA	1	3	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/29/1997	USA	1	6	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/29/1997	USA	1	6	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/29/1997	USA	1	4	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/29/1997	USA	1	5	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/29/1997	USA	1	3	-	89	Fuze, grenade, hand, practice, M228	MD
MRS-24C	4/29/1997	USA	1	4	-	89	Fuze, grenade, hand, practice, M228	MD
MRS-24C	4/29/1997	USA	1	6	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/29/1997	USA	1	2	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/29/1997	USA	1	4	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/29/1997	USA	1	6	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/30/1997	USA	1	4	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/30/1997	USA	1	2	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/30/1997	USA	1	3	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/30/1997	USA	1	8	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/30/1997	USA	1	3	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/30/1997	USA	1	2	FRAGMENTS, UNKNOWN	-	-	MD

Table 2
MD Items Identified Within MRS-24C and the Investigation Area

Site	Found Date	Contractor	Quantity	Depth (in)	Original Field Description	Model	MMRP Description	Type
MRS-24C	4/30/1997	USA	1	6	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/30/1997	USA	1	4	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/30/1997	USA	1	1	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/30/1997	USA	1	4	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/30/1997	USA	1	3	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/30/1997	USA	1	4	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/30/1997	USA	1	3	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/30/1997	USA	1	1	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/30/1997	USA	1	1	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/30/1997	USA	1	6	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/30/1997	USA	1	3	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/30/1997	USA	1	4	FRAGMENTS, UNKNOWN	-	-	MD
MRS-24C	4/30/1997	USA	1	3	FRAGMENTS, UNKNOWN	-	-	MD
Investigation Area	10/22/2009	Shaw	1	3	Hollow (empty) MKII grenade body	-	-	MD
Investigation Area	10/22/2009	Shaw	1	2	Hollow (empty) MKII grenade body	-	-	MD
Investigation Area	10/22/2009	Shaw	1	3	Hollow (empty) MKII grenade body	-	-	MD
Investigation Area	10/22/2009	Shaw	2	12	Hollow (empty) MKII grenade body	-	-	MD
Investigation Area	10/22/2009	Shaw	1	12	Hollow (empty) MKII grenade body	-	-	MD
Investigation Area	10/22/2009	Shaw	1	4	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	4	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	2	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	2	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	4	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	8	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	14	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	3	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	1	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	4	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	14	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	10	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	30	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	14	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	10	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	8	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	6	MKII Frag	-	-	MD

Table 2
MD Items Identified Within MRS-24C and the Investigation Area

Site	Found Date	Contractor	Quantity	Depth (in)	Original Field Description	Model	MMRP Description	Type
Investigation Area	10/22/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	10	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	10	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	4	Hollow (empty) MKII grenade body	-	-	MD
Investigation Area	10/22/2009	Shaw	1	4	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	3	4	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	8	30	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	4	12	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	6	12	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	4	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	5	18	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	12	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	7	5	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	4	5	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	3	12	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	3	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	4	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	8	8	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	18	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	10	30	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	3	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	9	8	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	5	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	4	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	3	8	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	6	7	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	8	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	6	8	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	6	3	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	4	8	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	6	MKII Frag	-	-	MD

Table 2
MD Items Identified Within MRS-24C and the Investigation Area

Site	Found Date	Contractor	Quantity	Depth (in)	Original Field Description	Model	MMRP Description	Type
Investigation Area	10/22/2009	Shaw	2	12	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	8	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	5	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	12	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	3	12	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	9	30	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	3	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	4	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	12	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	4	8	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	8	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	18	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	3	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	5	8	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	8	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	4	24	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	3	8	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	8	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	3	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	3	7	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	14	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	8	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	14	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	8	8	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	12	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	3	12	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	14	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	10	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	7	6	MKII Frag	-	-	MD
Investigation Area	10/22/2009	Shaw	2	4	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	4	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	4	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	8	MKII Frag	-	-	MD

Table 2
MD Items Identified Within MRS-24C and the Investigation Area

Site	Found Date	Contractor	Quantity	Depth (in)	Original Field Description	Model	MMRP Description	Type
Investigation Area	10/23/2009	Shaw	1	5	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	24	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	10	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	10	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	8	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	2	4	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	2	10	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	8	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	3	10	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	2	13	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	4	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	2	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	4	10	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	7	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	7	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	12	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	8	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	3	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	7	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	4	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	12	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	10	12	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	2	18	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	5	12	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	10	10	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	3	9	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	4	24	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	2	5	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	3	3	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	1	14	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	2	24	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	2	10	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	3	8	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	5	13	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	2	3	MKII Frag	-	-	MD

Table 2
MD Items Identified Within MRS-24C and the Investigation Area

Site	Found Date	Contractor	Quantity	Depth (in)	Original Field Description	Model	MMRP Description	Type
Investigation Area	10/23/2009	Shaw	4	8	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	2	3	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	2	9	MKII Frag	-	-	MD
Investigation Area	10/23/2009	Shaw	3	8	MKII Frag	-	-	MD
Investigation Area	2/24/2010	Shaw	1	3	MKII Frag	-	-	MD
Investigation Area	2/24/2010	Shaw	1	4	MKII Frag	-	-	MD
Investigation Area	2/24/2010	Shaw	1	4	MKII Frag	-	-	MD
Investigation Area	2/24/2010	Shaw	1	3	MKII Frag	-	-	MD
Investigation Area	2/24/2010	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	2/24/2010	Shaw	2	3	MKII Frag	-	-	MD
Investigation Area	2/24/2010	Shaw	43	12	MKII Frag	-	-	MD
Investigation Area	2/24/2010	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	2/24/2010	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	2/24/2010	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	2/24/2010	Shaw	7	4	MKII Frag	-	-	MD
Investigation Area	2/24/2010	Shaw	1	4	MKII Frag	-	-	MD
Investigation Area	2/24/2010	Shaw	1	4	MKII Frag	-	-	MD
Investigation Area	2/24/2010	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	2/24/2010	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	2/24/2010	Shaw	1	0	MKII Frag	-	-	MD
Investigation Area	2/24/2010	Shaw	1	3	MKII Frag	-	-	MD
Investigation Area	2/24/2010	Shaw	3	8	MKII Frag	-	-	MD
Investigation Area	2/24/2010	Shaw	1	3	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	4	4	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	6	8	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	3	3	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	4	6	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	4	4	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	4	4	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	7	4	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	67	12	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	3	6	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	7	4	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	1	4	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	3	6	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	3	6	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	5	4	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	2	6	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	3	3	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	3	4	MKII Frag	-	-	MD

Table 2
MD Items Identified Within MRS-24C and the Investigation Area

Site	Found Date	Contractor	Quantity	Depth (in)	Original Field Description	Model	MMRP Description	Type
Investigation Area	2/25/2010	Shaw	6	4	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	3	3	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	6	6	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	4	4	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	5	6	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	3	4	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	4	6	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	5	4	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	5	6	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	7	6	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	3	6	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	4	4	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	3	4	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	5	6	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	1	6	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	2	2	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	3	3	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	3	4	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	4	6	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	4	6	MKII Frag	-	-	MD
Investigation Area	2/25/2010	Shaw	1	6	MKII Frag	-	-	MD

Note: List of items located within the MRS-24C and Investigation Area boundary was generated from the Fort Ord MMRP Database. The "MMRP Description" is assigned after the "Original Field Description" has been through the quality control process to provide standard nomenclature. "MMRP Description" is blank if the "Original Field Description" could not be confirmed. Original Field description is blank if MMRP description is assigned. In cases where quantity is "0", a weight was typically recorded instead.

in - inches

MD - munitions debris

Shaw - Shaw Environmental, Inc.

USA - USA Environmental

Table 3
MEC and MD Items Identified Within the Remainder of Parcel E20c.1

Site	Found Date	Contractor	Quantity	Depth (in)	Original Field Description	Model	MMRP Description	Type
E20c.1 Remainder	1/12/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	0	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	0	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	4	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	0	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	3	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	0	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	3	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	0	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	3	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	0	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	3	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	5	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	3	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/12/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/13/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/13/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/13/2004	Shaw	1	3	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/13/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD

Table 3
MEC and MD Items Identified Within the Remainder of Parcel E20c.1

Site	Found Date	Contractor	Quantity	Depth (in)	Original Field Description	Model	MMRP Description	Type
E20c.1 Remainder	1/13/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/13/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/13/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/13/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/13/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/13/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/13/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/13/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/13/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/13/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/13/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/13/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/13/2004	Shaw	1	2	-	301	Projectile, 60mm, mortar, illumination, M721	MD
E20c.1 Remainder	1/13/2004	Shaw	1	2	-	17	Small arms, 50cal	SAA
E20c.1 Remainder	1/13/2004	Shaw	1	2	-	17	Small arms, 50cal	SAA
E20c.1 Remainder	1/13/2004	Shaw	1	1	-	17	Small arms, 50cal	SAA
E20c.1 Remainder	1/13/2004	Shaw	1	1	-	17	Small arms, 50cal	SAA
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	0	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	0	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	0	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	5	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	4	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	0	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD

Table 3
MEC and MD Items Identified Within the Remainder of Parcel E20c.1

Site	Found Date	Contractor	Quantity	Depth (in)	Original Field Description	Model	MMRP Description	Type
E20c.1 Remainder	1/14/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	3	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	0	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	0	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	0	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	0	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	3	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	0	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	0	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	4	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	1	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	0	-	148	Grenade, hand, fragmentation, MK II	MD
E20c.1 Remainder	1/14/2004	Shaw	1	0	-	369	Signal, ground, rifle, parachute, M17 series	MD
E20c.1 Remainder	1/14/2004	Shaw	1	0	-	15	Small arms, 30cal	SAA
E20c.1 Remainder	1/14/2004	Shaw	1	1	-	17	Small arms, 50cal	SAA
E20c.1 Remainder	1/14/2004	Shaw	1	2	-	17	Small arms, 50cal	SAA
E20c.1 Remainder	1/14/2004	Shaw	1	1	-	17	Small arms, 50cal	SAA
E20c.1 Remainder	1/14/2004	Shaw	1	1	-	17	Small arms, 50cal	SAA
E20c.1 Remainder	1/14/2004	Shaw	1	1	-	17	Small arms, 50cal	SAA
E20c.1 Remainder	1/14/2004	Shaw	1	1	-	17	Small arms, 50cal	SAA
E20c.1 Remainder	1/14/2004	Shaw	1	1	-	17	Small arms, 50cal	SAA
E20c.1 Remainder	1/15/2004	Shaw	1	0	-	15	Small arms, 30cal	SAA
E20c.1 Remainder	1/9/2008	USACE	1	4	MK II Frag	-	-	MD
E20c.1 Remainder	1/9/2008	USACE	1	4	MK II Frag	-	-	MD
E20c.1 Remainder	1/9/2008	USACE	1	4	MK II Frag	-	-	MD
E20c.1 Remainder	1/9/2008	USACE	1	4	MK II Frag	-	-	MD

Appendix D
Technical Information Paper
E20c.1 Additional Investigation Area

**TECHNICAL INFORMATION PAPER
E20C.1 ADDITIONAL INVESTIGATION AREA**

OCTOBER 2010

1.0 Introduction

This report presents the results of two geophysical surveys conducted within a 0.8-acre area located partially within Parcel E20c.1 at the former Fort Ord, California. The work was performed by Shaw Environmental (Shaw) for the United States Army Corps of Engineers (USACE), Sacramento District, Contract No. DACW05-96-D-0011, Task Order No. 0016.

A test plot was constructed by Shaw in September 2008 to determine the effectiveness of three geophysical methods (EM61-MK2A, G858 cesium vapor magnetometer, and Schonstedt magnetometer) in detecting seeded intact MKII grenades. The test plot survey showed that the EM61, G858, and Schonstedts can reliably detect intact MKII hand grenades at their expected depths (up to 12 inches below ground surface) (Shaw, 2009).

The purpose of the survey following establishment of the test plot was to identify subsurface anomalies in an area suspected to have been a live grenade training range. Digital geophysical mapping (DGM) was performed with a Geonics EM61-MK2A metal detector. Two survey grids (E1 and E2) were established by the Shaw project team. The initial survey took place in October 2009 in grid E1. The area of investigation was then expanded and an additional survey was conducted in February 2010 in grid E2.

The investigation was conducted in an area suspected to have been a live grenade training range. The area was delineated based on a cleared area visible on historical aerial photographs. Various munitions and explosives of concern (MEC) sampling and investigation activities have been performed in and near this area, during which hand grenade fragments were found. An intact live MKII fragmentation hand grenade has never been found.

This work was authorized by Field Work Variances (FWV) 032 and 035 issued to supplement the *Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California*, Revision 0 (Shaw, 2007).

This report includes the following figures, tables and appendices:

- Table 1 Grid Corners and QC Point Locations
- Table 2 EM61 Targets with Reacquisition and Dig Results
- Figure 1 Site Location
- Figure 2 Survey Paths
- Figure 3 EM61 MK2A Sum Results
- Photograph 1 E20c.1 Excavated Items
- Appendix A Field Logs and Fiducial Guidelines

- Appendix B Data Processing Logs
- Appendix C QC Logs
- Appendix D Weighted Sum Method

Geophysical data and electronic files are available upon request.

2.0 Methodology

The following sections describe the approach and methodology used for the survey.

2.1 Survey Location

The two survey grids (E1 and E2) were established within the investigation area by the Shaw project team. Prior to DGM, the four corners of each grid were staked. Vegetation was cleared in and around the survey area. A few trees located within the survey area were too large to remove and were left in place. In addition, the site was surrounded by larger trees that limited the view of the horizon. Figure 1 shows the location of the two grids.

Prior to the survey, Shaw geophysicists placed pipe fittings within the survey grids and recorded locations with a global positioning system (GPS) unit for quality control (QC) purposes. The positions for two of the six items were recorded using RTK GPS, while the positions for the remaining four were recorded in a local coordinate system due to the absence of satellite coverage. The locations were screened with the EM61-MK2A for preexisting anomalies before they were placed and their locations were logged in the field log. Table 1 lists the survey area corners and QC item locations for the first and second surveys.

2.2 EM61 Survey

Prior to the EM61 MK2A survey of grids E1 and E2, an area free of geophysical noise near the survey area was located using the EM61-MK2A. The calibration tests outlined in the *Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California* (Shaw, 2007) were then performed. The same calibration tests were also performed after the survey was completed. The results of the calibration tests are included in Appendix C.

The EM61-MK2A was used concurrently with the Leica SR530 RTK GPS with the GPS antenna mounted directly over the center of the EM61-MK2A coils. However, the GPS data were of extremely low quality due to the tree canopy and a limited viewing horizon. Therefore, survey data was collected as a fiducial survey while concurrently recording GPS locations for both grids.

The EM61-MK2A survey included multiple passes in parallel lines spaced 2 feet apart. Traffic cones were placed at either end of each survey line and at three locations within the grid for

guidance. The survey was conducted following the same guidelines (included in Appendix A) for fiducial surveys used on Burn Units 18/22. Figure 2 shows the surveyed line paths.

2.2.1 EM61-MK2A Data Processing, Target Selection, and General Results

The data were processed using standard Geosoft Oasis Montaj processing routines. The processing steps included leveling the data to remove the effects of instrument drift and correcting for instrument latency. After the data were corrected, the four-channel sum was calculated. Data processing steps for each data set are logged in Form G-5 included in Appendix B.

Targets were initially selected automatically using Geosoft's Oasis Montaj target selection routine using a sum threshold of 14 millivolts (mV). Targets were then merged and adjusted manually. Two hundred and forty-seven targets were selected from the EM61 MK2A data in grid E1 and 150 targets were selected from the data in grid E2, resulting in a total of 397 targets. Figure 3 shows the EM61-MK2A data and targets. Target density was higher in the northern portion of the investigation area, in grid E1.

When processing the E1 survey data, it became clear that the early time gates (EM61-MK2A Channels 1 and 2) dominated the signal. In some instances, the later time gates showed little or no response while the early time gates did at the same target location. This was thought to be an indication of smaller surface items and clutter (e.g., aluminum cans) that are not of interest. Additional processing steps were tested in an attempt to filter out targets with the above characteristics. The methods and results are summarized in Appendix D. However, the project team decided to use the original target list due to the relatively small number of targets, and these methods were not applied to the final data and target list.

2.2.2 Target Reacquisition

Target reacquisition included two steps:

1. Locating and flagging the original target using the GPS in areas where coverage was possible and using local coordinates where quality GPS coverage was unavailable.
2. Using the EM61 MK2A to find the target peak and relocating the target to that peak.

Targets were reacquired using the four-channel sum, which was observed and recorded in the field. A radius of approximately 4 to 5 feet was searched during reacquisition. Once the final peak was located, pin flags used to mark anomalies were moved to the peaks. The offset between the original anomaly location and the reacquired location along with the final response values were recorded. Final reacquisition results were reviewed by Shaw QC. Seventy-two targets had a reacquisition value below 14 mV. Fourteen of these targets were chosen as QC digs. Four targets were the result of multiple picks on the same targets and were removed from the dig list.

2.2.3 Target Excavation and Dig QC

Targets were excavated with the aid of Schonstedt magnetometers to pinpoint the source anomaly. Once items were recovered from the hole, their descriptions were logged. Targets were either denoted as MD (munitions debris), CD (cultural debris), or other. Depths, weights, and item dimensions were logged. The item was then removed and the hole was checked with the EM61-MK2A. No MEC items were found.

Many of the targets were the result of multiple scattered grenade fragments. Because of this, the holes were difficult to clear to a point where the final response was less than 14 mV. Since the objective of the survey was to determine the presence intact grenades, holes that still had signal response above 14 mV but below 40 mV due to residual metallic contents were left in place after verifying the absence of MEC. Any excavation that had signal response greater than 40 mV was iteratively checked until the instrument response was below 40 mV.

3.0 Results

Table 2 lists the targets and dig results. The overall excavation results are summarized below.

Item Description	Targets Detected
MD – Hollow (Empty) MKII Grenade Body	6
MD - MK II Hand Grenade Fragment, Multiple	222
Cultural Debris	107

A total of 335 targets were investigated as a result of the DGM survey. Six targets were found to be intact but hollow (empty) MKII grenade bodies (two grenade bodies were collocated at one target, for a total of seven grenade bodies found). Another 222 targets were MKII grenade fragments and a partial MKII grenade. The remaining 107 investigated targets were cultural debris, primarily scrap metal. Several target locations were not cleared of all metallic debris due to the high concentrations of scattered debris (Photograph 1). No MEC items were found.

4.0 References

Shaw Environmental, Inc. (Shaw), 2007. *Draft Final Work Plan, E20c.1 Investigation, Former Fort Ord, California*. Revision 0. August.

Shaw Environmental, Inc. (Shaw), 2009. *Draft Final Technical Information Paper, E20c.1 Test Plot*. January.

Tables

Table 1. Grid Corner and QC Point Locations

Item	Easting	Northing
SW Corner 1	5738456.00	2123981.00
NW Corner 1	5738486.00	2124060.00
SE Corner 1	5738604.00	2123923.00
NE Corner 1	5738635.00	2124003.00
NW Corner 2	5738456.49	2123981.03
NE Corner 2	5738604.08	2123923.23
SW Corner 2	5738409.69	2123855.25
SE Corner 2	5738554.24	2123795.68
QC Item Location 1A	5738584.70	2124011.00
QC Item Location 1B	5738505.20	2124010.50
QC Item Location 1C	5738480.09	2123988.00
QC Item Location 2A	5738426.00	2123848.00
QC Item Location 2B	5738435.00	2123864.00
QC Item Location 2C	5738513.00	2123958.00

Northings and Eastings are in California State Plane, Zone 4, US Survey Foot.

Table 2. EM61 Targets with Reacquisition and Dig Results

Grid	Anomaly ID	Easting	Northing	Initial Response	Reac Offset East	Reac Offset North	Reac Response	Dig Priority	Reac Date	Surface Item	Item Located	Total Depth Dug (in)	Dig Result Type	Quantity	Item Description	Total Weight (lbs)	Item Length (in)	Item Diameter (in)	Item Depth (in)	Dig Completed Date
E1	1	5738484.86	2124052.61	102.6	0	-0.5	140	Y	10/20/2009	N	Y	4	CD	1	Scrap Metal	0.25	10	0.25	4	10/22/2009
E1	2	5738475.38	2124024.11	15.8	0	0	14	Y	10/20/2009	N	Y	4	MD	1	Assorted MD Components	0.5	1	0.5	4	10/22/2009
E1	3	5738482.96	2124037.25	18.6	0	0	32	Y	10/20/2009	N	Y	12	MD	6	Assorted MD Components	0.5	3	1	12	10/22/2009
E1	6	5738491.97	2124056.28	23.1	0.5	-1	25	Y	10/20/2009	N	Y	4	MD	2	Assorted MD Components	0.25	0.25	0.25	4	10/22/2009
E1	7	5738469.17	2123994.33	13.2	0	0	14	Y	10/20/2009	N	Y	6	MD	1	Assorted MD Components	0.25	2	0.25	6	10/22/2009
E1	8	5738502.85	2124006.99	22.5	0	0	14	Y	10/20/2009	N	Y	4	MD	1	Grenade, hand, frag, MK II	0.5	2	2	4	10/22/2009
E1	9	5738492.79	2124052.32	22.7	-1	1	21	Y	10/20/2009	N	Y	4	MD	1	Assorted MD Components	0.25	0.25	0.25	4	10/22/2009
E1	11	5738482.84	2124021.21	22.6	0	0	40	Y	10/20/2009	N	Y	2	MD	1	Assorted MD Components	1	1	0.25	2	10/22/2009
E1	13	5738476.42	2124004.71	18	0	0	18	Y	10/20/2009	Y	Y	8	CD	1	Scrap Metal	0.25	4	0.5	8	10/22/2009
E1	14	5738490.09	2124039.85	20.3	-2	0	19	Y	10/20/2009	N	Y	2	MD	1	Assorted MD Components	1	1	0.25	2	10/22/2009
E1	15	5738488.12	2124032.03	417.4	0	-1	800	Y	10/20/2009	N	Y	6	CD	6	Scrap Metal	3	16	0.25	6	10/22/2009
E1	16	5738472.88	2123987.31	19.8	0.5	1	16	Y	10/20/2009	N	Y	18	MD	5	Assorted MD Components	1	1	0.25	18	10/22/2009
E1	17	5738474.61	2123990.39	119.4	1	1	172	Y	10/20/2009	N	Y	12	MD	2	Assorted MD Components	0.5	1	0.25	12	10/22/2009
E1	18	5738479.62	2123998.85	16.8	0	0	15	Y	10/20/2009	N	Y	4	MD	1	Assorted MD Components	0.25	0.5	0.25	4	10/22/2009
E1	19	5738487.57	2124011.86	19.3	0	-1	40	Y	10/20/2009	N	Y	3	CD	1	Scrap Metal	0.25	4	2	3	10/22/2009
E1	20	5738499.51	2124044.77	28.6	0	-0.5	26	Y	10/20/2009	N	Y	8	MD	1	Assorted MD Components	1	1	0.25	8	10/22/2009
E1	21	5738492.28	2124023.97	153.1	0	-1	100	Y	10/20/2009	N	Y	2	MD	1	Grenade, hand, frag, MK II	10	4	2	2	10/22/2009
E1	22	5738486.62	2124004.72	14.8	0	1	14	Y	10/20/2009	N	Y	5	MD	7	Assorted MD Components	1	2	1	5	10/22/2009
E1	25	5738476.68	2123976.39	156.1	0	1	170	Y	10/20/2009	N	Y	3	MD	1	Grenade, hand, frag, MK II	3	4	2	3	10/22/2009
E1	28	5738489.21	2124005.85	14.1	0	0	14	Y	10/20/2009	N	Y	5	MD	4	Assorted MD Components	1	2	1	5	10/23/2009
E1	29	5738481.74	2123980.86	54.5	1	1	35	Y	10/20/2009	N	Y	12	MD	3	Assorted MD Components	1	5	1	12	10/22/2009
E1	30	5738482.45	2123984.88	21.6	0	-1	52	Y	10/20/2009	N	Y	6	MD	3	Assorted MD Components	0.25	1	0.25	6	10/22/2009
E1	31	5738488.07	2123992.45	16	-0.5	0.5	14	Y	10/20/2009	N	Y	6	MD	4	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	32	5738495.01	2124011.11	17	-0.5	-1	35	Y	10/20/2009	N	Y	6	MD	2	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	33	5738482.71	2123977.27	16.7	0	0	25	Y	10/20/2009	N	Y	8	MD	8	Assorted MD Components	0.25	0.5	0.25	8	10/22/2009
E1	34	5738491.12	2123999.75	42.6	0	-1	43	Y	10/20/2009	N	Y	18	MD	2	Assorted MD Components	3	1	0.25	18	10/22/2009
E1	35	5738484.24	2123982.04	81.4	0	1	50	Y	10/20/2009	N	Y	30	MD	10	Assorted MD Components	4	7	4	30	10/22/2009
E1	36	5738486.23	2123987.7	55.1	0	0	54	Y	10/20/2009	N	Y	6	MD	3	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	37	5738497.57	2124015.48	18.6	0	0	14	Y	10/20/2009	N	Y	8	MD	9	Assorted MD Components	1	1	0.25	8	10/22/2009
E1	38	5738507.9	2124041.5	38.2	0.5	-1.5	33	Y	10/20/2009	N	Y	14	MD	1	Assorted MD Components	0.75	1	0.5	14	10/22/2009
E1	39	5738488.48	2123984.68	27.9	0	0	26	Y	10/20/2009	N	Y	6	MD	2	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	40	5738493.22	2123994.64	12.6	0	0.5	29	Y	10/20/2009	N	Y	6	MD	5	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	41	5738508.26	2124026.99	45.2	0	-1	84	Y	10/20/2009	N	Y	3	MD	1	Assorted MD Components	0.5	1	0.25	3	10/22/2009
E1	42	5738506.04	2124022.92	25	1.5	0	26	Y	10/20/2009	N	Y	6	CD	1	Can	0.5	5	2	6	10/22/2009
E1	43	5738487.66	2123974.27	16.4	0	0	15	Y	10/20/2009	N	Y	6	MD	2	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	44	5738493.97	2123985.55	31.7	0	0	50	Y	10/20/2009	N	Y	4	MD	2	Assorted MD Components	0.25	0.5	0.25	4	10/22/2009
E1	45	5738499.79	2123998.84	16.1	0	0	14	Y	10/20/2009	N	Y	8	MD	3	Assorted MD Components	1	1	0.25	8	10/22/2009
E1	47	5738493.72	2123981.03	15.7	0.5	0.5	38	Y	10/20/2009	N	Y	6	MD	2	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	48	5738506.16	2124009.99	597.4	2	0	15	Y	10/20/2009	N	Y	7	MD	6	Assorted MD Components	1	1	0.25	7	10/22/2009
E1	50	5738504.6	2124004.05	17.6	1	0	11	Y	10/20/2009	N	Y	1	MD	1	Assorted MD Components	0.5	1	0.25	1	10/23/2009
E1	51	5738498.14	2123985.22	24.8	0	0	22	Y	10/20/2009	N	Y	6	MD	2	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	52	5738507.04	2124005.36	29	-1	0	22	Y	10/20/2009	N	Y	8	MD	2	Assorted MD Components	1	1	0.25	8	10/22/2009
E1	53	5738494.4	2123968.43	17.6	1	0	50	Y	10/20/2009	Y	Y	4	CD	1	Can	0.25	1	2	4	10/22/2009

Table 2. EM61 Targets with Reacquisition and Dig Results

Grid	Anomaly ID	Easting	Northing	Initial Response	Reac Offset East	Reac Offset North	Reac Response	Dig Priority	Reac Date	Surface Item	Item Located	Total Depth Dug (in)	Dig Result Type	Quantity	Item Description	Total Weight (lbs)	Item Length (in)	Item Diameter (in)	Item Depth (in)	Dig Completed Date
E1	54	5738502.17	2123990.08	24.9	-1	0	20	Y	10/20/2009	N	Y	8	MD	6	Assorted MD Components	1	1	0.25	8	10/22/2009
E1	55	5738504.62	2123994.17	53	0	-1	60	Y	10/20/2009	N	Y	3	MD	6	Assorted MD Components	2	1	0.25	3	10/22/2009
E1	56	5738518.12	2124031.09	890	0	-1	900	Y	10/20/2009	N	Y	6	CD	4	Scrap Metal	3	9	0.25	6	10/22/2009
E1	57	5738496.1	2123975.28	16.5	-0.5	1.5	22	Y	10/20/2009	N	Y	6	MD	1	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	58	5738510.19	2124006.28	23.4	0	0.5	19	Y	10/20/2009	N	Y	8	MD	4	Assorted MD Components	1	1	0.25	8	10/22/2009
E1	60	5738500.87	2123978.46	20.6	0	0.5	29	Y	10/20/2009	N	Y	12	MD	4	Assorted MD Components	0.25	2	0.25	12	10/22/2009
E1	61	5738502.98	2123983.33	16.5	0.5	0	14	Y	10/20/2009	N	Y	6	MD	2	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	62	5738520.66	2124027.96	175.6	-1	-1	180	Y	10/20/2009	N	Y	4	CD	1	Scrap Metal	0.25	1	0.25		10/22/2009
E1	63	5738509.53	2123997.95	16.3	0.5	-0.5	14	Y	10/20/2009	N	Y	12	MD	2	Assorted MD Components	0.5	1	0.25	12	10/22/2009
E1	64	5738512.26	2124003.33	18.4	1	0	20	Y	10/20/2009	N	Y	8	MD	2	Assorted MD Components	1	1	0.25	8	10/22/2009
E1	65	5738514.53	2124008.88	14.6	0	0	11	Y	10/20/2009	N	Y	4	MD	1	Assorted MD Components	0.25	1	0.25	4	10/22/2009
E1	68	5738502.1	2123968.65	16.2	0	2	17	Y	10/20/2009	N	Y	6	MD	5	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	70	5738507.38	2123979.47	14.6	0	-2	19	Y	10/20/2009	N	Y	6	MD	2	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	71	5738523.14	2124020.55	126.9	-0.5	-0.5	156	Y	10/20/2009	N	Y	14	MD	1	Assorted MD Components	2	4	3	14	10/22/2009
E1	72	5738529.99	2124034.31	52.4	0.5	0	120	Y	10/20/2009	N	Y	4	MD	1	Assorted MD Components	0.25	0.25	0.25	4	10/22/2009
E1	73	5738517.75	2124002.27	18.6	0.5	1	17	Y	10/20/2009	N	Y	6	MD	1	Assorted MD Components	0.75	1	0.25	6	10/22/2009
E1	74	5738516.96	2123997.21	15	0.5	0	15	Y	10/20/2009	N	Y	6	MD	2	Assorted MD Components	0.25	0.5	0.5	6	10/22/2009
E1	75	5738521.14	2124004.92	20.7	0.5	0	14	Y	10/20/2009	N	Y	4	MD	2	Assorted MD Components	0.25	0.5	0.25	4	10/22/2009
E1	76	5738531.01	2124032.52	72.8	1.5	0	85	Y	10/20/2009	N	Y	3	MD	1	Grenade, hand, frag, MK II	2	4	5	3	10/22/2009
E1	77	5738508.49	2123970.46	17.9	0	0	40	Y	10/20/2009	N	Y	6	CD	1	Can	0.25	4	0.25	6	10/22/2009
E1	79	5738514.05	2123981.17	17.3	0.5	-1	20	Y	10/20/2009	N	Y	6	MD	2	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	82	5738513.44	2123977.12	29	0	1	20	Y	10/20/2009	N	Y	6	MD	2	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	84	5738520.11	2123988.47	43.1	-0.5	0	40	Y	10/20/2009	N	Y	12	MD	2	Assorted MD Components	0.25	0.5	0.25	12	10/22/2009
E1	85	5738515.03	2123972.1	345.1	0	1	990	Y	10/20/2009	N	Y	12	MD	1	Grenade, hand, frag, MK II	2	5	2.5	12	10/22/2009
E1	86	5738517.95	2123981.8	19.7	-0.5	0	32	Y	10/20/2009	N	Y	4	MD	3	Assorted MD Components	0.25	2	0.25	4	10/22/2009
E1	87	5738516.6	2123978.36	31.2	1	0	40	Y	10/20/2009	N	Y	12	MD	3	Assorted MD Components	0.25	0.5	0.25	12	10/22/2009
E1	88	5738532.03	2124004.22	74.6	-0.5	-1	150	Y	10/20/2009	N	Y	13	CD	1	Other	3	5	1.5	13	10/22/2009
E1	89	5738541.45	2124028.46	16.5	-0.5	0	23	Y	10/20/2009	N	Y	10	MD	1	Assorted MD Components	1	1.5	0.25	10	10/22/2009
E1	90	5738519.26	2123970.56	25.4	0	-2	180	Y	10/20/2009	N	Y	12	MD	2	Grenade, hand, frag, MK II	2	5	2.5	12	10/22/2009
E1	91	5738518.09	2123963.4	568	1	0	1000	Y	10/20/2009	N	Y	6	MD	2	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	92	5738526.92	2123984.75	31.9	0.5	0	46	Y	10/20/2009	N	Y	6	MD	2	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	93	5738528.09	2123988.59	43.6	-0.5	0	35	Y	10/20/2009	N	Y	30	MD	9	Assorted MD Components	4	1	0.25	30	10/22/2009
E1	94	5738523.49	2123975.36	30.5	-0.5	-1	60	Y	10/20/2009	N	Y	6	MD	2	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	95	5738518.26	2123959.15	26.5	0	1	43	Y	10/20/2009	N	Y	6	MD	2	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	96	5738521.23	2123968.19	69.2	1	0	110	Y	10/20/2009	N	Y	8	CD	1	Scrap Metal	0.5	2	0.5	0	10/22/2009
E1	97	5738526.64	2123979.07	28.8	1.5	0	33	Y	10/20/2009	N	Y	6	MD	3	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	98	5738533.09	2123990.94	15.3	-0.5	-1	14	Y	10/20/2009	N	Y	30	MD	8	Assorted MD Components	1.5	2	1	30	10/22/2009
E1	99	5738535.26	2123995.14	19.3	-0.5	-0.5	25	Y	10/20/2009	N	Y	30	MD	1	Assorted MD Components	4	1	0.25	30	10/22/2009
E1	100	5738523.55	2123964.49	310	0	1	335	Y	10/20/2009	N	Y	6	CD	1	Scrap Metal	0.5	2	0.5	0	10/22/2009
E1	101	5738525.86	2123970.14	29.4	0	0	75	Y	10/20/2009	N	Y	6	MD	2	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	102	5738527.49	2123973.8	19.1	0	0	60	Y	10/20/2009	N	Y	6	MD	4	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	103	5738503.81	2123962.84	24.1	0	-0.5	16	Y	10/20/2009	N	Y	6	CD	1	Scrap Metal	0.25	2	0.25	6	10/22/2009
E1	104	5738533.45	2123982.21	51.3	-0.5	-1	110	Y	10/20/2009	N	Y	18	CD	1	Scrap Metal	2	8	6	18	10/22/2009

Table 2. EM61 Targets with Reacquisition and Dig Results

Grid	Anomaly ID	Easting	Northing	Initial Response	Reac Offset East	Reac Offset North	Reac Response	Dig Priority	Reac Date	Surface Item	Item Located	Total Depth Dug (in)	Dig Result Type	Quantity	Item Description	Total Weight (lbs)	Item Length (in)	Item Diameter (in)	Item Depth (in)	Dig Completed Date
E1	105	5738544.5	2124011.18	74	-0.5	-1	85	Y	10/20/2009	N	Y	6	CD	1	Scrap Metal	3	7	0.25	6	10/22/2009
E1	106	5738534.59	2123979.62	63.8	-0.5	-1	85	Y	10/20/2009	N	Y	18	CD	1	Scrap Metal	2	8	6	18	10/22/2009
E1	108	5738532.83	2123970.97	31.2	0	0	20	Y	10/20/2009	N	Y	12	MD	2	Assorted MD Components	2	1	0.5	12	10/22/2009
E1	109	5738525.82	2123955.14	26.8	0	-1.5	30	Y	10/20/2009	N	Y	6	MD	2	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	110	5738530.58	2123961.87	242.8	0	0	280	Y	10/20/2009	N	Y	6	MD	1	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	111	5738533.22	2123967.28	21.3	0	0	30	Y	10/20/2009	N	Y	14	MD	1	Assorted MD Components	1.5	1	0.25	14	10/22/2009
E1	112	5738549.12	2124004.02	14.5	0	0	20	Y	10/20/2009	N	Y	4	CD	1	Scrap Metal	1	3	2	4	10/22/2009
E1	113	5738529.82	2123953.58	24.8	0.5	0	43	Y	10/20/2009	N	Y	6	MD	1	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	114	5738551.5	2124007.38	35.9	0	0	50	Y	10/20/2009	N	Y	4	CD	3	Scrap Metal	4	16	12	4	10/22/2009
E1	115	5738534.32	2123955.48	31.8	0	0.5	21	Y	10/20/2009	N	Y	6	MD	2	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	116	5738537.05	2123964.72	127.3	0	1	65	Y	10/20/2009	N	Y	6	MD	1	Assorted MD Components	1	1	0.5	6	10/22/2009
E1	117	5738550.46	2123999.2	16.4	0	0	15	Y	10/20/2009	N	Y	8	CD	1	Scrap Metal	1	6	3	8	10/22/2009
E1	118	5738544.6	2123981.1	348.8	0	-2	800	Y	10/20/2009	N	Y	8	CD	1	Scrap Metal	3	11	0.25	8	10/22/2009
E1	119	5738556.49	2124009.73	26.9	0	0	38	Y	10/20/2009	N	Y	5	CD	1	Scrap Metal	2	7	3	5	10/22/2009
E1	120	5738542.33	2123970.28	20.7	0	1	24	Y	10/20/2009	N	Y	6	MD	1	Assorted MD Components	0.25	1	0.25	6	10/22/2009
E1	122	5738537.31	2123957.11	44	0	1	42	Y	10/20/2009	N	Y	8	MD	4	Assorted MD Components	1	1	0.25	8	10/22/2009
E1	123	5738543.65	2123973.95	36	0	0	35	Y	10/20/2009	N	Y	8	MD	2	Assorted MD Components	0.25	1	0.25	8	10/22/2009
E1	124	5738545.21	2123977.42	284.7	1	-1	2700	Y	10/20/2009	N	Y	18	MD	2	Assorted MD Components	1	1	0.25	18	10/22/2009
E1	125	5738541.14	2123964.2	1138.1	0.5	0	2200	Y	10/20/2009	N	Y	6	MD	3	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	127	5738542.52	2123967.74	17.4	0	0	22	Y	10/20/2009	N	Y	8	MD	5	Assorted MD Components	2	1	0.5	8	10/22/2009
E1	128	5738548.2	2123975.73	2199.3	0	0	2000	Y	10/20/2009	N	Y	8	MD	2	Assorted MD Components	0.25	1	0.25	8	10/22/2009
E1	129	5738554.14	2123993.48	14.2	0	0.5	17	Y	10/20/2009	N	Y	6	CD	1	Scrap Metal	0.5	6	2	6	10/22/2009
E1	130	5738568.39	2124023.78	81.1	0	0	42	Y	10/20/2009	N	Y	10	MD	1	Assorted MD Components	0.75	1	0.25	10	10/22/2009
E1	131	5738544.91	2123962.84	33.2	0	-0.5	40	Y	10/20/2009	N	Y	24	MD	4	Assorted MD Components	3	1	0.5	24	10/22/2009
E1	132	5738549.74	2123968.37	329.9	0	0	480	Y	10/20/2009	N	Y	8	CD	1	Scrap Metal	2	4	2	8	10/22/2009
E1	133	5738559.8	2123993.42	17	0.5	1	26	Y	10/20/2009	N	Y	6	MD	1	Assorted MD Components	0.25	1	0.25	6	10/22/2009
E1	134	5738563.43	2124002.74	89.5	1	0	135	Y	10/20/2009	N	Y	7	CD	8	Scrap Metal	5	8	2	7	10/22/2009
E1	135	5738572.85	2124026.98	4567.7	0	-1	4500	Y	10/20/2009	N	Y	6	MD	1	Assorted MD Components	0.25	2	1	6	10/22/2009
E1	136	5738568.88	2124014.57	33.8	0	0	98	Y	10/20/2009	N	Y	6	MD	1	Assorted MD Components	1	1	0.25	6	10/22/2009
E1	137	5738547.05	2123958.69	19.5	1	1	50	Y	10/20/2009	N	Y	8	MD	3	Assorted MD Components	1.5	1	0.5	8	10/22/2009
E1	138	5738562.74	2123999.04	26.3	0	0	60	Y	10/20/2009	N	Y	5	CD	1	Scrap Metal	1	3	2	5	10/22/2009
E1	139	5738570.6	2124019.27	52.1	0	0	28	Y	10/20/2009	N	Y	8	MD	1	Assorted MD Components	1	1	0.25	8	10/22/2009
E1	140	5738573.16	2124023.64	2192.1	0	1	4500	Y	10/20/2009	N	Y	6	MD	1	Assorted MD Components	0.25	1	0.25	6	10/22/2009
E1	141	5738550.44	2123964.66	34.4	0	0.5	70	Y	10/20/2009	N	Y	8	MD	2	Assorted MD Components	0.25	1	0.25	8	10/22/2009
E1	142	5738545.44	2123951.8	79.6	0	0	95	Y	10/20/2009	N	Y	4	CD	1	Scrap Metal	0.5	10	0.25	4	10/22/2009
E1	143	5738561.13	2123990.76	21.7	0	1	24	Y	10/20/2009	N	Y	6	MD	1	Assorted MD Components	0.25	1	0.25	6	10/22/2009
E1	144	5738551.33	2123959.49	21.4	0	0	65	Y	10/20/2009	N	Y	6	MD	3	Assorted MD Components	1	1	0.25	6	10/22/2009
E1	145	5738555.71	2123971.3	498.3	-1	0	1150	Y	10/20/2009	N	Y	6	CD	6	Scrap Metal	5	24	3	6	10/22/2009
E1	146	5738553.66	2123962.44	26.4	-0.5	-0.5	33	Y	10/20/2009	N	Y	7	MD	3	Assorted MD Components	1	1	0.5	7	10/22/2009
E1	147	5738558.59	2123977.05	19.3	1	-1	40	Y	10/20/2009	N	Y	14	MD	2	Assorted MD Components	1	1	0.25	14	10/22/2009
E1	148	5738563.22	2123985.66	28.1	0	0	32	Y	10/20/2009	N	Y	10	MD	1	Assorted MD Components	0.5	1	0.25	10	10/22/2009
E1	149	5738555.85	2123960.63	17.1	0	-1.5	65	Y	10/20/2009	N	Y	8	MD	2	Assorted MD Components	1	1	0.5	8	10/22/2009
E1	150	5738574.5	2124010.24	41.5	0.5	0	86	Y	10/20/2009	N	Y	8	CD	1	Scrap Metal	2	8	2	8	10/22/2009

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Grid	Anomaly ID	Easting	Northing	Initial Response	Reac Offset East	Reac Offset North	Reac Response	Dig Priority	Reac Date	Surface Item	Item Located	Total Depth Dug (in)	Dig Result Type	Quantity	Item Description	Total Weight (lbs)	Item Length (in)	Item Diameter (in)	Item Depth (in)	Dig Completed Date
E1	151	5738576.48	2124016.98	14.4	0	-1	32	Y	10/20/2009	N	Y	10	MD	1	Assorted MD Components	1	1	0.25	10	10/22/2009
E1	152	5738559.26	2123972.17	21.9	0	-1	51	Y	10/20/2009	N	Y	6	MD	2	Assorted MD Components	1	1	0.25	6	10/22/2009
E1	153	5738559.45	2123964.91	15.6	0.5	0	45	Y	10/20/2009	N	Y	6	MD	2	Assorted MD Components	0.25	0.5	0.25	6	10/22/2009
E1	154	5738557.53	2123959.97	24.1	1	-1.5	44	Y	10/20/2009	N	Y	14	MD	2	Assorted MD Components	1	1	0.25	14	10/22/2009
E1	155	5738570.78	2123991.3	27.2	1.5	0	27	Y	10/20/2009	N	Y	8	MD	8	Assorted MD Components	0.25	1	0.25	8	10/22/2009
E1	157	5738571.44	2123982.78	24.7	0	1	30	Y	10/20/2009	N	Y	6	MD	1	Assorted MD Components	0.25	1	0.25	6	10/22/2009
E1	158	5738573.97	2123987.91	23.2	-1	0	26	Y	10/20/2009	N	Y	6	MD	1	Assorted MD Components	0.25	1	0.25	6	10/22/2009
E1	159	5738565.69	2123962.49	18.2	0	0	37	Y	10/20/2009	N	Y	12	MD	2	Assorted MD Components	0.5	1	0.5	12	10/22/2009
E1	160	5738562.86	2123955.76	19.1	-1	0	46	Y	10/20/2009	N	Y	12	MD	3	Assorted MD Components	0.5	1	0.5	12	10/22/2009
E1	161	5738558.81	2123943.7	208.8	0	0	370	Y	10/20/2009	N	Y	14	MD	2	Assorted MD Components	1.5	1	0.5	14	10/22/2009
E1	162	5738582.29	2124003.78	18.6	0	0	13	Y	10/20/2009	N	Y	6	MD	1	Assorted MD Components	0.5	2	1	6	10/23/2009
E1	164	5738565.96	2123960.98	20.2	0	0	37	Y	10/20/2009	N	Y	10	MD	2	Assorted MD Components	0.75	1	0.25	10	10/23/2009
E1	165	5738584.74	2124007.33	131.6	0	-1	330	Y	10/20/2009	N	Y	6	MD	1	Assorted MD Components	0.5	2	1	6	10/22/2009
E1	167	5738575.21	2123974.56	729.5	0.5	0	1240	Y	10/20/2009	N	Y	3	CD	1	Scrap Metal	4	48	1	3	10/22/2009
E1	168	5738578.36	2123981.27	15.9	1	0.5	14	Y	10/20/2009	N	Y	6	MD	7	Assorted MD Components	0.25	1	0.25	6	10/22/2009
E1	169	5738576.46	2123970.85	520.6	-1	0	1025	Y	10/20/2009	N	Y	3	CD	1	Scrap Metal	4	48	1	3	10/22/2009
E1	170	5738587.57	2124000.54	57	0.5	0	93	Y	10/20/2009	N	Y	8	CD	2	Scrap Metal	1	4	0.5	8	10/22/2009
E1	171	5738590.77	2124008.21	95.1	0	0	140	Y	10/21/2009	Y	Y	4	MD	1	Assorted MD Components	0.25	2	1	4	10/23/2009
E1	172	5738574.79	2123966.03	14.3	0	-2	35	Y	10/21/2009	N	Y	12	MD	5	Assorted MD Components	1	1	0.25	12	10/23/2009
E1	173	5738584.86	2123993.01	23.7	1	-0.5	33	Y	10/21/2009	N	Y	8	CD	1	Scrap Metal	0.5	2	0.25	8	10/23/2009
E1	174	5738591.39	2124011.18	27	0	2	16	Y	10/21/2009	N	Y	4	MD	1	Assorted MD Components	0.25	1	0.25	4	10/23/2009
E1	175	5738567.69	2123943.9	22.3	0.5	0	22	Y	10/21/2009	N	Y	10	MD	10	Assorted MD Components	1	1	0.25	10	10/23/2009
E1	176	5738569.52	2123948.87	16.3	0	0	14	Y	10/21/2009	N	Y	6	MD	2	Assorted MD Components	1	1	0.25	6	10/23/2009
E1	178	5738596.15	2124017.91	24.6	-2	0	14	Y	10/21/2009	N	Y	9	MD	3	Assorted MD Components	0.5	1	0.25	9	10/23/2009
E1	179	5738594.16	2124012.25	17	0	0	18	Y	10/21/2009	N	Y	6	MD	1	Assorted MD Components	1	2	1	6	10/23/2009
E1	180	5738582.31	2123980.38	25.4	0	0	21	Y	10/21/2009	N	Y	8	MD	1	Assorted MD Components	0.25	1	0.25	8	10/23/2009
E1	181	5738581.13	2123975.15	16.1	0	0	16	Y	10/21/2009	N	Y	5	MD	1	Assorted MD Components	0.5	1	0.5	5	10/23/2009
E1	182	5738574.96	2123954.59	24	0	0	21	Y	10/21/2009	N	Y	24	MD	1	Assorted MD Components	2	1	0.25	24	10/23/2009
E1	184	5738590.2	2123990.19	15.4	0	-1	45	Y	10/21/2009	N	Y	10	MD	1	Assorted MD Components	0.5	1	0.5	10	10/23/2009
E1	185	5738594.27	2124001.48	27.4	0	0	34	Y	10/21/2009	N	Y	6	MD	1	Assorted MD Components	0.75	2	1	6	10/23/2009
E1	186	5738578.81	2123958.14	16.1	0	0	18	Y	10/21/2009	N	Y	18	MD	2	Assorted MD Components	1	1	0.25	18	10/23/2009
E1	187	5738586.05	2123976.78	27	0	-1	19	Y	10/21/2009	N	Y	10	MD	1	Assorted MD Components	0.25	1	0.25	10	10/23/2009
E1	188	5738575.35	2123944.57	21.5	0	0	14	Y	10/21/2009	N	Y	24	MD	4	Assorted MD Components	1.5	1	0.5	24	10/23/2009
E1	189	5738572.68	2123939.06	19.9	0	0	11	Y	10/21/2009	N	Y	5	MD	2	Assorted MD Components	0.5	1	0.25	5	10/23/2009
E1	190	5738590.8	2123985.66	14.2	0	1	15	Y	10/21/2009	N	Y	8	MD	1	Assorted MD Components	0.5	1	0.25	8	10/23/2009
E1	191	5738599.73	2123999.25	117	0	1	300	Y	10/21/2009	N	Y	4	MD	2	Assorted MD Components	1	3	2	4	10/23/2009
E1	192	5738594.32	2123986.44	14.2	-1	0	16	Y	10/21/2009	N	Y	10	MD	2	Assorted MD Components	0.25	1	0.25	10	10/23/2009
E1	193	5738603.74	2124010.67	19.4	-2	0	30	Y	10/21/2009	N	Y	12	MD	10	Assorted MD Components	5	2	2	12	10/23/2009
E1	194	5738580.07	2123944.02	42.2	-1	0	53	Y	10/21/2009	N	Y	8	MD	1	Assorted MD Components	1	1	0.25	8	10/23/2009
E1	195	5738577.8	2123937.07	12.7	0	0	14	Y	10/21/2009	N	Y	6	MD	1	Assorted MD Components	0.75	1	0.25	6	10/23/2009
E1	196	5738602.74	2123998.72	149.6	0	0	22	Y	10/21/2009	N	Y	6	MD	1	Assorted MD Components	2	4	3	6	10/23/2009
E1	197	5738600.55	2123994.74	18.5	-2	0	15	Y	10/21/2009	N	Y	10	MD	3	Assorted MD Components	2	3	3	10	10/23/2009
E1	198	5738604.64	2124003.88	25.1	0	-2	70	Y	10/21/2009	N	Y	3	CD	1	Scrap Metal	1	1	0.5	3	10/23/2009

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Grid	Anomaly ID	Easting	Northing	Initial Response	Reac Offset East	Reac Offset North	Reac Response	Dig Priority	Reac Date	Surface Item	Item Located	Total Depth Dug (in)	Dig Result Type	Quantity	Item Description	Total Weight (lbs)	Item Length (in)	Item Diameter (in)	Item Depth (in)	Dig Completed Date
E1	199	5738587.43	2123959.07	41.9	0.5	0	31	Y	10/21/2009	N	Y	3	MD	3	Assorted MD Components	2	1	0.25	3	10/23/2009
E1	200	5738589.61	2123964.67	15.3	0	-0.5	11	Y	10/21/2009	N	Y	13	MD	2	Assorted MD Components	0.25	1	0.25	13	10/23/2009
E1	201	5738580.46	2123940.33	14.2	0.5	1	30	Y	10/21/2009	N	Y	14	MD	1	Assorted MD Components	0.5	1	0.25	14	10/23/2009
E1	202	5738595.07	2123969.62	61.2	0	0	95	Y	10/21/2009	N	Y	4	MD	1	Assorted MD Components	0.5	15	1.25	4	10/23/2009
E1	203	5738609.72	2124004.8	14.1	0	0	15	Y	10/21/2009	N	Y	2	MD	1	Assorted MD Components	0.75	2	0.5	2	10/23/2009
E1	204	5738588.23	2123943.74	30.2	0	0.5	19	Y	10/21/2009	N	Y	6	MD	2	Assorted MD Components	0.75	1	0.5	6	10/23/2009
E1	205	5738603.35	2123984	22.3	-0.5	0	64	Y	10/21/2009	N	Y	10	MD	4	Assorted MD Components	1	4	3	10	10/23/2009
E1	206	5738610.23	2124000.32	31.5	-0.5	-0.5	65	Y	10/21/2009	N	Y	7	MD	1	Assorted MD Components	0.5	1	0.5	7	10/23/2009
E1	207	5738589.68	2123947.47	17.1	0	-1	14	Y	10/21/2009	N	Y	24	MD	2	Assorted MD Components	0.25	1	0.25	24	10/23/2009
E1	209	5738587.15	2123934.61	16	0	0	25	Y	10/21/2009	N	Y	10	MD	2	Assorted MD Components	1	1	0.25	10	10/23/2009
E1	210	5738589.1	2123940.19	23.2	-1	0	53	Y	10/21/2009	N	Y	6	MD	2	Assorted MD Components	0.75	1	0.5	6	10/23/2009
E1	211	5738612.34	2123995.53	17.3	1	0	40	Y	10/21/2009	N	Y	6	CD	1	Scrap Steel	1	10	0.25	6	10/23/2009
E1	212	5738609.8	2123989	14.1	0	1.5	14	Y	10/21/2009	N	Y	6	MD	1	Assorted MD Components	0.25	0.5	0.25	6	10/23/2009
E1	213	5738601.12	2123964.48	14.3	0	-0.5	18	Y	10/21/2009	N	Y	7	MD	1	Assorted MD Components	0.25	1	0.5	7	10/23/2009
E1	214	5738589.27	2123932.61	23.9	0	0	14	Y	10/21/2009	N	Y	8	MD	3	Assorted MD Components	1	1	0.25	8	10/23/2009
E1	215	5738618.72	2124005.6	94.5	-0.5	0	195	Y	10/21/2009	N	Y	6	CD	1	Wire	1	20	0.25	6	10/23/2009
E1	216	5738598.84	2123954.75	16.8	-0.5	-0.5	15	Y	10/21/2009	N	Y	13	MD	5	Assorted MD Components	1.5	1	0.25	13	10/23/2009
E1	218	5738612.03	2123979.55	65.4	-0.5	0	210	Y	10/21/2009	N	Y	10	CD	1	Scrap Metal	1	10	0.25	10	10/23/2009
E1	219	5738602.34	2123955.21	16.2	0	-2	14	Y	10/21/2009	N	Y	12	MD	1	Assorted MD Components	0.5	1	0.25	12	10/23/2009
E1	220	5738618.38	2123987.06	23.9	-1	0.5	25	Y	10/21/2009	N	Y	4	CD	1	Scrap Steel	0.25	3	0.25	4	10/23/2009
E1	221	5738623.08	2124000.25	30.9	0	0	50	Y	10/21/2009	N	Y	8	MD	1	Assorted MD Components	0.25	4	0.25	8	10/23/2009
E1	222	5738615.57	2123979.57	45.9	0	-0.5	145	Y	10/21/2009	N	Y	12	CD	2	Scrap Metal	1	10	0.25	12	10/23/2009
E1	223	5738621.63	2123995.13	20.6	-1.5	0	14	Y	10/21/2009	N	Y	6	MD	1	Assorted MD Components	0.75	3	0.25	6	10/23/2009
E1	224	5738620.66	2123989.07	48.4	-1.5	-0.5	49	Y	10/21/2009	N	Y	4	CD	1	Scrap Metal	0.75	13	0.25	4	10/23/2009
E1	225	5738597.21	2123927.38	30	-1	0	30	Y	10/21/2009	N	Y	7	CD	1	Scrap Metal	0.25	8	0.25	7	10/23/2009
E1	226	5738605.46	2123947.77	16.5	0	0	14	Y	10/21/2009	N	Y	3	MD	2	Assorted MD Components	0.25	1	0.25	3	10/23/2009
E1	227	5738611.19	2123960.57	26.8	-2	0	27	Y	10/21/2009	N	Y	5	CD	1	Scrap Metal	1	4	1	5	10/23/2009
E1	228	5738605.08	2123937.41	29.1	-1	0	33	Y	10/21/2009	N	Y	8	MD	4	Assorted MD Components	2	2	1	8	10/23/2009
E1	229	5738609.39	2123954.83	12.5	0	-1	20	Y	10/21/2009	N	Y	4	CD	1	Can	0.25	4	2	4	10/23/2009
E1	230	5738604.31	2123941.78	21.4	-1	0	22	Y	10/21/2009	N	Y	6	MD	1	Assorted MD Components	1.25	2	1	6	10/23/2009
E1	231	5738626.07	2123994.15	86.5	-1	-1	400	Y	10/21/2009	N	Y	8	CD	1	Wire	1	15	0.25	8	10/23/2009
E1	233	5738618.50	2123968.88	235	-1	1	310	Y	10/21/2009	N	Y	4	CD	1	Scrap Metal	0.5	12	0.25	4	10/23/2009
E1	234	5738609.28	2123946.29	16.6	-0.5	0	14	Y	10/21/2009	N	Y	3	MD	2	Assorted MD Components	0.25	1	0.25	3	10/23/2009
E1	235	5738622.61	2123979.73	18.7	2	0	16	Y	10/21/2009	N	Y	3	MD	1	Assorted MD Components	0.75	1	0.25	3	10/23/2009
E1	236	5738624.53	2123983.28	44.5	0	-0.5	18	Y	10/21/2009	N	Y	7	MD	1	Assorted MD Components	0.5	1	0.5	7	10/23/2009
E1	238	5738627.57	2123985.31	32	-0.5	0	34	Y	10/21/2009	N	Y	4	MD	1	Assorted MD Components	0.25	1	0.25	4	10/23/2009
E1	239	5738570.76	2123935.52	17.1	0	0	14	Y	10/21/2009	N	Y	9	MD	2	Assorted MD Components	0.5	1	0.25	9	10/23/2009
E1	240	5738576.35	2123933.34	16.8	1	0	15	Y	10/21/2009	N	Y	8	MD	3	Assorted MD Components	1.5	1	0.25	8	10/23/2009
E1	243	5738565.37	2124032.03	14.7	0	-2	46	Y	10/21/2009	N	Y	12	MD	1	Assorted MD Components	0.5	1	0.25	12	10/23/2009
E1	244	5738481.65	2124048.49	18.3	-1	0	66	Y	10/21/2009	N	Y	1	CD	1	Scrap Metal	0.25	6	0.25	1	10/23/2009
E1	245	5738555.33	2124014.48	14.2	0	1	42	Y	10/21/2009	N	Y	6	CD	4	Scrap Metal	2	6	2	6	10/23/2009
E2	1	5738537.188	2123890.226	17.516	0	0	1	Y	2/23/2010	N	Y	6	CD	4	Nails	0.25	3	0	6	2/25/2010
E2	2	5738535.265	2123886.665	14.039	-1	0	12	Y	2/23/2010	N	Y	4	CD	1	Scrap Metal	0.75	3	0	4	2/25/2010

Table 2. EM61 Targets with Reacquisition and Dig Results

Grid	Anomaly ID	Easting	Northing	Initial Response	Reac Offset East	Reac Offset North	Reac Response	Dig Priority	Reac Date	Surface Item	Item Located	Total Depth Dug (in)	Dig Result Type	Quantity	Item Description	Total Weight (lbs)	Item Length (in)	Item Diameter (in)	Item Depth (in)	Dig Completed Date
E2	3	5738539.587	2123882.712	16.811	-1	0	15	Y	2/23/2010	N	Y	6	CD	7	Nails	1	3	0	6	2/25/2010
E2	4	5738539.293	2123878.467	80.707	0	0	21	Y	2/23/2010	N	Y	6	CD	8	Nails	1	3	0	6	2/25/2010
E2	5	5738538.637	2123874.651	51.105	0	0	140	Y	2/23/2010	N	Y	6	CD	6	Nails	1	3	0	6	2/25/2010
E2	6	5738543.697	2123877.079	18.104	0	0	18	Y	2/23/2010	N	Y	6	CD	8	Nails	0.75	3	0	6	2/25/2010
E2	7	5738545.172	2123884.820	14.24	0	0	16	Y	2/23/2010	N	Y	6	MD	2	Assorted MD Components	0.25	2	0	6	2/25/2010
E2	9	5738562.810	2123885.218	25.937	0	-1	69	Y	2/23/2010	N	Y	4	CD	1	Can	0.25	5	0	4	2/25/2010
E2	10	5738570.415	2123885.380	40.824	-1	-1	40	Y	2/23/2010	N	Y	2	CD	1	Can	0.25	6	0	2	2/25/2010
E2	11	5738573.624	2123877.701	29.8	1	0	18	Y	2/23/2010	N	Y	6	CD	1	Can	0.25	6	0	6	2/25/2010
E2	12	5738568.899	2123869.060	85.619	-1	0	90	Y	2/23/2010	N	Y	3	CD	1	Other	0.25	3	0	3	2/25/2010
E2	13	5738570.490	2123864.516	1360.7	-1	0	4300	Y	2/23/2010	N	Y	6	CD	1	Other	1	8	8	6	2/25/2010
E2	14	5738568.017	2123862.604	73.533	-2	0	890	Y	2/23/2010	N	Y	6	CD	1	Other	1	8	8	6	2/25/2010
E2	16	5738551.318	2123860.435	14.174	0	0	14	Y	2/23/2010	N	Y	4	CD	1	Can	0.25	6	0	4	2/25/2010
E2	18	5738545.368	2123867.386	43.743	0	1	90	Y	2/23/2010	N	Y	4	CD	3	Nails	0.5	4	0	4	2/25/2010
E2	19	5738530.501	2123850.296	37	0	0	32	Y	2/23/2010	N	Y	2	CD	1	Pipe	0.75	1	1	0	2/24/2010
E2	20	5738539.552	2123848.756	21.85	0	1	22	Y	2/23/2010	N	Y	4	MD	1	Other	0.25	4	0	4	2/24/2010
E2	22	5738547.892	2123845.373	18.1	0	0	15	Y	2/23/2010	N	Y	4	MD	1	Other	0.25	2	0.1	4	2/24/2010
E2	23	5738553.359	2123834.607	24.3	-3	0	30	Y	2/23/2010	N	Y	12	CD	1	Can	0.25	6	0	0	2/24/2010
E2	24	5738538.426	2123827.869	15.4	0	0	24	Y	2/23/2010	N	Y	6	CD	1	Can	0.25	6	0	0	2/24/2010
E2	27	5738516.267	2123839.051	54.9	-1	-1	43	Y	2/23/2010	N	Y	12	CD	1	Bolt	1.5	6	1	12	2/24/2010
E2	28	5738493.646	2123838.849	45.225	-2	0	80	Y	2/23/2010	N	Y	6	MD	1	Other	0.5	2	0.4	6	2/24/2010
E2	29	5738491.297	2123844.999	19	-1	0	15	Y	2/23/2010	N	Y	6	MD	1	Frag	0.25	0.3	0.3	6	2/24/2010
E2	34	5738511.462	2123890.105	18.08	-1	0	16	Y	2/23/2010	N	Y	4	MD	4	Assorted MD Components	0.5	4	0	4	2/25/2010
E2	35	5738513.010	2123893.455	28.3	-1	1	24	Y	2/23/2010	N	Y	4	MD	7	Assorted MD Components	0.75	1	0	4	2/25/2010
E2	36	5738504.391	2123890.552	14.884	0	0	24	Y	2/23/2010	N	Y	6	MD	6	Assorted MD Components	0.5	4	0	6	2/25/2010
E2	37	5738502.532	2123893.425	40.9	0	0	70	Y	2/23/2010	N	Y	4	MD	4	Assorted MD Components	0.5	4	0	4	2/25/2010
E2	38	5738501.601	2123898.028	15.6	0	0	20	Y	2/23/2010	N	Y	6	MD	5	Assorted MD Components	0.75	4	0	6	2/25/2010
E2	39	5738497.624	2123898.389	16.499	-1	-1	37	Y	2/23/2010	N	Y	12	MD	67	Assorted MD Components	2	1	0	12	2/25/2010
E2	40	5738492.299	2123889.079	20.3	-1	-1	15	Y	2/23/2010	N	Y	3	MD	1	Other	0.25	1	0	3	2/24/2010
E2	44	5738489.316	2123877.548	14.903	0	0	25	Y	2/23/2010	N	Y	3	CD	1	Wire	0.25	8	0.05	3	2/24/2010
E2	45	5738485.490	2123859.650	86.247	-1	-1	325	Y	2/23/2010	N	Y	2	CD	1	Pipe	3	18	1	2	2/24/2010
E2	46	5738480.999	2123861.915	35.971	-1	0	15	Y	2/23/2010	N	Y	4	MD	1	Other	0.25	0.5	0	4	2/24/2010
E2	47	5738477.079	2123868.011	14.128	0	0	11	Y	2/23/2010	N	Y	2	CD	1	Other	0.25	1	0	2	2/24/2010
E2	49	5738465.872	2123876.524	20.4	-1	0	67	Y	2/23/2010	N	Y	2	CD	1	Can	0.25	6	0	2	2/24/2010
E2	50	5738457.053	2123884.318	51.5	-2	0	135	Y	2/23/2010	N	Y	3	CD	1	Scrap Metal	0.5	6	0	3	2/24/2010
E2	51	5738454.982	2123880.943	22.3	0	0	30	Y	2/23/2010	N	Y	6	CD	1	Other	0.25	0	0	0	2/24/2010
E2	53	5738443.463	2123870.877	14.8	0	0	1	Y	2/23/2010	N	Y	1	CD	1	Other	0.25	0.5	0	1	2/24/2010
E2	54	5738439.327	2123866.244	28.7	-3	0	28	Y	2/23/2010	N	Y	8	CD	9	Nails	1	3	0.05	8	2/24/2010
E2	55	5738452.721	2123843.863	14	-2	0	19	Y	2/23/2010	N	Y	3	CD	1	Other	0.5	0.5	1	3	2/24/2010
E2	56	5738443.903	2123841.321	18.007	1	-1	27	Y	2/23/2010	Y	Y	4	MD	1	Other	0.5	2	0.5	4	2/24/2010
E2	57	5738424.166	2123855.605	15	0	0	14	Y	2/23/2010	N	Y	3	MD	1	Other	0.25	1	0.1	3	2/24/2010
E2	58	5738426.453	2123858.878	33.4	0	0	14	Y	2/23/2010	N	Y	4	CD	3	Nails	0.25	2	0.1	4	2/24/2010
E2	60	5738423.549	2123874.999	25.983	0	0	47	Y	2/23/2010	N	Y	3	CD	2	Other	0.75	6	0	3	2/24/2010
E2	61	5738427.857	2123894.051	21.769	-1	-1	11	Y	2/23/2010	N	Y	2	CD	1	Can	0.25	6	0	2	2/24/2010

Table 2. EM61 Targets with Reacquisition and Dig Results

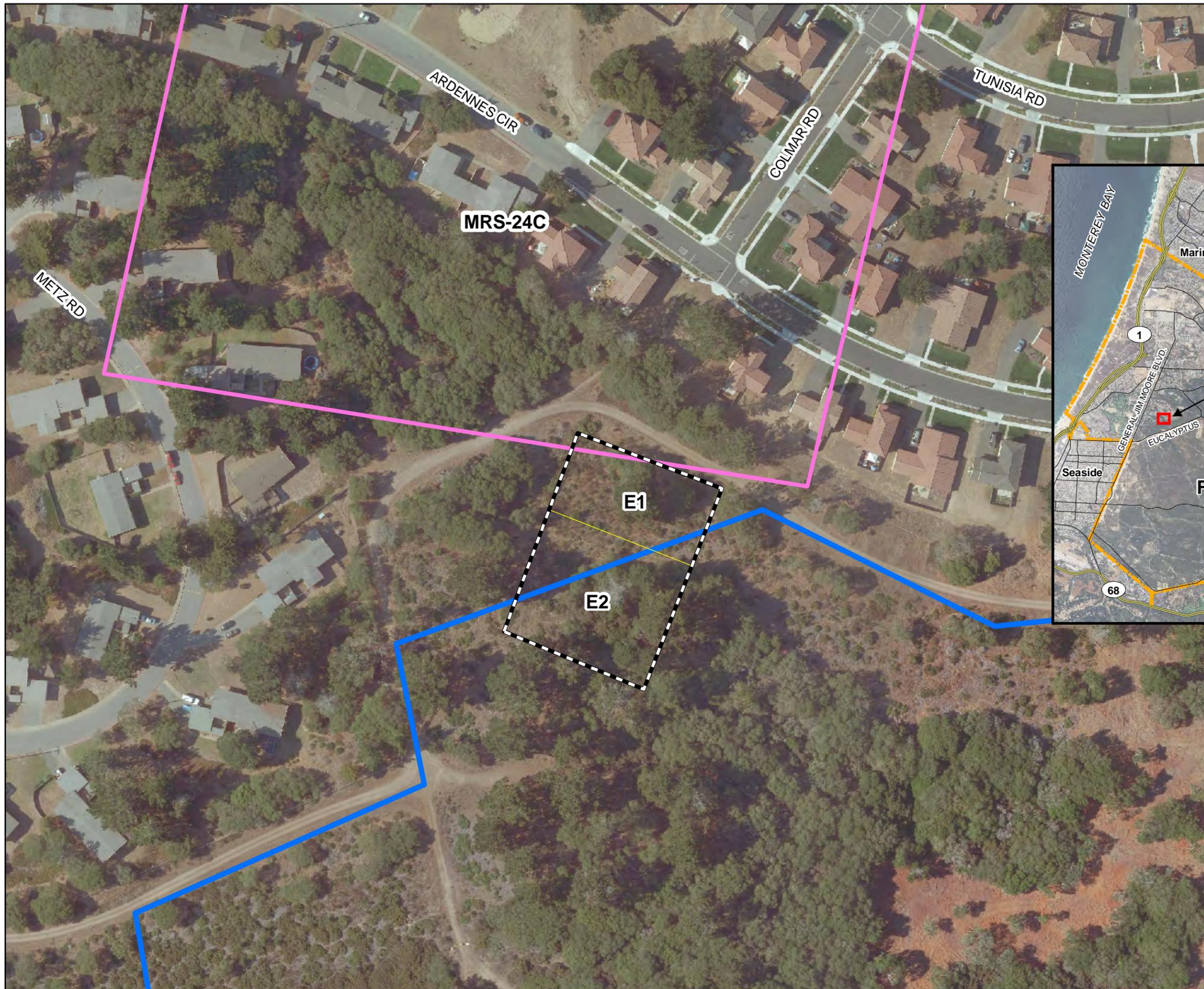
Grid	Anomaly ID	Easting	Northing	Initial Response	Reac Offset East	Reac Offset North	Reac Response	Dig Priority	Reac Date	Surface Item	Item Located	Total Depth Dug (in)	Dig Result Type	Quantity	Item Description	Total Weight (lbs)	Item Length (in)	Item Diameter (in)	Item Depth (in)	Dig Completed Date
E2	63	5738453.969	2123900.303	18.6	-1	0	16	Y	2/23/2010	N	Y	3	MD	1	Other	0.25	1	0	3	2/24/2010
E2	64	5738458.140	2123900.726	18.1	-1	-1	17	Y	2/23/2010	N	Y	4	CD	1	Nails	0.5	8	0.1	4	2/24/2010
E2	65	5738468.909	2123894.548	25.925	-1	-1	26	Y	2/23/2010	N	Y	4	CD	1	Can	0.25	5	0	4	2/25/2010
E2	66	5738478.551	2123905.153	15.801	0	-1	10	Y	2/23/2010	N	Y	3	MD	1	Other	0.25	1	0	3	2/24/2010
E2	67	5738486.389	2123912.595	541.55	0	0	850	Y	2/23/2010	N	Y	6	CD	1	Other	1	12	1	6	2/25/2010
E2	68	5738495.292	2123913.222	21.5	0	0	34	Y	2/23/2010	N	Y	6	CD	1	Can	0.25	6	0	0	2/24/2010
E2	70	5738506.705	2123921.339	23	0	0	27	Y	2/23/2010	N	Y	8	MD	6	Assorted MD Components	0.75	4	0	8	2/25/2010
E2	71	5738504.211	2123926.812	16.515	0	0	17	Y	2/23/2010	N	Y	3	MD	3	Assorted MD Components	0.5	4	0	3	2/25/2010
E2	72	5738506.914	2123931.804	34.4	0	0	24	Y	2/23/2010	N	Y	6	MD	2	Assorted MD Components	0.5	4	0	6	2/25/2010
E2	73	5738490.379	2123919.398	22.2	0	0	20	Y	2/23/2010	N	Y	4	CD	2	Scrap Metal	0.75	8	0	4	2/24/2010
E2	74	5738486.644	2123920.886	29.4	0	0	22	Y	2/23/2010	N	Y	6	MD	1	Other	0.25	5	0	6	2/24/2010
E2	75	5738481.770	2123916.511	16	0	0	40	Y	2/23/2010	N	Y	3	MD	2	Other	0.5	2	0	3	2/24/2010
E2	76	5738471.616	2123931.102	14.719	1	1	16	Y	2/23/2010	N	Y	12	MD	43	Other	2.5	4	0	12	2/24/2010
E2	77	5738466.439	2123912.120	20.8	0	-1	42	Y	2/23/2010	N	Y	15	CD	1	Pipe	2	20	1	15	2/24/2010
E2	78	5738458.400	2123911.401	20.265	-1	1	15	Y	2/23/2010	N	Y	12	CD	1	Other	0.5	8	0.5	12	2/24/2010
E2	79	5738458.278	2123915.361	23.635	0	-2	20	Y	2/23/2010	N	Y	1	CD	1	Other	0.25	2	0	1	2/24/2010
E2	81	5738430.696	2123913.973	27.591	-1	0	30	Y	2/23/2010	N	Y	4	CD	1	Can	0.25	6	0	4	2/24/2010
E2	82	5738441.379	2123936.827	20.75	0	0	19	Y	2/23/2010	N	Y	2	CD	1	Can	0.25	6	0	2	2/24/2010
E2	83	5738455.986	2123964.510	27.1	-1	0	26	Y	2/23/2010	N	Y	6	MD	2	Other	0.5	4	0	6	2/24/2010
E2	88	5738468.542	2123970.030	33	0	0	14	Y	2/23/2010	N	Y	3	CD	1	Scrap Metal	0.5	3	0	3	2/24/2010
E2	89	5738472.064	2123968.648	39.9	0	0	24	Y	2/23/2010	N	Y	12	CD	1	Other	0.25	12	0	12	2/24/2010
E2	90	5738477.603	2123972.633	168.21	0	0	25	Y	2/23/2010	N	Y	6	MD	1	Other	0.25	2	0	6	2/24/2010
E2	91	5738482.621	2123970.621	90.796	1	0	20	Y	2/23/2010	N	Y	8	CD	1	Other	0.25	4	0	8	2/24/2010
E2	92	5738480.753	2123965.237	22.6	2	0	16	Y	2/23/2010	N	Y	6	MD	1	Frag	0.25	3	0	6	2/24/2010
E2	93	5738485.516	2123954.975	15.4	2	0	11	Y	2/23/2010	N	Y	6	CD	1	Can	0.25	4	0	0	2/24/2010
E2	94	5738496.299	2123965.405	15.124	0	0	18	Y	2/23/2010	N	Y	6	MD	3	Assorted MD Components	0.25	2	0	6	2/25/2010
E2	95	5738496.535	2123959.270	26.359	0	0	33	Y	2/23/2010	N	Y	6	MD	2	Assorted MD Components	0.25	1	0	6	2/25/2010
E2	97	5738500.356	2123953.602	17.308	0	1	21	Y	2/23/2010	N	Y	6	MD	3	Assorted MD Components	0.25	4	0	6	2/25/2010
E2	98	5738501.339	2123957.338	25.315	0	0	26	Y	2/23/2010	N	Y	8	MD	3	Other	0.5	4	0	8	2/24/2010
E2	99	5738507.018	2123956.243	29.631	0	0	94	Y	2/23/2010	N	Y	6	MD	2	Assorted MD Components	0.25	3	0	6	2/25/2010
E2	100	5738513.525	2123952.769	20.616	0	0	25	Y	2/23/2010	N	Y	3	MD	3	Assorted MD Components	0.25	4	0	3	2/25/2010
E2	101	5738518.274	2123956.282	96.183	0	0	66	Y	2/23/2010	N	Y	4	MD	3	Assorted MD Components	0.5	4	0	4	2/25/2010
E2	102	5738521.687	2123953.650	24.737	0	0	20	Y	2/23/2010	N	Y	6	MD	4	Assorted MD Components	0.5	4	0	6	2/25/2010
E2	103	5738528.139	2123952.701	19.808	0	0	22	Y	2/23/2010	N	Y	4	MD	4	Assorted MD Components	0.25	1	0	4	2/25/2010
E2	104	5738534.698	2123950.394	14.267	0	0	57	Y	2/23/2010	N	Y	4	MD	6	Assorted MD Components	0.25	1	0	4	2/25/2010
E2	105	5738529.597	2123946.066	56.7	0	0	33	Y	2/23/2010	N	Y	3	MD	3	Assorted MD Components	0.5	4	0	3	2/25/2010
E2	106	5738525.135	2123947.818	115.38	1	0	104	Y	2/23/2010	N	Y	3	CD	1	Scrap Metal	1.5	6	0	0	2/25/2010
E2	107	5738519.741	2123947.827	19	0	0	33	Y	2/23/2010	N	Y	6	CD	4	Nails	0.5	3	0	6	2/25/2010
E2	108	5738517.568	2123943.060	108.18	1	0	350	Y	2/23/2010	N	Y	8	CD	1	Pipe	1.5	18	1	8	2/24/2010
E2	109	5738519.755	2123937.268	26.244	0	0	10	Y	2/23/2010	N	Y	4	MD	1	Other	1.5	4	0	0	2/24/2010
E2	110	5738517.855	2123933.923	246.15	-1	0	650	Y	2/23/2010	N	Y	8	CD	1	Scrap Metal	1	6	0	8	2/24/2010
E2	111	5738529.375	2123937.706	14.467	1	0	36	Y	2/23/2010	N	Y	4	MD	4	Assorted MD Components	0.5	4	0	4	2/25/2010
E2	112	5738535.473	2123930.023	33.811	-1	0	92	Y	2/23/2010	N	Y	4	MD	7	Other	1.5	4	0	4	2/24/2010

Table 2. EM61 Targets with Reacquisition and Dig Results

Grid	Anomaly ID	Easting	Northing	Initial Response	Reac Offset East	Reac Offset North	Reac Response	Dig Priority	Reac Date	Surface Item	Item Located	Total Depth Dug (in)	Dig Result Type	Quantity	Item Description	Total Weight (lbs)	Item Length (in)	Item Diameter (in)	Item Depth (in)	Dig Completed Date
E2	113	5738537.113	2123938.890	17.9	0	0	43	Y	2/23/2010	N	Y	3	CD	1	Other	0.25	2	0	3	2/25/2010
E2	114	5738539.223	2123944.401	16.7	0	0	14	Y	2/23/2010	N	Y	4	MD	3	Assorted MD Components	0.25	1	0	4	2/25/2010
E2	115	5738540.960	2123939.558	15.194	0	0	30	Y	2/23/2010	N	Y	4	CD	1	Can	0.25	6	0	0	2/25/2010
E2	116	5738544.623	2123935.939	20.2	0	0	37	Y	2/23/2010	N	Y	6	MD	4	Assorted MD Components	0.5	2	0	6	2/25/2010
E2	117	5738550.262	2123940.072	20.5	0	0	16	Y	2/23/2010	N	Y	4	MD	5	Assorted MD Components	0.5	2	0	4	2/25/2010
E2	118	5738550.383	2123933.745	14.028	0	0	32	Y	2/23/2010	N	Y	6	MD	5	Assorted MD Components	0.25	4	0	6	2/25/2010
E2	119	5738554.717	2123934.089	17.3	0	0	31	Y	2/23/2010	N	Y	6	MD	7	Assorted MD Components	0.5	1	0	6	2/25/2010
E2	120	5738558.952	2123936.663	31.3	0	0	28	Y	2/23/2010	N	Y	6	MD	3	Assorted MD Components	0.5	4	0	6	2/25/2010
E2	121	5738560.680	2123934.132	17.565	0	0	34	Y	2/23/2010	N	Y	4	MD	4	Assorted MD Components	0.25	4	0	4	2/25/2010
E2	122	5738566.354	2123934.821	23.372	0	0	54	Y	2/23/2010	N	Y	6	CD	3	Wire	0.5	4	0	6	2/25/2010
E2	123	5738572.263	2123935.561	14.88	0	0	34	Y	2/23/2010	N	Y	6	CD	4	Nails	0.5	3	0	6	2/25/2010
E2	124	5738569.602	2123930.630	23.84	0	1	37	Y	2/23/2010	N	Y	6	CD	5	Nails	0.5	2	0	6	2/25/2010
E2	125	5738564.326	2123926.072	50.1	0	0	14	Y	2/23/2010	N	Y	4	MD	3	Assorted MD Components	0.25	4	0	4	2/25/2010
E2	126	5738562.065	2123929.078	14.126	0	0	26	Y	2/23/2010	N	Y	6	MD	5	Assorted MD Components	0.25	1	0	6	2/25/2010
E2	127	5738551.879	2123924.612	15.7	0	0	34	Y	2/23/2010	N	Y	6	MD	1	Assorted MD Components	0.5	1	0	6	2/25/2010
E2	128	5738555.988	2123918.772	15.044	0	0	21	Y	2/23/2010	N	Y	2	MD	2	Assorted MD Components	0.25	1	0	2	2/25/2010
E2	129	5738558.207	2123922.117	16.6	0	0	22	Y	2/23/2010	N	Y	3	MD	3	Assorted MD Components	0.5	1	0	3	2/25/2010
E2	130	5738565.841	2123921.324	183.15	0	0	20	Y	2/23/2010	N	Y	4	MD	3	Assorted MD Components	0.25	1	0	4	2/25/2010
E2	131	5738570.181	2123921.645	11513	0	0	8000	Y	2/23/2010	Y	Y	0	CD	1	Wire	2	24	0	0	2/25/2010
E2	132	5738573.671	2123919.490	347.49	0	-1	390	Y	2/23/2010	Y	Y	0	CD	1	Wire	2	24	0	0	2/25/2010
E2	133	5738574.387	2123924.215	14.49	0	0	17	Y	2/23/2010	N	Y	6	MD	4	Assorted MD Components	0.25	4	0	6	2/25/2010
E2	134	5738575.237	2123928.418	20.526	0	0	21	Y	2/23/2010	N	Y	6	MD	2	Assorted MD Components	0.25	4	0	6	2/25/2010
E2	135	5738579.452	2123924.415	20.305	0	0	19	Y	2/23/2010	N	Y	4	CD	2	Scrap Metal	1	6	0.5	4	2/25/2010
E2	136	5738582.883	2123931.308	22.595	0	0	33	Y	2/23/2010	N	Y	6	MD	4	Assorted MD Components	0.25	3	0	6	2/25/2010
E2	137	5738585.792	2123926.478	41.177	0	0	86	Y	2/23/2010	N	Y	4	CD	6	Nails	0.75	3	0	4	2/25/2010
E2	138	5738588.541	2123929.167	26.126	0	0	26	Y	2/23/2010	N	Y	4	CD	4	Nails	0.5	2	0	4	2/25/2010
E2	139	5738590.423	2123924.320	17.4	0	0	22	Y	2/23/2010	N	Y	6	CD	6	Nails	0.5	3	0	6	2/25/2010
E2	140	5738592.612	2123921.599	14.249	0	0	14	Y	2/23/2010	N	Y	4	CD	4	Nails	0.5	3	0	4	2/25/2010
E2	141	5738591.722	2123905.518	68.377	0	0	120	Y	2/23/2010	N	Y	6	MD	1	Assorted MD Components	1	4	3	6	2/25/2010
E2	142	5738575.871	2123893.865	17.5	0	0	12	Y	2/23/2010	N	Y	6	MD	3	Assorted MD Components	0.25	4	0	6	2/25/2010
E2	143	5738568.670	2123903.110	15.5	1	-1	21	Y	2/23/2010	N	Y	4	MD	7	Assorted MD Components	5	5	0	4	2/25/2010
E2	144	5738552.726	2123898.846	16.249	0	-1	16	Y	2/23/2010	N	Y	4	MD	1	Assorted MD Components	0.25	2	0	4	2/25/2010
E2	148	5738434.494	2123864.007	340	2	0	14	Y	2/23/2010	N	Y	2	CD	2	Nails	0.25	3	0.05	2	2/24/2010
E2	150	5738514.440	2123958.113	417.77	0	0	37	Y	2/23/2010	N	Y	4	MD	5	Assorted MD Components	0.5	4	0	4	2/25/2010

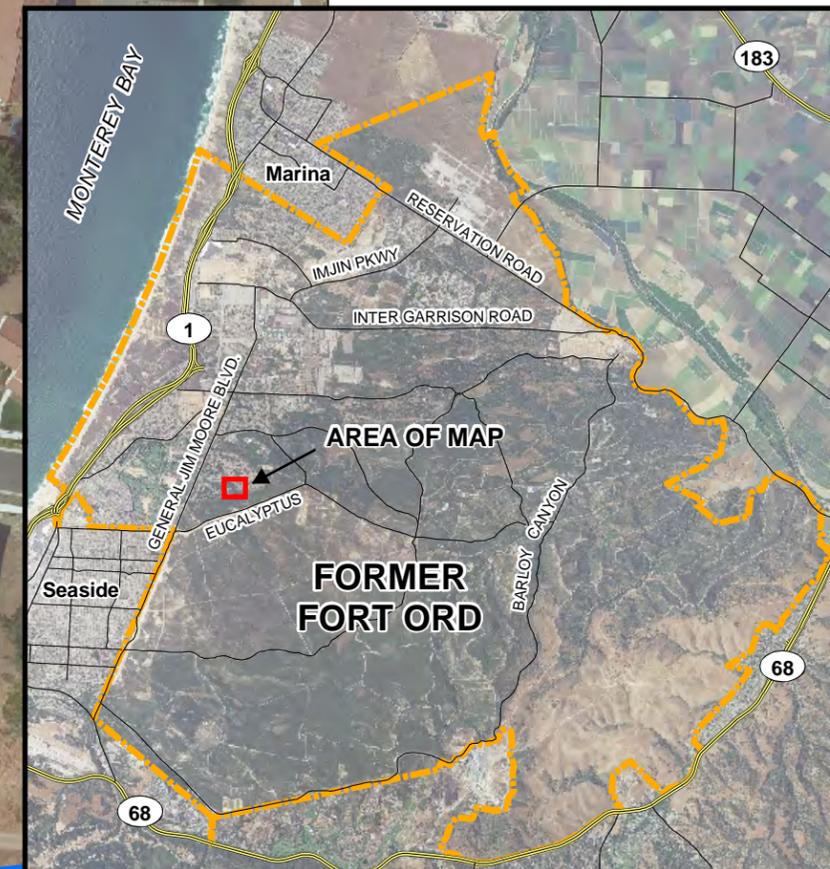
CD - cultural debris
in - inches
lbs - pounds
MD - munitions debris

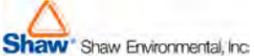
Figures

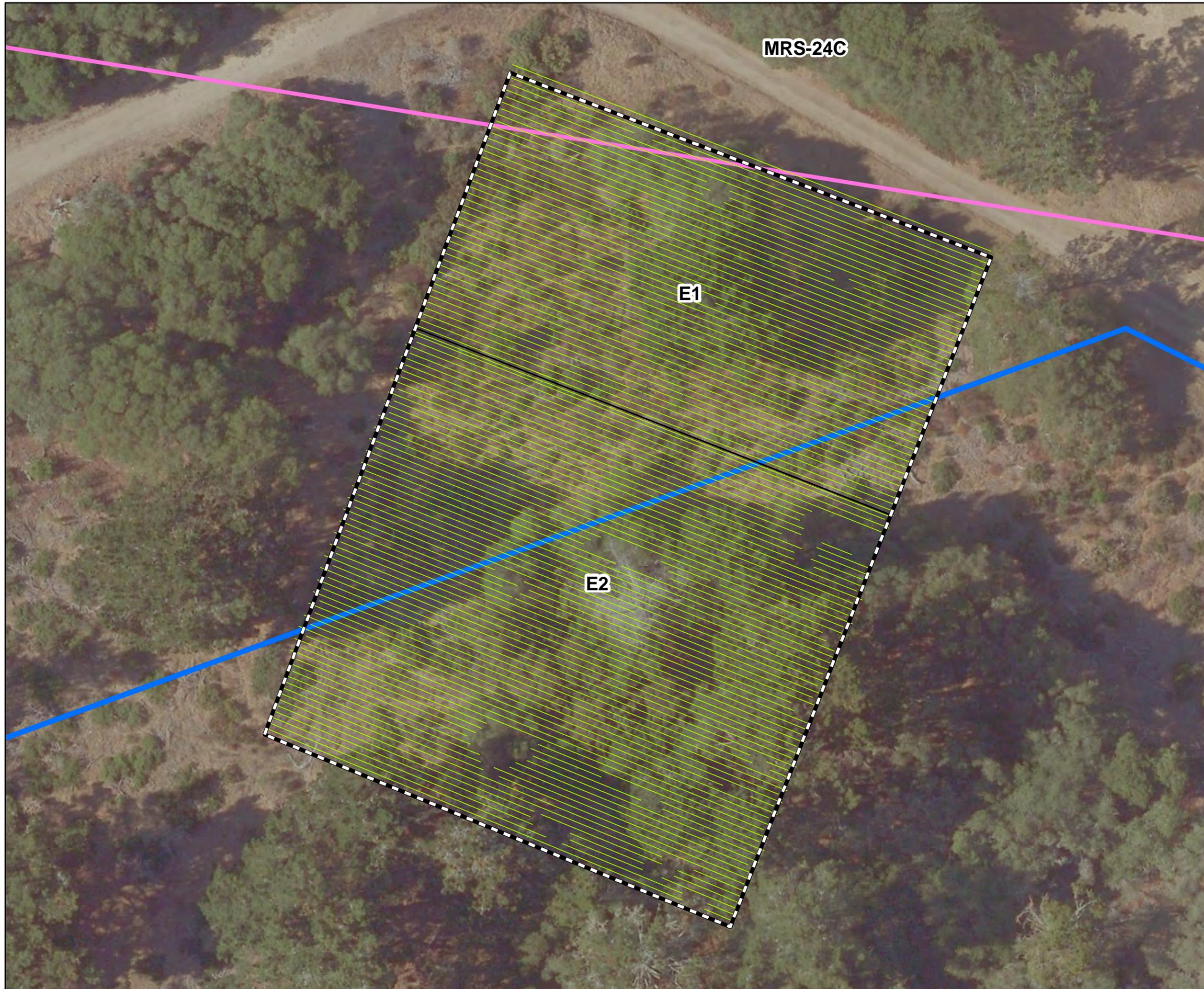


Legend

-  E20c1 Parcel
-  Munitions Response Site (from ASR)
-  Ranges (from Aerial Photos)

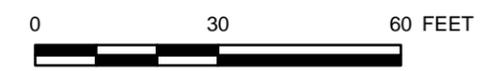


REVISION	DATE	DESCRIPTION	CHKD	APPR
		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: C. NYCUM	FIGURE 1 E20c.1 ADDITIONAL INVESTIGATION AREA FORMER FORT ORD, CALIFORNIA			
DRAWN: K. BLACK				
CHECKED:				
SUBMITTED:	DATE	SCALE:	SPEC. No.	
		SHEET	FILE No. E20c1_TechMemo_site.mxd	

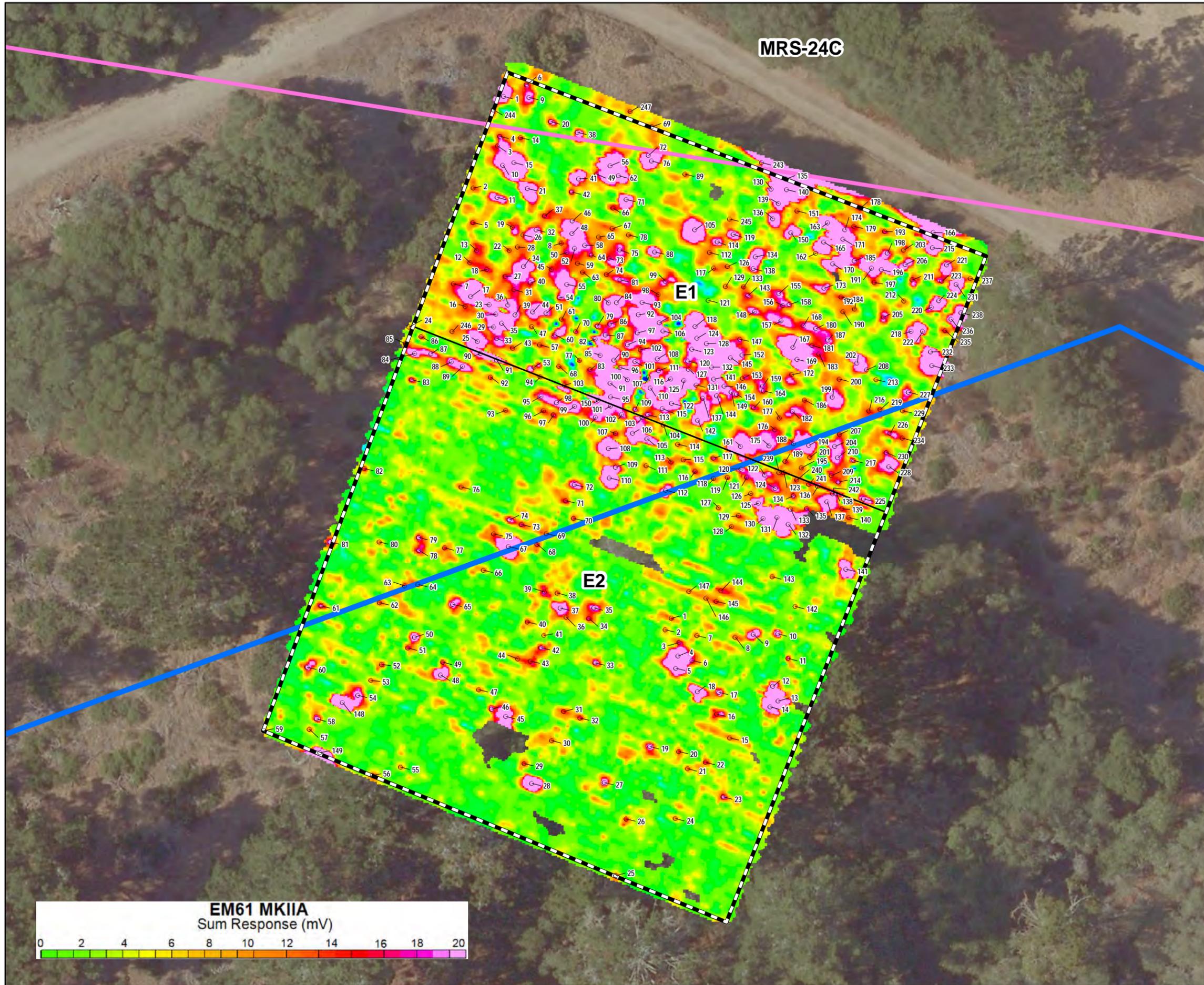


Legend

-  Survey Path
-  E20c1 Parcel
-  Munitions Response Site (from ASR)
-  Ranges (from Aerial Photos)



REVISION	DATE	DESCRIPTION	CHKD	APPR
		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: C. NYCUM	FIGURE 2 SURVEY PATHS FORMER FORT ORD, CALIFORNIA			
DRAWN: K. BLACK				
CHECKED:				
SUBMITTED:	DATE	SCALE:	SPEC. No.	
		SHEET	FILE No.	
			E20c1_TechMemo_Paths.mxd	



Legend

- Targets
- E20c1 Parcel
- Munitions Response Site (from ASR)
- Ranges (from Aerial Photos)



REVISION	DATE	DESCRIPTION	CHKD	APPR
		Department of the Army Sacramento District, Corps of Engineers Sacramento, California		
DESIGNED: C. NYCUM	FIGURE 3 EM61 MK2A SUM RESULTS FORMER FORT ORD, CALIFORNIA			
DRAWN: K. BLACK				
CHECKED:				
SUBMITTED:	DATE	SCALE:	SPEC. No.	
		SHEET	FILE No. E20c1_TechMemo_DGM.mxd	

Photographs

Photograph 1
E20c.1 Excavated Items



Appendix A
Field Logs and Fiducial Guidelines

QC checked by CS
Date: 10/2/09

Project Name: FORT ORD E20C-1

Project Location: E20C-1 ADDITIONAL AREA

Project Geophysicist:

Team Leader: C. NYCOM

Survey Area ID: Survey Date: 10/01/09

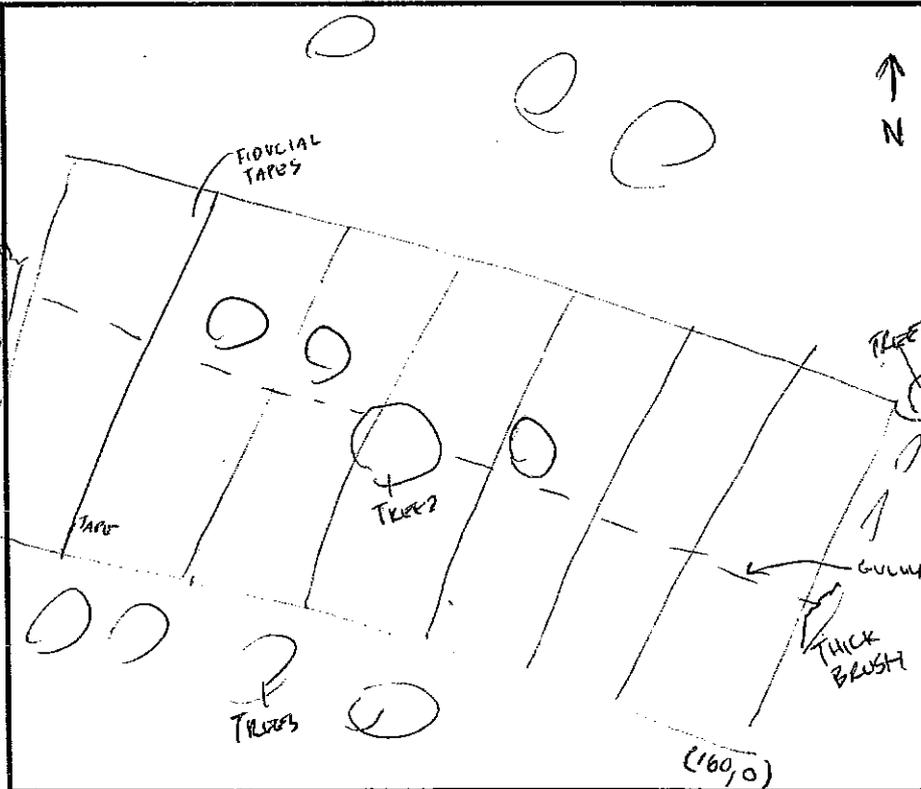
Field Team: C. NYCOM, A. GRITZ

Survey Type: Initial Survey Re-survey QC Survey Other _____

Survey Type Comments: FIDUCIAL AND GPS COMBINED

Survey Grids: N/A

Sketch of Survey Area:



Terrain:
 Level Moderate Slope Steep
 Rolling Ruts Gullies
 Rocky Swampy Dangerous

Tree Cover: Tree Height: 10-20'
 None Light Medium Thick

Brush:
 None Light Medium Thick

Weather:
 Sunny Cloudy Drizzle
 Rain Thunderstorms Hail
 Fog Humid Snow

Instrumentation: Left Coil S/N: Center Coil S/N: 02753 Right Coil S/N:

Left Electronics S/N: Center Electronics S/N: 02753 Right Electronics S/N:

Navigation: GPS Rover S/N: Remote S/N: Tx S/N:

Start Time: 0900

Start Battery Voltage: 12.6

AM Calibration File Name: 1001A.R61

Instrument Nulled

Equipment Warm-up (~5 min.)

Sensor Positions (+/- 1 inch) Antenna/Prism Offset:

Personnel Test (2 mV)

L0: Static Background (2.5 mV) Ch3=0 mV

L2: Cable Shake (No data Spikes)

L3: Static Spike (+/- 20% Std) Ch3=27 mV

L4: Repeatability (+/- 20%, +/- 20cm Position)

L4: Coil Test (L,C,R - Array only):

End Battery Voltage: 12.3

End Time: 11:49

PM Calibration: File Name: 1001Z.R61

Instrument Nulled

Equipment Warm-up (~5 min.)

Sensor Positions (+/- 1 inch) Antenna/Prism Offset:

Personnel Test (2 mV)

L0: Static Background (2.5 mV) Ch3=0 mV

L1: Cable Shake (No data Spikes)

L2: Static Spike (+/- 20% Std) Ch3=270 mV Spike Type: PAPER FITTING

L3: Repeatability (+/- 20%, +/- 20cm Position)

GPS Position Check ID: SW CORNER

Easting 5738456.94 Northing 2123981.05

PM 5738457.00 2123981.00

Ft Ord Area 18 and 22 Subsurface Area Fiducial Surveys.

List of items:

400+' of survey tape.

4 (9) 100'+ ropes with paint marks at 20' intervals. Mark at 20, 40, 60, 80 ft.

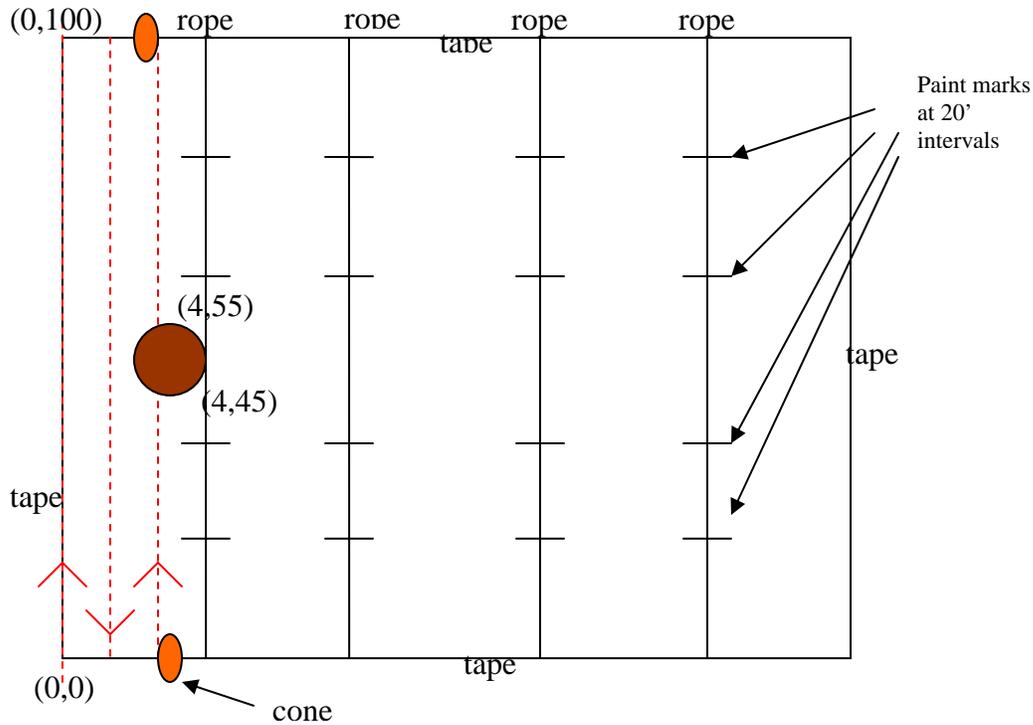
Helper

EM61

2 Trailer hitches

2 cones.

1. Lay out tapes on all 4 sides of the grid around the grid periphery.
2. Lay out marked ropes or tapes at 10' (20' if possible) intervals parallel to the expected path of travel.
 - a. Start surveys with rule of thumb that hilly sites should be marked at 10-ft intervals (hilly being any site where vegetation or topography prevent line-of-site from one marker to next)
 - b. Flat sites can be set up at 20-ft spacing
 - c. QC will observe first 4-6 grids and will make recommendations to USACE QA based on field observations.
3. Place a trailer hitch at (0,25) and one at (100,75) and leave it there for the survey. A pin flag will be placed adjacent to the hitch so that it can be readily reacquired and re-surveyed at the end of the survey.
4. Start at SW corner if possible. Create a separate line in the data file for each line you survey. Collect the data at 10 Hz.
 - a. Line 0 will be the first line and will run from (0, 0) to (0, 100). Line 2 will be the line from (2, 100) to (2, 0). Line 4 will be from (4, 0) to (4, 100), etc. If your line spacing is 3' then lines would be (0, 0) to (0, 100). Line 3 will be (3, 100) to (3, 0), etc.
 - b. Some lines will be short and you will have to end before you reach the 100 foot mark. Then just end the line where you can and record that in the notes.



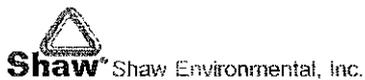
Note: For the example above the notes would look like this:

Grid C1A1A5

Line	Start	End	Note
0	0	100	
2	100	0	
4	0	45	Tree @ 45'
4.1	55	100	

5. Remember to name the lines in the data file to match the lines in your notes, and it is best to name the lines according to their x-coordinate.
6. Taking real good notes is critical for fiducial surveys.
7. When doing the survey, start collection at the tape line and end collection at the line at the end. When you pass a painted increment marker hit the fiducial/marker button for the EM61 MK2A.
8. Use the cones for a guide. Place one on each end of the survey lane. Have your assistant increment the cone every two feet on one side while you move the cone on the other side.
9. Data Preprocessing - The data must be "rubber sheeted" between the 20 foot fiducial marks (as the software allows). DAT61 should have a function to do the

rubber sheeting. After all segments are rubber sheeted the grid can than be processed and anomalies selected. Use the trailer hitch locations to QC the positioning.



FIELD DATA SHEET

Survey Date: 10/01/04 2 of 2

Survey Information:

Raw Data File Name(s): 100109A,B,C,Z

QC Points:

Location 1: _____

Easting: 573854.70

Northing: 212401.0

Location 2: _____

Easting: 5738505.20

Northing: 2124010.5

LOCATION 3:

20

16

LOCATION 4:

140

88

Data Collection Rate (per s): 10

Line Spacing (ft): 2

Metallic Surface Features Encountered

SLAP FLARE @
5738590.9, 2124005.3

Completion: Complete Partially Complete

Notes:

QC LOCATIONS 3 AND 4 WERE RECORDED USING LOCAL COORDINATES.
FIDUCIAL NOTES APPENDED

FILE: 100109B-561

NEW FILE

Line	Start (x,y)	Stop (x,y)	Notes
0.0	(0,0)	(44,0)	STUMP
0.1	(47,0)	(160,0)	
2	(160,2)	(150,2)	STUMP
2.1	(146,2)	(47,2)	MILITARY MISSED MARK @ 60' FID.
2.2	(47,2)	(0,2)	
3.0	(0,4)	(160,4)	SHOULD BE BORN LINE 4
6.0	(160,6)	(0,6)	
8.0	(0,8)	(160,8)	
10.0	(160,10)	(0,10)	
12.0	(0,12)	(160,12)	
14.0	(160,14)	(0,14)	
16.0	(0,16)	(160,16)	
18.0	(160,18)	(0,18)	
20.0	(0,20)	(160,20)	
22.0	(160,22)	(0,22)	
24.0	(0,24)	(160,24)	
26.0	(160,26)	(0,26)	
28.0	(0,28)	(160,28)	
30.0	(160,30)	(0,30)	
32.0	(0,32)	(160,32)	
34.0	(160,34)	(0,34)	
36.0	(0,36)	(160,36)	
38.0	(160,38)	(0,38)	
40.0	(0,40)	(160,40)	
42.0	(160,42)	(0,42)	DISCARD LINE
42.1	(160,42)	(78,42)	TREE
42.2	(78,42)	(0,42)	(78,42) TO (0,42) ^a
44.0	(0,44)	(160,44)	
46.0	(160,46)	(0,46)	
48.0	(0,48)	(160,48)	
50.0	(160,50)	(0,50)	
52.0	(0,52)	(160,52)	
54.0	(160,54)	(0,54)	
56.0	(0,56)	(160,56)	
58.0	(160,58)	(0,58)	
60.0	(0,60)	(160,60)	
62.0	(160,62)	(122,62)	TREE
62.1	(116,62)	(0,62)	
64.0	(0,64)	(116,64)	TREE
64.1	(122,64)	(160,64)	
66.0	(160,66)	(0,66)	
68.0	(0,68)	(160,68)	
70.0	(160,70)	(0,70)	
72.0	(0,72)	(70,72)	TREE
72.1	(77,72)	(160,72)	MILITARY MISSED MARK @ 120'
74.0	(160,74)	(77,74)	TREE
74.1	(70,74)	(0,74)	
76.0	(0,76)	(70,76)	TREE
76.1	(77,76)	(160,76)	
78.0	(160,78)	(0,78)	

CONTINUED →

QC POINTS (20,16)
(140,88)

Two 170' LINES
430' LINES
630' LINES

FIELD DATA SHEET

QC checked by cm

Date: 1/23/10

Project Name: E20C.1

Project Location:

Project Geophysicist: C. NYLUM

Team Leader: C. CHANG

Survey Area ID: E20C Survey Date: 1/19/2010

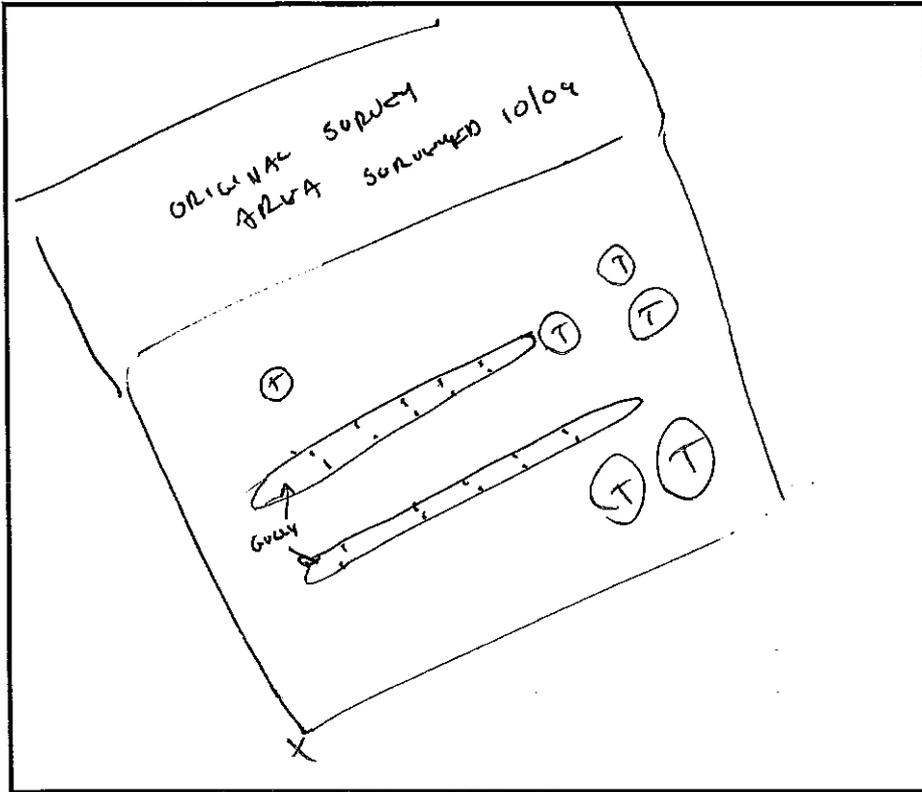
Field Team: C. NYLUM

Survey Type: Initial Survey Re-survey QC Survey Other _____

Survey Type Comments: FIDUCIAL

Survey Grids: E20C.1

Sketch of Survey Area:



Terrain:

- Level Moderate Slope Steep
- Rolling Ruts Gullies
- Rocky Swampy Dangerous

Tree Cover: Tree Height:

- None Light Medium Thick

Brush:

- None Light Medium Thick

Weather:

- Sunny Cloudy Drizzle
- Rain Thunderstorms Hail
- Fog Humid Snow

Instrumentation: Pack S/N: Top Coil S/N: 0906 Bottom Coil S/N: 0806

Navigation: GPS Rover S/N: Remote S/N: Tx S/N: 38811

Start Time:

Start Battery Voltage: 12.45

AM Calibration File Name: 011910-9

Instrument Nulled

Equipment Warm-up (~5 min.)

Sensor Positions (+/- 1 inch) Antenna/Prism Offset:

Personnel Test (2 mV)

L0: Static Background (2.5 mV) Ch3= 0 mV

L2: Cable Shake (No data Spikes)

L3: Static Spike (+/- 20% Std) Ch3= 214 mV

L4: Repeatability (+/- 20%, +/- 20cm Position)

L5: Coil Test (L,C,R - Array only):

End Battery Voltage: 12.0

PM Calibration: File Name: 011910-2

Instrument Nulled

Equipment Warm-up (~5 min.)

Sensor Positions (+/- 1 inch) Antenna/Prism Offset:

Personnel Test (2 mV)

L0: Static Background (2.5 mV) Ch3= 0 mV

L1: Cable Shake (No data Spikes)

L2: Static Spike (+/- 20% Std) Ch3= 70 mV Spike Type:

L3: Repeatability (+/- 20%, +/- 20cm Position)

GPS Position Check ID: SW CORNER

Easting 5738410.0

Northing 2123855.3

End Time:



FIELD DATA SHEET

Survey Date: 1/19/10 2 of 2

Survey Information:

Raw Data File Name(s):

QC Points:

Location 1: 20,0

Easting: _____

Northing: _____

Location 2: 20,18

Easting: _____

Northing: _____

Data Collection Rate (per s): (0)

Line Spacing (ft): 2

Metallic Surface Features Encountered

Completion: Complete Partially Complete

Notes:

FIELD DATA SHEET

QC checked by cn
Date: 10/23/10

Project Name: E20C.1

Project Location:

Project Geophysicist:

Team Leader: C. CHANG

Survey Area ID: Survey Date: 1/22/10

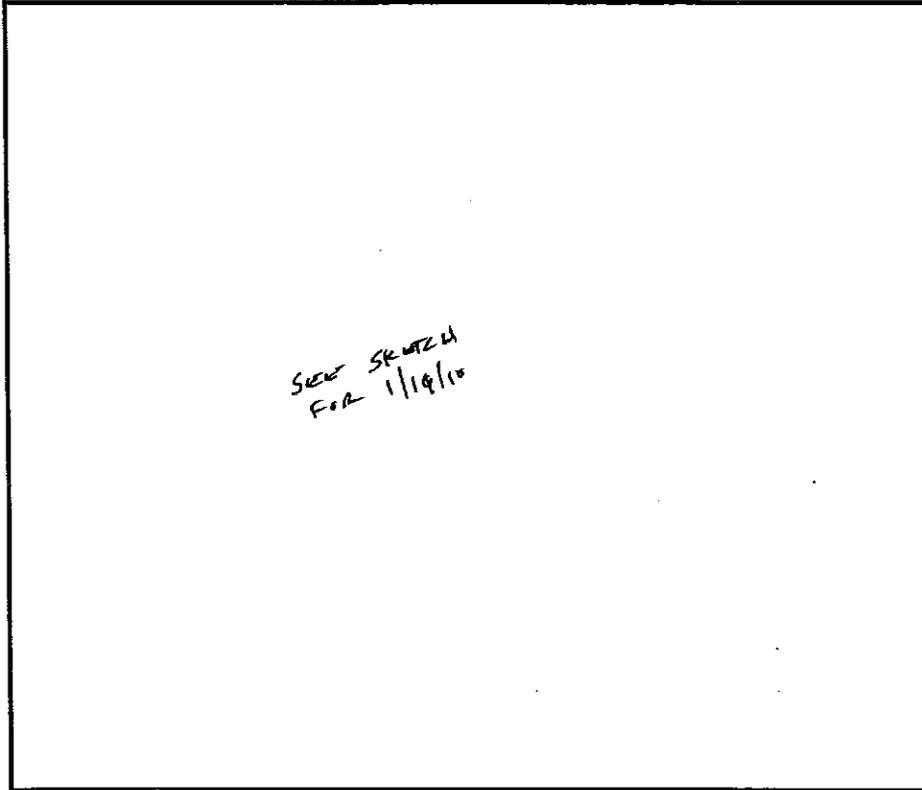
Field Team: J.

Survey Type: Initial Survey Re-survey QC Survey Other _____

Survey Type Comments: COMPLETION OF GRID #2

Survey Grids: N/A

Sketch of Survey Area:



Terrain:

- Level Moderate Slope Steep
- Rolling Ruts Gullies
- Rocky Swampy Dangerous

Tree Cover: Tree Height: 10-20'

- None Light Medium Thick

Brush:

- None Light Medium Thick

Weather:

- Sunny Cloudy Drizzle
- Rain Thunderstorms Hail
- Fog Humid Snow

Instrumentation: Pack S/N: Top Coil S/N: 0906 Bottom Coil S/N: 0806

Navigation: GPS Rover S/N: Remote S/N: Tx S/N: 3881

Start Time: 0:40

Start Battery Voltage: 12.3

AM Calibration File Name: 12210-01

Instrument Nulled

Equipment Warm-up (~5 min.)

Sensor Positions (+/- 1 inch) Antenna/Prism Offset:

Personnel Test (2 mV)

L0: Static Background (2.5 mV) Ch3=0 mV

L1: Cable Shake (No data Spikes)

L2: Static Spike (+/- 20% Std) Ch3=891 mV

L3: Repeatability (+/- 20%, +/- 20cm Position)

L4: Coil Test (L, C, R - Array only):

End Battery Voltage: 11.0

PM Calibration: File Name: 12210-02

Instrument Nulled

Equipment Warm-up (~5 min.)

Sensor Positions (+/- 1 inch) Antenna/Prism Offset:

Personnel Test (2 mV)

201 L0: Static Background (2.5 mV) Ch3=0 mV

202 L1: Cable Shake (No data Spikes)

203 L2: Static Spike (+/- 20% Std) Ch3=886 mV Spike Type:

204 L3: Repeatability (+/- 20%, +/- 20cm Position)

GPS Position Check ID: cont column, SW

Easting 5738410.0

Northing 2123855.7

End Time:



FIELD DATA SHEET

Survey Date: 1/22/17 2 of 2

Survey Information:

Raw Data File Name(s): 012210b

QC Points:

Location 1: 20,0

Easting: _____

Northing: _____

Location 2: 20,18

Easting: _____

Northing: _____

Data Collection Rate (per s):

Line Spacing (ft):

Metallic Surface Features Encountered

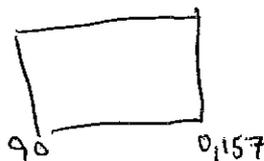
Completion: Complete Partially Complete

Notes:

First T Survey

1/19 R1

Line	Start	Stop	Notes
0	0,0	0,157	spike @ 0,20
2	2,157	2,147	TREE
2.1	2,140	2,0	
4	4,0	4,94	TREE
4.1	4,100	4,140	
4.2	4,148	4,157	TREE
6	6,157	6,131	
6.1	6,125	6,100	
6.2	6,88	6,0	
8	8,0	8,87	TREE
8.1	8,100	8,125	
8.2	8,135	8,157	
10	10,157	10,135	TREE
10.1	10,130	10,89	
10.2	10,87	10,0	BAD LINE
10.3	10,87	10,0	
12	12,0	12,130	TREE
12.1	12,140	12,157	
14	14,157	14,0	
16	16,0	16,68	TREE
16.1	16,73	16,157	
18	18,157	18,70	double click @ 140'
18.1	18,66	18,0	spike @ 18,20
20	20,0	20,65	
20.1	20,75	20,157	
22	22,157	22,76	Tree, Lines 22-30 in a Gully
22.1	22,60	22,0	
24	24,0	24,60	Tree
24.1	24,80	24,157	end @ 157
26	26,157	26,123	Tree
26.1	26,116	26,80	Tree/gully
26.2	26,60	26,0	
28	28,0	28,63	Tree/gully
28.1	28,0		Ignore
28.2	28,80	28,106	Tree
28.3	28,124	28,157	
30	30,157	30,80	Tree/gully
30.1	30,63	30,0	
32	32,0	32,157	
34	34,157	34,0	
36	36,0	36,157	
38	38,157	38,0	
40	40,0	40,140	Tree
40.1	40,149	40,157	
42	42,157	42,0	
44	44,0	44,157	File 011910C
46	46,157	46,0	
48	48,0	48,157	
50	50,157	50,150	Tree
50.1	50,144	50,0	



VZZ

A

Line	Start	Stop	Notes
52	52,0	52,144	Tree
52.1	52,156	52,157	
54	54,157	54,0	1/22 0122108
56	0	133	missed next mark
56.1	120	157	
57			
58	157	0	
60	0	80	Root
60.1	80		
60.2	80	157	
62	157	0	
64	0	157	
66	157	66.1	Wrong number
66.1	157	0	
68	0	157	
70	150	58	Tree
70.1	56	0	
72	0	54	Tree
72.1	60	150	Tree
74	156	60	Tree
74.1	56	0	
76	0	50	Tree Double click on 40
76.1	50	156	
78	156	0	
80	0	95	
80.1	100	156	
82	156	0	
84	0	156	
86	156	0	
88	0	157	
90	157	0	
92	0	84	no double click at end, tree
92.1	86	157	
94	152	100	Trees
94.1	70	0	
96	0	74	trees
96.1	100	151	trees
98	157	115	tree
98.1	112	96	trees
98.2	75	0	
100	0	157	
102	157	0	
104	0	157	
106	157	0	
108	0	157	
110	157	0	
112	0	20	stop
112.1	20	157	
114	157	140	tree
114.1	133	0	
116	0	134	tree

Appendix B
Data Processing Logs



FORM G-5 DATA PROCESSING LOG

SITE: Fort Ord
Survey Area: E20C.1
Grids: Additional Investigation Area

Survey Date(s): 10/01/2009
Sensor: EM61-MK2
Crew: C.Nycum, A. Gritz

Shaw GP:	<u>cn</u>	<u>10/02/09</u>
	Init.	Date

Sensor Verification QC Log
Sensor_100109_single.pdf

Navigation Verification QC Log
Navigation_100109_single.pdf

Navigation Correction

Is data lagged correctly? Y
Latency Correction value: 0.4 seconds

Data Cataloging and Coordinate Conversion
Initial data in local coordinate system. Coordinates were added to the SW corner @ (5738455.49,2123980.027) and rotated 21.5 ° CW.
Final: California State Plane Zone 4, US Survey Foot, NAD83

Is data translated correctly? Y

Data Leveling / Diurnal Correction

Geosoft GX: uxdrift.gx
Parameters: UXDRIFT.LOW=0
 UXDRIFT.HIGH=60
 UXDRIFT.BLOCK=100

Note: The same drift correction was applied to all lines and all sensors. Leveling was performed before data was masked. Some lines were split prior to leveling to remove negative values.

Is data leveled? Y
How is data leveled? Uxdrift.gx

Data Filtering

None

Initial Review

Initial field data files are valid. Appropriate data files are included.

Data Location Plot Review

Data covers planned survey area.

Field log files:
FieldLog_100109_E20C.1.pdf
Field data files:
100109a,b,c, z
Initial (x,y,z) files:
E20C_raw.xyz
Turn in Date: xx/xx/09
Processed (x,y,z) files:
E20C_proc.xyz
Process Date: xx/xx/09
Turn in Date: xx/xx/09

Background Statistics

	Ch1_lev	Ch2_lev	Ch3_lev	Ch4_lev	Sum
Clipping Values	(0, 10)	(0, 10)	(0, 10)	(0, 10)	(0, 20)
Mean	3.6	2.3	1.0	0.5	6.6
STD	2.6	2.1	1.3	1.1	5.0
Number of Points	15420	17899	18747	19217	16390

Note: Stats apply to the entire processed data set.

Comments

Initial target selection using Geosoft's Blakely Algorithm with no smoothing filter, a normal (4) level of peak detection, and a threshold of 14mV on the sum channel. Targets were merged using a 3 foot radius and were later adjusted manually.

QC Comments



FORM G-5 DATA PROCESSING LOG

SITE: Fort Ord
Survey Area: E20c.1
Grids: NA

Survey Date(s): 1/19/10, 1/22/10
Sensor: EM61-MK2 Fiducial
Crew: C. Nycum, C. Chang

Shaw GP:	<u>sml</u>	<u>02/11/10</u>
	Init.	Date
Shaw QC	<u>JF</u>	<u>2/19/10</u>
	Init	Date

Sensor Verification QC Log

SensorQC_011910.xls
 SensorQC_012210.xls

Navigation Verification QC Log

NavigationQC_011910.xls
 NavigationQC_012210.xls

Navigation Correction

Lag/Latency Correction value: 0.5

Data Cataloging and Coordinate Conversion

Data collected fiducially in a local coordinate system. Field coordinates for GPO grid corners provided and data translated to State Plane coordinates. Final coordinate system: California State Plane Zone 4 (US Survey Feet)

Data Leveling / Diurnal Correction

Geosoft GX: uxdrift.gx
 Parameters: UXDRIFT.LOW=0
 UXDRIFT.HIGH=20
 UXDRIFT.BLOCK=100

The same drift correction was applied to all lines and all sensors.

Data Filtering

None

Initial Review

Initial field data files are valid. Appropriate data files are included.

Data Location Plot Review

Data covers planned survey area.

Background Statistics

	Ch1_lev	Ch2_lev	Ch3_lev	Ch4_lev	Sum
Clipping Values	(-3, 102)	(-18, 32)	(-6, 29)	(-2, 16)	(-9, 130)
Mean	0.34	-0.06	0.01	0.07	0.36
STD	3.40	1.22	0.52	0.32	3.88
# of Points	27275	27275	27275	27275	27275

Note: Clipping Values Selected automatically by script. Stats apply to the entire data set.

Anomaly Selection

Blakely test used at a 14mV threshold.

Comments

None

Field log files:

E20c.1_Fid_Notes.pdf

Field data files:

011910a.r61
 011910b.r61
 011910c.r61
 011910z.r61

012210a.r61
 012210b.r61
 012210z.r61

Initial (x,y,z) files:

E20c.1_raw.xyz

Turn in Date: 2/11/10

Processed (x,y,z) files:

E20c.1_proc.xyz

QC Comments

There is a little bit of streakiness in the data but overall looks good. QC was on site for the 1/19 data collection and the site conditions were very poor. Ground was undulating and included deep trenches and berms which are not conducive to a fiducial survey.

Appendix C
QC Logs



**FORM 6-1
SENSOR QC VERIFICATION LOG**

EM-61 MK2 Data

Site: Ft. Ord
 Area: E20C.1
 Dataset: 100109

E20C.1 Additional Investigation
 Grid ID: Area
 Survey Date: 10/1/2009

Check by: cn 10/02/09

Static Background Test

Sensor #1		Pre Survey				Post Survey			
		CH 1	CH 2	CH 3	CH 4	CH 1	CH 2	CH 3	CH 4
File Name		100109a				100109z			
Line #:		L1				L201			
Min:		-8.49	-2.14	-.73	-.57	-2.44	-1.84	-.84	-.32
Max:		-.32	.68	.54	.43	-.08	.29	.34	.34
Mean:		-5.92	-1.23	-.21	.03	-1.16	-.81	-.27	-.01
Std:		1.26	.36	.17	.14	.44	.36	.21	.11

AM CH3 p-p = 1.27
 PM CH3 p-p = 1.18

Comments: _____

Static Response Test

Sensor #1		Pre Survey				Post Survey			
		CH 1	CH 2	CH 3	CH 4	CH 1	CH 2	CH 3	CH 4
File Name		100109a				100109z			
Line #:		L3				L203.1			
Min:		638.55	447.20	257.23	114.90	667.36	462.30	263.52	116.80
Max:		687.26	480.67	275.93	123.60	718.79	497.94	284.10	126.16
Mean:		656.06	459.13	263.81	118.01	681.47	471.90	269.12	119.37
Std:		14.57	10.09	5.75	2.57	8.44	6.05	3.50	1.57

CH3 AM vs PM
 Mean diff % = 2.0

Comments: _____

Cable Shake Test

Sensor #1		Pre Survey				Post Survey			
		CH 1	CH 2	CH 3	CH 4	CH 1	CH 2	CH 3	CH 4
File Name		100109a				100109z			
Line #:		L2				L202			
Min:		-10.55	-2.55	-.65	-.23	-.38	-.42	-.20	-.14
Max:		-7.01	-1.34	.07	.15	2.04	.59	.42	.34
Mean:		-8.82	-1.99	-.30	-.06	.70	.02	.14	.06
Std:		.81	.25	.12	.08	.49	.20	.10	.09

AM CH3 p-p = 0.72
 PM CH3 p-p = 0.62

Comments: _____



**FORM G-1
SENSOR QC VERIFICATION LOG
EM61-MK2 DATA**

Site: Ft. Ord
Area: First Tee
Dataset: 011910A, Z

Grid ID: NA
Survey Date: 01/19/10

Check by: SML 1/27/10
QC Check by: JF 2/9/10

Static Background Test

Sensor #1		Pre Survey				Post Survey			
		CH 1	CH 2	CH 3	CH 4	CH 1	CH 2	CH 3	CH 4
File Name		011910A				011910Z			
Line #:		L1				L201			
Min:		-1.89	-1.06	-.65	-.21	23.64	2.38	-.19	-.55
Max:		.00	-.16	-.01	.26	122.01	25.22	1.44	.70
Mean:		-1.02	-.64	-.32	.06	70.42	12.16	.26	.14
Std:		.36	.14	.10	.08	29.56	6.66	.19	.12

AM CH3 p-p = 0.64
PM CH3 p-p = 1.63

Comments: Extreme ch1/ch2 drift in PM. Ch3 peak-min to peak-max still within metric.
QC Note - QC was present for this survey and data collection stopped and started a few times at the end of the day due to local thuderstorms. Drift was probably due to haste to collect the final tests between storms and the equipment not warming up long enough after being put away during a storm.

Static Response Test

Sensor #1		Pre Survey				Post Survey			
		CH 1	CH 2	CH 3	CH 4	CH 1	CH 2	CH 3	CH 4
File Name		011910A				011910Z			
Line #:		L3				L204			
Min:		464.51	337.92	213.62	114.68	580.35	349.47	197.94	108.57
Max:		473.17	343.26	216.75	116.43	656.15	397.64	200.64	110.80
Mean:		467.40	339.93	214.79	115.48	618.57	371.03	199.35	109.57
Std:		1.63	1.00	.58	.29	23.20	14.31	.47	.33

CH3 AM vs PM
Mean diff % = 7.2

Comments: Extreme ch1/ch2 drift in PM. Ch3 peak-min to peak-max still within metric.

Cable Shake Test

Sensor #1		Pre Survey				Post Survey			
		CH 1	CH 2	CH 3	CH 4	CH 1	CH 2	CH 3	CH 4
File Name		011910A				011910Z			
Line #:		L2				L202			
Min:		-2.41	-.91	-.54	-.23	241.07	98.27	-4.36	.16
Max:		1.69	.64	.33	.25	243.97	107.74	-3.39	.48
Mean:		-.24	-.17	-.17	.00	242.53	102.91	-3.86	.33
Std:		.81	.30	.15	.09	.70	2.54	.23	.07

AM CH3 p-p = 0.87
PM CH3 p-p = 0.97

Comments: Extreme ch1/ch2 drift in PM. Ch3 peak-min to peak-max still within metric.



**FORM G-1
SENSOR QC VERIFICATION LOG
EM61-MK2 DATA**

Site: Ft. Ord
Area: First Tee
Dataset: 012210A, Z

Grid ID: NA
Survey Date: 01/22/10

Check by: SML 1/27/10
QC Check by: JF 2/19/10

Static Background Test

Sensor #1

	Pre Survey				Post Survey			
	CH 1	CH 2	CH 3	CH 4	CH 1	CH 2	CH 3	CH 4
File Name	012210A				012210Z			
Line #:	L1				L201			
Min:	-3.54	-1.07	-.54	-.22	-3.46	-1.03	-.37	-.28
Max:	1.13	.55	.16	.31	-.11	.22	.18	.26
Mean:	-1.55	-.37	-.18	.06	-2.41	-.52	-.10	-.02
Std:	.88	.27	.11	.08	.52	.16	.08	.07

AM CH3 p-p = 0.70
PM CH3 p-p = 0.55

Comments:

Static Response Test

Sensor #1

	Pre Survey				Post Survey			
	CH 1	CH 2	CH 3	CH 4	CH 1	CH 2	CH 3	CH 4
File Name	012210A				012210Z			
Line #:	L3				L204			
Min:	2,136.60	1,487.52	884.91	439.86	2,123.88	1,481.64	881.81	438.22
Max:	2,156.22	1,500.30	891.90	443.54	2,143.70	1,494.36	889.07	441.81
Mean:	2,142.59	1,491.53	886.77	440.98	2,127.54	1,483.94	883.19	438.94
Std:	3.99	2.55	1.42	.69	4.07	2.59	1.45	.71

CH3 AM vs PM
Mean diff % = 0.4

Comments:

Cable Shake Test

Sensor #1

	Pre Survey				Post Survey			
	CH 1	CH 2	CH 3	CH 4	CH 1	CH 2	CH 3	CH 4
File Name	012210A				012210Z			
Line #:	L2				L202			
Min:	3.59	.24	-.68	-.77	-4.31	-.97	-.47	-.31
Max:	6.72	2.53	.47	.38	-1.91	-.14	.09	.09
Mean:	5.54	1.44	-.12	-.11	-3.13	-.60	-.20	-.14
Std:	.70	.42	.21	.16	.60	.18	.10	.08

AM CH3 p-p = 1.15
PM CH3 p-p = 0.56

Comments:



**FORM G-2
NAVIGATION QC FUNCTION LOG
EM-61 MK2 Data**

Check by: CN
Date: 10/2/2009

Survey Area.: Ft Ord - MRS18-22
Dataset: 100109
Grid ID: E20C.1 Additional Area
Survey Date: 10/1/2009

2-Line Repeat Data Test

Comments:

Pre Survey		Post Survey		Metric
100109a		100109z		
Lag Correction	Line	Lag Correction	Line	
5.50	4	5.50	204	TBD
Anomaly Amplitude mV/nT	Distance Offset (ft)	Anomaly Amplitude mV/nT	Distance Offset (ft)	
225	0.3	211	0.3	TBD

Anomaly Amplitude taken from CH3 values. Offset distances are peak to bar in the location after latency is applied in the forward direction.

Known Location QC Points Detected

Comments:

Location ID		Location ID		Metric
		NA		
Easting	573854.70	Easting	5738505.20	
Northing	2124011.00	Northing	2124010.50	
Anomaly Offset		Anomaly Offset		
Dist. (ft)	2.30	Dist. (ft)	1.30	<=2-ft
Direction	NE	Direction	SE	

Positioning Repeatability Test

Comments:

AM	Location ID		PM	Location ID	
	SW Corner			SW Corner	
	Easting	5738456.49		Easting	5738456.49
	Northing	2123981.03		Northing	2123981.03
	Meas. Easting	5738456.99		Meas. Easting	5738457.00
	Meas. Northing	2123981.05		Meas. Northing	2123981.00
	Position Offset			Position Offset	
	Dist. (ft)	0.5		Dist. (ft)	0.5
	Direction	NE		Direction	SE

Data Sampling

Comments:

Platform Velocity		Metric
Minimum (mph)	0	
Maximum (mph)	4.17	
Average (mph)	2	<3 mph
Standard Deviation	0.4	
Along Track / Across Track Sampling		
Along Track Minimum (ft)	0.0	
Along Track Maximum (ft)	0.9	
Along Track Average (ft)	0.3	<=0.6-ft
Along Track Std Dev	0.1	
Across Track (ft)	2.0	<=2-ft
Total Area Surveyed (acres)		
This Data Set	0.3	

Stats apply to entire dataset.

Small area surveyed for fill in.



**FORM G-2
NAVIGATION QC FUNCTION LOG
EM61-MK2 DATA**

Check by: sml
 Date: 1/27/2010
 QC Check by: JF
 Date: 2/19/2010

Survey Area.: Ft Ord - E20c.1
 Dataset: 011910A,B,C,Z
 Grid ID: NA
 Survey Date: 1/19/2010

2-Line Repeat Data Test

Pre Survey		Post Survey		Metric
011910A		011910Z		
Latency Correction	Line	Latency Correction	Line	
0.40	4	0.40	204	
Anomaly Amplitude mV/nT	Distance Offset (ft)	Anomaly Amplitude mV/nT	Distance Offset (ft)	<=0.5 ft
198.33	0.37	141.07	0.19	
190.52		117.73		

Comments:
 Anomaly Amplitude taken from CH3 values. Offset distances are peak to QC Location after latency is applied in the forward direction

QC Locations:

E 5738355
 N 2123714
 E 5738350
 N 2123715

Note: 0.5 latency applied to survey data based on chevron features

Known Location QC Points Detected

Location ID	
(x=20, y=0)	
Easting	20 (local)
Northing	0 (local)
Anomaly Offset	
Dist. (ft)	0.9
Direction	W

Location ID		Metric
(x=20, y=18)		
Easting	20 (local)	
Northing	18 (local)	
Anomaly Offset		
Dist. (ft)	1.28	
Direction	W	

Comments:

Data Sampling

Platform Velocity		Metric
Average (mph)	1.5	
Standard Deviation	0.4	
Along Track / Across Track Sampling		
Along Track Average (ft)	0.2	<=0.6-ft
Along Track Std Dev	0.1	
Across Track (ft)	2.0	<=2-ft
Total Area Surveyed (acres)		
This Data Set	0.16	

Comments:



**FORM G-2
NAVIGATION QC FUNCTION LOG
EM61-MK2 DATA**

Check by: sml
 Date: 1/27/2010
 QC Check by: JF
 Date: 2/19/2010

Survey Area.: Ft Ord - First Tee
 Dataset: 012210A,B,Z
 Grid ID: NA
 Survey Date: 1/22/2010

2-Line Repeat Data Test

Pre Survey		Post Survey		Metric
012210A		012210Z		TBD
Latency Correction	Line	Latency Correction	Line	
0.40	4	0.40	204	
Anomaly Amplitude mV/nT	Distance Offset (ft)	Anomaly Amplitude mV/nT	Distance Offset (ft)	<=0.5 ft
80.00	0.09	82.24	0.22	
72.22		87.91		

Comments:
 Anomaly Amplitude taken from CH3 values. Offset distances are peak to QC Location after latency is applied in the forward direction

QC Locations:

Note: 0.5 latency applied to survey data based on chevron features

Known Location QC Points Detected

Location ID	
(x=60, y=138)	
Easting	60 (local)
Northing	138 (local)
Anomaly Offset	
Dist. (ft)	1.3
Direction	E

Location ID		Metric
NA		
Easting	---	
Northing	---	<=2-ft
Anomaly Offset		
Dist. (ft)	---	
Direction	---	

Comments:

Data Sampling

Platform Velocity		Metric
Average (mph)	1.6	<3 mph
Standard Deviation	0.6	
Along Track / Across Track Sampling		
Along Track Average (ft)	0.2	<=0.6-ft
Along Track Std Dev	0.1	
Across Track (ft)	2.0	<=2-ft
Total Area Surveyed (acres)		
This Data Set	0.33	

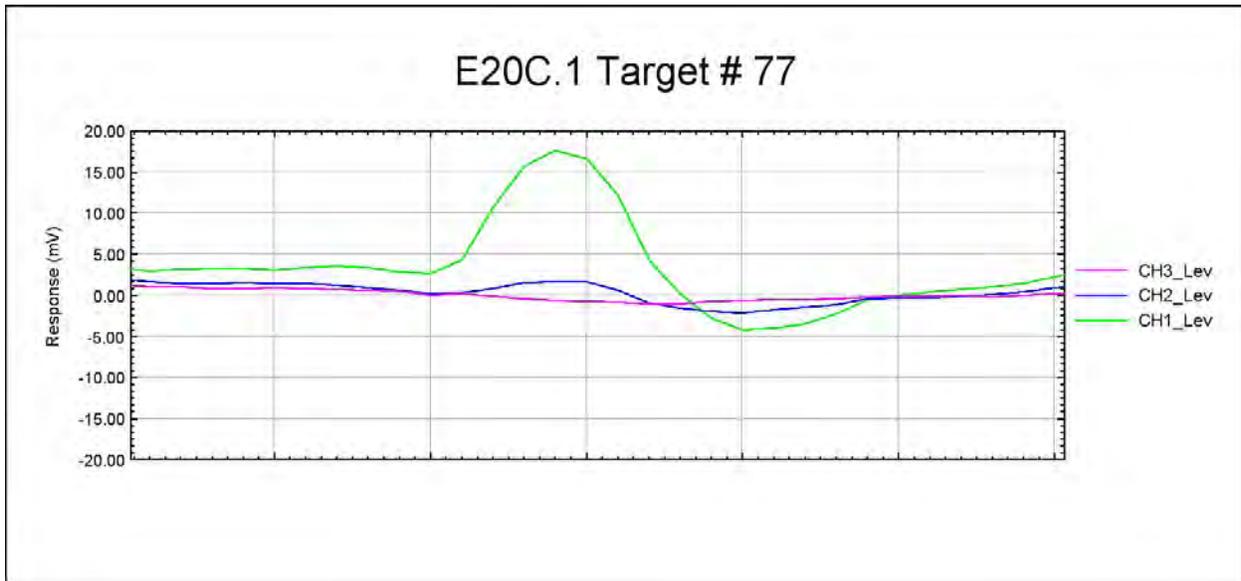
Comments:

Appendix D
Weighted Sum Method

Weighted Sum Method

DGM investigation at E20C.1 in the first survey area on 10/01/2009 resulted in a large number of targets when applying a 14 mV threshold on the sum channel (sum of EM61-MKII channels 1 through 4). Preliminary analysis of the survey data resulted in the determination that several target signals were dominated by high readings from the earlier time gates.

One drawback of a simple straight sum method is that the response from the early time gates can exceed the sum threshold while the response from later time gates is negligible or close to background values. This was observed in both the data and during target reacquisition. In theory, early time gate responses (Channel 1) are indicative of both small and larger items, while later time (Channels 3 and 4) gate responses indicate the presence of larger items. Figure 1 below is an example taken from the E20C.1 survey data. The response for this target was mostly from Channel 1. The response at later times was negligible. During target reacquisition, it was noted that this particular target was due to an aluminum can protruding on the surface.



After further analysis and consultations with USACE QA, a modified sum approach that weights each channel was chosen as an alternative to picking from a straight sum channel. This method was recommended by USACE QA and has been used by Earth Tech at Camp Beale. Both approaches are summarized below.

- Current method: $\text{Sum} = \text{Ch1} + \text{Ch2} + \text{Ch3} + \text{Ch4}$
- Modified method: $\text{Sum} = \text{Ch1}(0.16) + \text{Ch2}(0.21) + \text{Ch3}(0.26) + \text{Ch4}(0.31)$

Note that the modified sum approach can still produce 3 mV targets in instances where the later time gate responses are negligible. However, the modified sum does appear to increase the signal to noise ratio. Another proposed benefit is the reduction of false positives.

The weighted sum method was initially applied to the E20C.1 test plot data (FWV 25, September 2008) and it was determined that target selection using the weighted sum channel at a threshold of 3mV detected all seeded MKII Grenades.

Applying this method to the E20C.1 survey data with a threshold of 3 mV reduced the initial target list by 29 fewer items. Of the 29 targets that were filtered out; 7 were false positives, 5 were scrap metal, and 17 were MD frag. However, one of the targets missed was ½ of a practice grenade, which was not considered to be fully intact.

Using the modified sum method on E20C.1 was successful in that it eliminated several targets that were not of interest and reduced the number of false positives. It also successfully detected the six intact grenades that were found on site. Some of the filtered items are close to the 3 mV threshold, and differences in leveling and gridding techniques can affect the final millivolt readings. However, this method would still improve the quality of the final target list.

Appendix E

Definitions and Terms

DEFINITIONS AND TERMS

Administrative Record	A compilation of all documents relied upon to select a remedial action pertaining to the investigation and cleanup of Fort Ord. Source: 1
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.). Source: 2
Approval Memorandum	For the purposes of an MR NFA at Fort Ord, a document submitted for regulatory agency review with supporting documentation of eligibility that will serve as a record that no further action is necessary at a site upon approval. Source: 1
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)	A federal law that addresses the funding for and cleanup of abandoned or uncontrolled hazardous waste sites. This law also establishes criteria for the creation of decision documents such as the RI, FS, Proposed Plan, and ROD. Source: 1
Discarded Military Munitions (DMM)	<p>The term “discarded military munitions” means military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of, consistent with applicable environmental laws and regulations. Source: 6</p> <p>For the purposes of the Fort Ord MR, DMM does not include small arms ammunition (.50 caliber or smaller).</p>
Disposal	End-of-life tasks or actions for residual materials resulting from demilitarization or disposition operations. Source: 3
Disposition	Reusing, recycling, converting, redistributing, transferring, donating, selling, demilitarizing, treating, destroying, or fulfilling other life-cycle guidance, for DoD property. Source: 3
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 HE and propellants, together with igniters, primers, initiators, and pyrotechnics (e.g., illuminant, smoke, delay, decoy, flare, and incendiary compositions). Source: 3
Feasibility Study (FS)	An evaluation of potential remedial technologies and treatment options that can be used to clean up a site. Source: 1

DEFINITIONS AND TERMS

- Grid** A subdivided work area in a site, usually 100 feet by 100 feet. Grids are surveyed and marked with wooden stakes before removal work begins in a site. They are numbered sequentially using an alphanumeric system. Source: 1
- High Explosive** An explosive substance designed to function by detonation (e.g., main charge, booster, or primary explosive). Source: 3
- Historical Impact Area** The 8,000-acre area within the southwest portion of former Fort Ord containing numerous firing ranges previously used for military training activities involving live ammunition. The Impact Area is bounded by Eucalyptus Road to the north, General Jim Moore Boulevard to the west, South Boundary Road to the southwest, and Barclay Canyon Road to the south and east. Source: 1
- Military Munitions**
- (A) The term “military munitions” means all ammunition products and components produced for or used by the armed forces for national defense and security, including ammunition products or components under the control of the Department of Defense, the Coast Guard, the Department of Energy, and the National Guard.
- (B) Such term includes the following:
- (i) Confined gaseous, liquid, and solid propellants.
 - (ii) Explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives and chemical warfare agents.
 - (iii) Chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, and demolition charges.
 - (iv) Devices and components of any item specified in clauses (i) through (iii).
- (C) Such term does not include the following:
- (i) Wholly inert items.
 - (ii) Improvised explosive devices.
 - (iii) Nuclear weapons, nuclear devices, and nuclear components, other than nonnuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) have been completed. Source: 4

DEFINITIONS AND TERMS

Military Munitions Burial Site

A site, regardless of location, where military munitions or CA [chemical agents], regardless of configuration, were intentionally buried, with the intent to abandon or discard. This term includes burial sites used to dispose of military munitions or CA, regardless of configuration, in a manner consistent with applicable environmental laws and regulations or the national practice at the time of burial. It does not include sites where munitions were intentionally covered with earth during authorized destruction by detonation, or where *in situ* capping is implemented as an engineered remedy under an authorized response action. Source: 3

Military Munitions Response Program (MMRP)

Program established by the Department of Defense to manage environmental, health and safety issues presented by munitions and explosives of concern (MEC). Source: 3

Munitions and Explosives of Concern (MEC)

A term distinguishing specific categories of military munitions that may pose unique explosives safety risks:

- (A) UXO, as defined in 10 U.S.C. 101 (e)(5);
- (B) DMM, as defined in 10 U.S.C. 2710 (e)(2); or
- (C) Munitions constituent (MC) (e.g., TNT, cyclotrimethylenetrinitramine [RDX]), as defined in 10 U.S.C. 2710 (e)(3) present in high enough concentrations to pose an explosive hazard. Source: 3

For the purposes of the Fort Ord MR, MEC does not include small arms ammunition (.50 caliber or smaller).

Munitions Debris (MD)

Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization or disposal. Source: 3

Munitions Response (MR)

Response actions, including investigation, removal actions, and remedial actions to address the explosives safety, human health, or environmental risks presented by UXO, DMM, or MC, or to support a determination that no removal or remedial action is required. Source: 3

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. Source: 3

Munitions Response Site (MRS)

A discrete location within an MRA that is known to require a munitions response. Source: 3

No Further Action (NFA)

Determination following a remedial investigation or action that a site does not pose a significant risk and so requires no further activity under CERCLA. Source: 1

DEFINITIONS AND TERMS

Ordnance	Explosives, chemicals, pyrotechnics, and similar stores (e.g., bombs, gun and ammunition, flares, smoke, or napalm). (See military munitions.) Source: 3
Projectile	Object projected by an applied force and continuing in motion by its own inertia. Includes bullets, bombs, shells, grenades, guided missiles, and rockets. Source: 5
Proposed Plan	A plan that identifies the preferred alternative for a site cleanup, and is made available to the public for comment. Source: 1
Range	<p>The term “range,” when used in a geographic sense, means a designated land or water area that is set aside, managed, and used for range activities of the Department of Defense. Such term includes the following:</p> <ul style="list-style-type: none">(A) Firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, electronic scoring sites, buffer zones with restricted access, and exclusionary areas.(B) Airspace areas designated for military use in accordance with regulations and procedures prescribed by the Administrator of the Federal Aviation Administration. Source: 4
Range Activities	<p>The term “range activities” means –</p> <ul style="list-style-type: none">(A) research, development, testing, and evaluation of military munitions, other ordnance, and weapons systems; and(B) the training of members of the armed forces in the use and handling of military munitions, other ordnance, and weapons systems. Source: 4
Record of Decision (ROD)	A report documenting the action, approved by the regulatory agencies, that is required at Superfund sites. Source: 1
Remedial Investigation (RI)	Exploratory inspection conducted at a site to define the nature and extent of chemicals and, in this case, MEC present. Source: 1
Schonstedt	A handheld analog magnetometer that measures the strength of a magnetic field and is used to detect buried iron and other metal objects. Source: 1
Small Arms Ammunition (SAA)	Ammunition, without projectiles that contain no explosives (other than tracers), that is .50-caliber or smaller, or for shotguns. Source: 5
Superfund	See CERCLA.

DEFINITIONS AND TERMS

Unexploded Ordnance (UXO)

The term “unexploded ordnance” means 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, installations, personnel, or material; and
- (C) remain unexploded by either malfunction, design, or any other cause. Source: 4

For the purposes of the Fort Ord MR, UXO does not include small arms ammunition (.50 caliber or smaller).

UXO Technician

Personnel who are qualified for and filling Department of Labor, Service Contract Ace, Directory of Occupations, contractor positions of UXO Technician I, UXO Technician II, and UXO Technician III. Source: 3

1 – Nonstandard definitions developed to describe items, conditions, and procedures specific to Fort Ord Military Munitions Response Program.

2 – EM 1110-1-4009

3 – Department of Defense Manual, Number 6055.09-M, DoD Ammunition and Explosives Safety Standards. 29 February 2008, Reissued 4 August 2010.

4 – 10 U.S.C. 101(e)

5 – Compendium of Department of Defense (DoD) Acronyms, Terms, and Definitions: The Interstate Technology and Regulatory County (ITRC) Work Group (Unexploded Ordnance Team).

6 – 10 U.S.C. 2710(e)(2)

Appendix F
Responses to Comments

RESPONSES TO COMMENTS

Document: Track 1 Plug-In Approval Memorandum, MRS-24A, MRS-24C, and Parcel E20c.1, Former Fort Ord, California, March 24, 2011

Commenting Organization: Marina in Motion and Edson Ecosystems, LLC

Name: Dan Amadeo and Jeff Edson

Date of Comments: 04/25/11

Cover Letter Comment

“Appendix B, Figure 2 indicates approximately half of the live grenade training area lies outside the defined boundaries for MRS-24C and Parcel E20c.1. If this section has already been transferred by previous actions then the three questions below are moot. Please respond if this is the case.

“A. Given the proximity of this area to the adjacent housing why is not this small section include as part of the Parcel E20c.1?”

“B. If this part of the former live grenade training area has not been fully cleared what controls are in place to preclude entry into this area?”

“C. Why is MRS-24C only now being recommended for no further action what it appears approximately 40% lies within an existing residential area?”

Response to Cover Letter Comment

The boundary of Parcel E20c.1 defines land ownership. This parcel has not been transferred. The parcel to the north (the area of Fitch Park housing) is being retained by the Army. The full area of the “live grenade” training area, including that part outside the parcel boundary, was investigated and no munitions and explosives of concern (MEC) items were found.

MRS-24C was previously evaluated as part of the Track 1 Remedial Investigation/Feasibility Study (RI/FS) (Administrative Record [AR] number: OE-0421M). The location of the training area was revised based on research conducted for the Approval Memorandum. This research revealed that a part of the MRS-24C site footprint is located in the Fitch housing area previously developed by the Army. An investigation was conducted and no MEC was found, leading to the recommendation for no further action (NFA). Please also see response to Specific Comment 9.

General Comment 1

“Introduction:

“As part of the clean-up of Fort Ord, the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) process includes a Munitions Response Remedial Investigation/Feasibility Study (MR RI/FS) to investigate and remediate areas within the former base that contained known or suspected munitions and explosives of concern (MEC). This program is part of the ‘No Further Action Related to Munitions and Explosives of Concern - Track 1 Sites, No Further Remedial Action with Monitoring for Ecological Risks from Chemical Contamination at Site 3;’ a 2005 Record of Decision (ROD) that identified 21 sites on Fort Ord that met the ‘no further action’ criteria. The ROD allowed, based on written concurrence from the U.S. Environmental Protection Agency (EPA) and acknowledgement from the California Department Toxic Substance Control (DTSC), that future sites with the same environmental conditions can be ‘plugged-in’ to the ROD’s no further action remedy.

“Track 1 MEC sites are defined as sites where military munitions were suspected to have been used. Based on the RI/FS for each site, each Track 1 MEC site falls into one of following three categories:

Category 1 – There is no evidence to indicate military munitions were used at the site, i.e., suspect training did not occur:

Category 2 – The site was used for training, but the military munitions items used do not pose an explosive hazard, i.e., training did not involve explosive items; or

Category 3 – The site was used for training with military munitions, but military munitions items that potentially remain as a result of that training do not pose an unacceptable risk based on site-specific evaluations conducted in the Track 1RI/FS.

“This document concludes that based on the evaluation described in this Approval Memorandum, MRS-24A meets the Track 1, Category 3 criteria; MRS-24C meets the Track1, Category 1 criteria; the Investigation Area is a Track 1, Category 3 variant site; and the remainder of Parcel E20c.1 meets the Track 1, Category 1 criteria. With these proposed conditions, the Army is requesting that no further action (NFA) be performed at these areas of Fort Ord.”

Response to General Comment 1

No response is necessary.

General Comment 2

“Summary:

“The *‘Track 1 Plug-In Approval Memorandum MRS-24A, MRS-24C, and Parcel E20c.1’* provides: 1) a description of the area; 2) the historical use of the area; 3) the rationale for the designation of the area as a Track 1 site; and 4) a map of the area detailing the location and any pertinent available MEC-related

information.

“In conclusion, the U.S. Army recommends the following:

- ‘Based on review of existing information, MEC is not expected in MRS-24A and NFA Related to MEC is appropriate for this MRS. MRS-24A, Practice Rifle Grenade Training Area, meets the Track 1, Category 3 criteria because historical research and field investigations identified evidence of past training involving military munitions, but training at this site involved only the use of practice and pyrotechnic items that are not designed to cause injury.’

As described by the comments below, Edson Ecosystems cannot agree with this recommendation. We will work with the Army to resolve concerns with this Action Memorandum.

- ‘MRS-24C as originally identified on maps in the ASR lies outside Parcel E20c.1. It is likely the range location as drawn on historical training maps was incorrectly transposed to later maps, and the boundary did not encompass the location of the "Live Grenade" training area associated with the MRS. The "Live Grenade" training area is believed to be located to the south of MRS-24C (Section 5.3). Therefore, the original ASR boundary of MRS-24C meets the Track 1, Category I criteria because there is no evidence to indicate military munitions were used at the site (suspected training did not occur).’

As described by the comments below, Edson Ecosystems cannot agree with this recommendation. We will work with the Army to resolve concerns with this Action Memorandum.

In addition, it is unclear why the Army is requesting the Track 1, Category 1 criteria for this MRS when a residential community currently exists on a portion of MRS-24C. Why wasn't such a designation approved prior to residential development?

- ‘Based on this analysis, the Investigation Area is a Track 1, Category 3 variant site. The results of historical research and field investigations indicate previous training with military munitions at the site; however, per Army policies observed at the time, any dud or discarded grenades would have been removed and destroyed, therefore it is unlikely a MEC hand grenade would be present at the site.’

Based on the information provided in this document, Edson Ecosystems has no reason to disagree with the Army that the Investigation Area be categorized as a Track 1 site. However, the term ‘Track 3 variant’ is not well defined in the document. The document states ‘The results of historical research and field investigations indicate previous training with military munitions at the site; however, per Army policies observed at the time, any dud or discarded grenades would have been removed and destroyed, therefore it is unlikely a MEC hand grenade would be present at the site.’

There were numerous Army policies associated with military training during this time; compliance with these policies is unknown. It is unclear why in this instance this policy should allow the Army to consider the Investigation Area a Category 3 ‘variance.’

- ‘Within the remaining portion of Parcel E20c.1, no evidence of past training involving military munitions was found. Based on review of existing information, MEC is not expected in the remaining portion of Parcel E20c.1 and NFA Related to MEC is appropriate. The remainder of Parcel E20c.1 meets the Track 1, Category 1 criteria because there is no evidence to indicate military munitions were used at the site.’

As described by the comments below, Edson Ecosystems cannot agree with this recommendation. We will work with the Army to resolve concerns with this Action Memorandum.”

Response to General Comment 2

Under the Fort Ord Munitions Response (MR) RI/FS program, munitions response sites (MRSs) are evaluated as a series of “tracks” numbered 0 through 3 that are based on munitions-related site characteristics (these tracks are described in Section 1.1 of the Approval Memorandum). The Track 1 portion of the MR RI/FS program addresses sites or areas that were suspected to have been used for military training with military munitions and that, based on an evaluation, meet the description of one of three categories (described in Section 1.1). This Approval Memorandum provides the Track 1 evaluation for MRS-24A, MRS-24C and Parcel E20c.1 and rationales for determining that no further MEC investigation is warranted in these areas.

Track 1 site evaluations are conducted according to the procedures described in the Final Plan for Evaluation of Previous Work (EPW; AR numbers: OE-0283G

and OE-0466). The EPW provides the checklists and data quality objectives for evaluating available site information. As stated in the Track 1 Ordnance and Explosives RI/FS (AR number: OE-0421M), to be included in the Track 1 decision process, the results of the evaluation performed for a site must indicate a strong weight of evidence to support no further munitions-related investigation as determined by the project team (the Army, U.S. Army Corps of Engineers [USACE], U.S. Environmental Protection Agency [EPA] and California Department of Toxic Substances Control [DTSC]). A variety of supporting information is considered in the Track 1 site evaluation including historical aerial photographs, historical training maps, training manuals, information about site use and development, potential MEC based on the historical use of the area, and the history and results of MEC investigations. The information is evaluated together to determine whether the weight of evidence supports the no further action recommendation. The “weight of evidence” approach does not rely solely on any one piece of information such as sampling results. Additional background information for the Track 1 process can be found in the EPW, Track 1 Ordnance and Explosives RI/FS and *Record of Decision, No Further Action Related to Munitions and Explosives of Concern - Track 1 Sites, No Further Remedial Action with Monitoring for Ecological Risks from Chemical Contamination at Site 3 (MRS-22), Former Fort Ord, California* (Track 1 ROD; AR number: OE-0526).

In response to the second bullet above, the Fitch Park residential area was initially developed by the Army in the 1950s when Fort Ord was an active installation. The MR RI/FS process was initiated in 1998. Please also see responses to Cover Letter Comment and Specific Comment 9.

In response to the third bullet above, the Investigation Area is considered a Track 1, Category 3 variant site based on a compilation of several pieces of supporting evidence in addition to the Army policies related to the use of hand grenades in training. As explained in Section 5.3 of the Approval Memorandum, a 100% digital geophysical mapping survey and intrusive investigation of all detected anomaly targets were completed in the footprint of the Investigation Area, and there is sufficient evidence to indicate that the Investigation Area was the location used for grenade training. Additional explanation to designate the Investigation Area as a Track 1, Category 3 “variant” site is provided in Section 5.3.

Please see below for responses to other bulleted comments, which concern specific information about the Track 1 areas addressed in this Approval Memorandum.

Specific Comment 1

“**Section 2.2.2** – It is unclear why this section does not contain, with the exception of trails, any descriptions of cleared areas in Parcel E20c.1. Figures 3 and 4 clearly identify areas of clearance, yet a description of potential historical uses are not included in this section. With E20c.1 being part of this Approval Memorandum, the review of aerial photos of the area is necessary.”

Response to Specific Comment 1

The cleared areas identified in Figures 3 and 4 are described in the second and third bulleted paragraphs in Section 2.2.2, which also describe results of the review of aerial photographs of the area.

Specific Comment 2

“**Section 2.3** – This section is confusing; based on historical documentation, it narrows the types of MEC in these areas to: 1) practice rifle grenades; 2) rifle grenades (smoke); 3) illumination signals; and 4) hand grenades. However, sampling and visual investigations at these sites clearly identifies numerous other types of MEC that may exist in MRS-24A, MRS-24C, the Investigation Area, and the remainder of E20c.1. These include, but are not limited to:

- M83 series illumination mortar 60 millimeter (mm) projectiles,
- M43 series practice mortar 81 mm projectiles,
- M7 series practice 2.36-inch rockets,
- M29 series practice 3.5-inch rockets,
- M181 series practice subcaliber 14.5 mm projectiles,
- M306 series HE 57 mm projectiles, and
- M585 white star 40 mm projectiles.

“As with the investigation and clearance of all former military training facilities, the reliance on historical documentation in defining abandoned MEC is not recommended, especially when MEC discovered during field investigations contradict historical records.”

Response to Specific Comment 2

Section 2.3 is intended to specifically review potential munitions based on documented historical uses. The items listed in the comment are not described in this section because they are not related to documented historical use. MEC and MD found during field investigations are described in Sections 2.4 through 2.6, including all the items listed in the comment. The items are also considered in the Site Evaluation in Section 4.

To clarify, with regard to the munitions items listed in the comment, the following information is provided in the Approval Memorandum.

- Projectile, 60mm mortar, illumination, M83 series: One MEC item was found in MRS-24A during sampling; Section 2.5.1 discusses that the item is not consistent with historical use of the site because projectiles of this type were not associated with practice rifle grenade training ranges and that the item is considered incidental. See also response to Specific Comment 14.
- Projectile, 81mm mortar, practice, M43 series: One MEC item was found during sampling in MRS-24A; Section 2.5.1 discusses that the item is not

consistent with historical use of the site because projectiles of this type were not associated with practice rifle grenade training ranges and that the item is considered incidental. See also response to Specific Comment 14.

- Rocket, 2.36-inch, practice, M7 series: One MD item was found during sampling in MRS-24A; Section 2.5.1 provides that practice rocket training occurred in the Impact Area, located south of the MRS. One MD item was found during a site walk in Parcel E20c.1; Section 2.4.3 discusses that the item is not consistent with the past use of the parcel.
- Rocket, 3.5-inch, practice, M29 series: Two MD items were found during sampling in MRS-24A; Section 2.5.1 provides that practice rocket training occurred in the Impact Area, located south of the MRS. Several MD items were found in a burial pit in E20c.1.1.1 adjacent to Parcel E20c.1 (Section 2.6.1). MEC and MD items have been found in the Impact Area.
- Projectile, 14mm, subcaliber, practice, M181 series: One MD item was found during sampling in MRS-24A.
- Projectile, 57mm, high explosive, M306 series: One MEC item was found during a site walk in E20c.1; Section 2.5.3 discusses that the item is considered to be an incidental item associated with activities in the adjacent Impact Area south of the parcel.
- Projectile, 40mm, cluster, white star, M585: One MEC item was found during sampling in MRS-44PBC east of Parcel E20c.1.

In addition, a Grenade, Rifle, Smoke, M23 series (MEC) and 100 rounds of small arms ammunition were removed from what appeared to be a former foxhole in the northeastern portion of Parcel E20c.1 in a February 1993 incident. This incident is now noted in Section 2.5.4 of the final Approval Memorandum.

It should be noted that, based on the evaluations as described in the Approval Memorandum, the presence of these items does not indicate that training using these munitions types occurred at the site. The information was included in the site evaluation, which determined that there was a strong weight of evidence to support that no further action was warranted in the subject areas.

Specific Comment 3

“**Section 2.4.1.1** – This section should define ‘perfunctory’ search and investigations as they relate to MEC investigations. The text states ‘Based on this work, approximately 30% of MRS-24A was sampled.’ Does this include perfunctory searches and investigations? The USA’s perfunctory investigation and clearance identified 2 types of live mortars that could cause serious injury if mishandled. It is unclear how MRS-24A can be designated as a Track 1 Category 3 site. Finally, it is unclear whether the MD discoveries were single pieces of fragments or were there multiple discoveries of the MD listed.”

Response to Specific Comment 3

The term “perfunctory” was adopted from the original reference. As explained in Section 2.4.1.2, the grids where perfunctory searches were conducted were later subjected to 100% sampling. These grids are part of the calculated 30% sampling investigation coverage at MRS-24A.

The two mortars are evaluated in Sections 4.2.1 and 4.4.2.2. These items are not consistent with the known use of MRS-24A in that there is no evidence from the historical site use and development or sampling investigation results that the site was used for training with mortars or that it was an impact area for mortars. The two mortars that were found are suspected to have originated from the Impact Area. Section 4.4.2.2 concluded that “Given the extent of investigations conducted within MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1, it is considered unlikely that additional projectiles are present.”

Additional information concerning the MD is included in Appendix C, Table 1. It should be noted that MD can be documented by quantities or by weight, depending on the investigation objectives. On Table 1, MD recorded by weight are shown with no quantity listed indicating that the items were found as fragments and were not counted individually.

Specific Comment 4

“**Section 2.4.1.2** – Please provide the percentage of MRS-24C that was sampled by USA in 1997.”

Response to Specific Comment 4

The area sampled (5%) is provided in Section 4.2.5.2. As explained in the text only two grids were included within the MRS boundary because the housing had been constructed in the majority of the area which limited the surface area available for investigation. Further discussion of the extent of investigation in this area is not warranted because the Approval Memorandum provides sufficient documentation that the area in question was not the correct location of the training area based on aerial photographs.

Specific Comment 5

“**Section 2.4.2** – Since UXO technicians were not included in the 2002 fuel break development, it is unclear why this is included as part of the ‘History of Area Investigations.’”

Response to Specific Comment 5

This section was included because the fuel break development adds to the overall weight of evidence regarding limited MEC finds in the area. The section could have been placed in Section 2.2, Site History, but this does not affect the information or conclusions presented.

Specific Comment 6

“Section 2.4.3 – It is unclear from the text how the locations of the site walks were determined. Were the site walks associated with historical MEC discoveries? What was the objective of this and other site walks? Were there systematic investigations, i.e., the use of Visual Sample Plan (VSP), in the area of the M306 series HE 57mm projectile after its discovery? Is there any reason not to be concerned that others exist in the area, regardless of whether the HE 57 mm projectile was fired or a kick-out?”

Response to Specific Comment 6

As described in the text the site walks were conducted in accessible areas along trails. The site walks were conducted as a method to collect additional site information with regulatory agency participation in a timely fashion, and vegetation cutting was not conducted. As a result of finding the 57mm projectile, a sampling investigation in 10 grids (“Shaw Grid Investigation 2004” discussed in Section 2.4.5) was conducted, as well as an additional site walks (“Shaw Site Walks 2003” in Section 2.4.4). No additional MEC items were found.

During the Eucalyptus Road construction project another 57mm projectile (MEC, model M306 target practice) was discovered within Parcel E20c.1 (discussed in Section 2.6.4). The 57mm projectile items are evaluated in Section 2.5.3. It is concluded that the 57mm projectile items found in Parcel E20c.1 are incidental items associated with activities conducted in the adjacent Impact Area south of Eucalyptus Road.

A variety of different types of munitions items (both MEC and MD) were found during the investigations, such as the single 57mm HE projectile noted in the comment. However, based on the evaluations as described in the Approval Memorandum, the presence of these items, given the absence of other supporting evidence from additional investigation and research, does not indicate that training using these munitions types occurred at the site; therefore, additional items of the same munitions types are not expected. Please also see response to Specific Comment 2.

Specific Comment 7

“Section 2.5 – What percentage of MRS-24A, MRS-24C, the Investigation Area and the remainder of E20c.1 were grid investigated/site walked, with trained UXO technicians, from 2003 to 2008? Is this percentage sufficient to base the conclusions of this Action Memorandum?”

Response to Specific Comment 7

The percentages are presented in Section 4.2.5 and in Appendix A, “Evaluation Checklist Part 2: Sampling Evaluation” Question 24 for each of the areas. The percentages are all based on grid investigations conducted by trained UXO technicians.

The percentages are further discussed in responses to Specific Comments 11, 12 and 13. Again, all available relevant information is reviewed as part of the Track 1 site evaluation, including historical aerial photographs, historical training maps, training manuals, information about site use and development, potential MEC based on the historical use of the area, and the history and results of MEC investigations. The “weight of evidence” approach does not rely solely on any one piece of information such as sampling results.

Specific Comment 8

“**Section 3.0** – As stated in this section, the Conceptual Site Model (CSM) should include the ‘identification of military munitions origin (determined from sources such as historical records, land features, historical scars, military munitions previously encountered, and eyewitness accounts)’ (emphasis added). It appears the CSM relies entirely on historical maps and aerial photographs; it is unclear why MEC discovered as part of site walks and site investigations are not included in the facility and release profiles of MRS-24A, MRS-24C, Investigation Area, and the remainder of E20c.1.”

Response to Specific Comment 8

The CSM relates to the documented use of the area based on historical records. The items found during investigations including mortars and projectiles are discussed in other sections of the Approval Memorandum, recognized in Section 3.3 Release Profile, and considered in the overall evaluation. The CSM does not highlight items that were discovered, for which there is no surrounding evidence indicating that training using those munitions types occurred at the site (such as those noted in the response to Specific Comment 2).

Specific Comment 9

“**Section 3.4** – It is unclear why at this time the Army is requesting the concurrence of the EPA and acknowledgement of the DTSC that no further action is required at MRS-24C when a portion of the site is currently residential. Are there historical agreements that allowed development on MRS-24C? If so, why is the residential area of MRS-24C included in this document? What are the potential impacts of Fitch Park if EPA and DTSC do not concur with this Action Memorandum and additional clean-up is required?”

Response to Specific Comment 9

The Fitch Park residential area was initially developed by the Army in the 1950s when Fort Ord was an active installation. MRS-24C was previously evaluated as part of the Track 1 RI/FS (AR number: OE-0421M). The location of the “live grenade” training area was revised based on research conducted for the Approval Memorandum. This research revealed that part of the training area is located in an area previously developed by the Army. An investigation was conducted and no MEC was found, leading to the recommendation for NFA. The Approval Memorandum was required to complete the CERCLA process for MRS-24C.

EPA and DTSC have reviewed and agreed with the investigations and evaluations conducted for MRS-24A, MRS-24C and Parcel E20c.1. Based on the investigations and evaluations, there is a strong weight of evidence to support NFA under the Track 1 site categories as identified in Section 5.0.

Specific Comment 10

“Section 3.6 – This section states, ‘Based on the preceding profiles, MEC is not expected in MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1.’ What is the basis of this statement?

“In addition, this section states, ‘The following information is listed for the types of military munitions previously encountered and thus potentially remaining in MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1: (a) a description of the item, (b) how the item was designed to function, and (c) the likelihood the item would function if encountered and the type of injury that could result from the functioning of the item. The information is provided for practice rifle grenades, smoke rifle grenades, illumination signals, and MKII hand grenades, the primary items used and identified within MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1.’

“As identified in the Section 3.0 comment, why is the list of potential remaining munitions limited to those identified in historical records and aerial photographs and why doesn't the list include those discovered during site walks and site investigations?”

Response to Specific Comment 10

The “preceding profiles” are discussed in Sections 3.1 through 3.5 of the Approval Memorandum describing various aspects of the site, which are evaluated together with regard to the potential for MEC to be present. Based on the evaluation, MEC is not expected at the site. Please also see response to Specific Comment 8.

A variety of different types of munitions items (both MEC and MD) other than those discussed in Section 3.6 were found during the investigations. However, given their quantity, distributions, and circumstances of discoveries, the presence of these items does not indicate that training using these munitions types occurred at the site. Therefore, additional items of the same munitions types are not expected. Please also see response to Specific Comment 2.

Specific Comment 11

“Section 4.2.5.1 – This section states, ‘Approximately 47% of the acreage comprising MRS-24A has been investigated by USA and Shaw. The methods used for sampling were sufficient to identify the expected munitions.’

“Of the 47% investigated, what percent was visual investigations versus areas

that included the use of Schonstedt GA-52Cx magnetometers. In addition, because numerous MEC were discovered that were not identified in historical documents, is there a concern that the sampling was not sufficient to identify 'unexpected' munitions? Is the Army's statement that the sampling was sufficient based on documented MEC sampling formal guidance or protocol approved by the Army Corps of Engineers and/of EPA?"

Response to Specific Comment 11

The 47% represents the proportion of the MRS that was investigated systematically in grids with magnetometers.

The investigations conducted at MRS-24A followed a systematic process and used procedures that were accepted by the regulatory agencies at the time they were conducted. Investigations were focused on suspect areas identified from aerial photographs, historical records and site walks, and were conducted in several iterations until sufficient information was available to make a conclusion about the site. The iterative approach and the evaluation that considers a variety of supporting information, such as historical documents, sampling and site walk results, are consistent with the evaluation process established for Track 1 sites at the former Fort Ord.

Three MEC items were recovered during the previous investigations in MRS-24A. These items are considered incidental, and their presence does not indicate that training using these munitions types occurred in the site, as discussed in Section 2.5.1 and other parts of the Approval Memorandum.

Specific Comment 12

"Section 4.2.5.2 – This section states, 'Approximately 5% of the acreage comprising the MRS-24C boundary as shown in the ASR was investigated by USA Environmental, using SS/GS sampling. The methods used for sampling were sufficient to identify the expected munitions types.'

"As stated in previous comment packages, in January 2001, U.S. EPA published interim guidance on the use of SS/GS, identifying numerous concerns with its use, including:

- the ability of SS/GS and UXO Calculator to locate Unexploded Ordnance (UXO) clusters e.g., target impact areas) and the boundaries of UXO contaminated areas;
- whether the assumption of homogeneity of UXO used in these techniques is valid;
- the extent to which an area is classified as 'homogeneous;'
- the statistical validity of assessing sector non-homogeneity;
- the consistency/reproducibility of results;
- a problem in the algorithm and confidence intervals for UXO Calculator;
- and

- variability in UXO estimates and exposure scenarios.

“This section states, ‘Although there were problems identified regarding the methodologies that guided the MEC characterization approach at a given site, the site-specific data that was collected during the SS/GS sampling at MRS-24C still provided valuable information that identified the presence and type of military munitions items at the site.’

“While this statement may be accurate, the goal of this Action Memorandum is to provide sufficient confidence that no further action is required based on the nature and extent of contamination, not the presence and type of military munitions items at the site. It is questionable whether SS/GS can provide sufficient characterization of this MRS.”

Response to Specific Comment 12

Please see response to Specific Comment 4. The amount of investigation within the MRS-24C boundary as shown in the ASR was limited by the existing housing development. The Approval Memorandum provides documentation that the area in question was not the correct location of the training area based on aerial photographs. Further discussion of the adequacy of the coverage or the SS/GS method is not warranted. The concerns identified by EPA regarding the assumptions and design of the SS/GS statistical methodology are recognized and briefly discussed in Section 4.2.5.2. Again, all available relevant information is reviewed as part of the Track 1 site evaluation, including historical aerial photographs, historical training maps, training manuals, information about site use and development, potential MEC based on the historical use of the area, and the history and results of MEC investigations. The “weight of evidence” approach does not rely solely on any one piece of information such as sampling results. Data quality is also considered as part of the evaluation, and data generated from SS/GS sampling investigations is used with caution, as noted above.

Specific Comment 13

“**Section 4.2.5.3** – This section states, ‘Approximately 25% of the remainder of Parcel E20c.1 was investigated by Shaw and USACE.’ Based on what guidance does the Army believe this is sufficient to allow future residential land uses?”

Response to Specific Comment 13

Please see response to Specific Comment 11. Investigations were focused on suspect areas identified from previous site walks, and were conducted in several iterations until sufficient information was available to make a conclusion about the site. The evaluation considered a variety of supporting information, such as historical documents, sampling and site walk results, are consistent with the process established for Track 1 sites, as described in the Track 1 ROD (OE-0526). Based on the investigations and evaluations, there is a strong weight of evidence to support no further action under the Track 1 site categories as identified in Section 5.0.

Specific Comment 14

“**Section 4.4.2.2** – This section states, ‘MEC items identified in MRS-24A and the remainder of Parcel E20c.1 during various investigations and site walks include two M306 series 57 mm projectiles (one HE, one target practice), one M43 series practice mortar 81 mm projectile, one M83 series illumination mortar 60 mm projectile, and one M2 series ignition cartridge (Appendix B, Figure 17). The presence of these projectiles is not consistent with past training practices suspected or known to have occurred at the MRS or parcel. These items are suspected to have originated from training conducted in the Impact Area because of the proximity to the Impact Area and the similarity to items found within the Impact Area. Given the extent of investigations conducted within MRS-24A, MRS-24C including the Investigation Area, and the remainder of Parcel E20c.1, it is considered unlikely that additional projectiles are present.’

“What is the basis of the conclusion that it is unlikely that additional projectiles are present? Of concern is the Army's proposal to allow residential land use on the remainder of E20c.1, a 70-acre property that the Army has only investigated 17.5 acres for MEC (and discovered MEC on the 17.5 acres).”

Response to Specific Comment 14

The conclusions of the Approval Memorandum are based on the documented history of the area as well as the investigations. The evaluation concluded that it is unlikely that additional projectiles are present based on a weight of evidence including:

- Three projectiles of different types have been found during the investigations conducted in the area. These investigations were focused on suspect areas identified from aerial photographs, historical records and site walks (approximately 50 acres on the western portion of the parcel).
- There is no historical documentation that projectiles were used in the area or that the area was an impact zone for projectiles.
- Projectiles were used in the Impact Area to the south of Eucalyptus Road. The use of projectiles in that area provides an explanation for why isolated MEC might be found in adjacent areas.

The investigations conducted within Parcel E20c.1 followed a systematic process and used procedures that were accepted by the regulatory agencies at the time they were conducted. Investigations were focused on suspect areas identified from aerial photographs, historical records, previous investigations and site walks, and were conducted in several iterations until sufficient information was available to make a conclusion about the area. The iterative approach and the evaluation that considers a variety of supporting information, such as historical documents, sampling and site walk results, are consistent with the evaluation process established for Track 1 sites at the former Fort Ord.

All available relevant information is reviewed as part of the Track 1 site evaluation, including historical aerial photographs, historical training maps, training manuals, information about site use and development, potential MEC based on the historical use of the area, and the history and results of MEC investigations. Based on the evaluation there is a strong weight of evidence to support the no further action recommendation for MRS-24A, MRS-24C, and Parcel E20c.1.

Because Fort Ord is a former military installation, there is a possibility that MEC could be present. As discussed in Section 5.5, as a precaution, the Army recommends construction personnel involved in intrusive operations attend the Army's "MEC recognition and safety training" and if requested, will provide MEC recognition and safety refresher training as appropriate. The precautionary recommendation is also consistent with the process established for Track 1 sites.