Munitions and Explosives of Concern Remediation After Action Report

Munitions Response Site 3 (MRS-3)

Bravo Munitions Response Area of McClellan, Anniston, Alabama

Prepared for:
McClellan Development Authority

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McCLELLAN
DEVELOPMENT AUTHORITY

Matrix ENVIRONMENTAL

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STATEMENT OF REMOVAL OF MUNITIONS AND EXPLOSIVES OF CONCERN

Munitions and Explosives of Concern (MEC) have been removed from Munitions Response Site 3 (MRS-3) and its associated step-outs in accordance with the *Revision 1 to the Final Program-Level Work Plan Munitions and Explosives of Concern Remediation, Alpha and Bravo Munitions Response Areas of McClellan, Anniston, Alabama* (PWP) dated November, 2007 and the *Munitions Response Site 3 (MRS-3) Site-Specific Work Plan* (SSWP) dated January, 2008, and associated Field Change Requests (FCRs) as approved by the Alabama Department of Environmental Management (ADEM). This removal action was performed by contractors to the McClellan Development Authority (MDA) under the oversight of Matrix Environmental Services, LLC (MES).

This removal action for MRS-3 completes the required response for portions of eight U.S. Army-designated subsectors (M3-2H Mortar Area-PR sector, M3-2H Mortar Area-D sector, M3-1L Rocket Area-D sector, M3-1H Rocket Area-PR sector, M3-1H Mixed Use Area-D sector, M3-1H Grenade Area-PR sector, M3-1L 37mm Projectile Area-D sector, and the M3-3H Rocket/Hand Grenade Area –D sector) under the Environmental Services Cooperative Agreement (ESCA) No. W9128F-07-2-0163 and ADEM Clean-up Agreement No. AL4 210 020 562. To increase operational efficiencies, the boundary of MRS-3 was adjusted to conform to the bordering MRS boundaries and the McClellan 100-foot state plane coordinate line grid, resulting in a baseline clearance area (not including step-outs) of approximately 410.14 acres (432.37 acres including step-outs).

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Richard Satkin, PG

Vice President, MES

EXECUTIVE SUMMARY

This Munitions and Explosives of Concern (MEC) After Action Report prepared by Matrix Environmental Services, LLC (MES) documents the MEC remediation at Bravo Munitions Response Area (MRA) Munitions Response Site 3 (MRS-3). MEC remediation was conducted in accordance with the *Revision 1 to the Final Program-Level Work Plan Munitions and Explosives of Concern Remediation, Alpha and Bravo Munitions Response Areas of McClellan, Anniston, Alabama* (PWP)(MES, 2007) and the *Munitions Response Site 3 (MRS-3) Site-Specific Work Plan* (SSWP) (MES, 2008). The Alabama Department of Environmental Management (ADEM) concurred with the SSWP in March 2008. During the course of fieldwork, ADEM approved Field Change Requests (FCRs) 5 through 9 to the PWP.

The MEC remediation activities in MRS-3 occurred from March 2008 through January 2010. Approximately 238.26 acres of MRS-3 were designated as non-McClellan Park System future use and approximately 171.88 acres of MRS-3 were designated as McClellan Park System future use. An additional 22.23 acres of step-outs were performed for a total clearance area of 432.37 acres.

MEC remediation in MRS-3 was primarily conducted between March 2008 and January 2010, and involved the following major tasks:

- Land surveying
- Surface sweep
- Brush clearing
- Mag and dig based clearance to depth of one foot for areas designated as McClellan Park System future use
- An aggressive (6-inch) surface and near-surface clearance of MEC items and other metallic munitions debris (MD) and non-munitions related debris (other debris) in advance of digital geophysical mapping (DGM)
- DGM of non-McClellan Park System future use areas
- Clearance to depth of detection for non-McClellan Park System future use areas
- Clearance to depth of 1 foot of step-outs from non-DGM areas
- Clearance to depth detection of step-outs from DGM areas. In accordance with FCR 6, mag and dig based clearance to depth of detection for step-outs driven by DMM and non-penetrating ordnance was approved for areas not affected by previous earth moving activity.
- Explosive demolition of material potentially presenting an explosive hazard (MPPEH)
- Site restoration activities

- Inspection, demilitarization, certification and disposal of munitions related debris

The MEC clearance was performed in accordance with a rigorous Quality Control (QC) and Quality Assurance (QA) program, which identified specific methods and procedures for measuring effectiveness of each task. Lessons learned were identified by the project team, proposed as FCRs, reviewed by ADEM, and if approved, incorporated into the MEC remediation program. Revision 1 of the PWP incorporated previous FCRs and lessons learned up to that point.

In total, 432.37 acres were cleared either to the depth of detection (242.12 acres) or to a depth of 1 ft. (190.25 acres) during MRS-3 remediation, including 22.23 acres of step-outs. The following totals of MEC and materials were removed during the clearance:

- A total of 3,401 MPPEH items were found. Of these, 2,553 were determined to be MEC by explosive investigation or x-ray operations.
- 153,062 pounds of Material Documented as Safe (MDAS) ("MEC scrap" terminology is used in some of the appendicized materials and database tables for consistency with existing documents and databases).
- 120,688 pounds of other debris ("non-MEC scrap" terminology is used in some of the appendicized materials and database tables for consistency with existing documents and databases).

The 432.37 acre area was seeded in excess of the PWP requirements of 1 per acre to test the clearance processes. QC seeding results are as follows:

- 438 QC seeds (1.8 per acre) were placed to test aggressive (6 inch) surface and near-surface clearance (not final product) operations and 434 (99.1%) were recovered. All missed blind seeds were subsequently recovered during rework.
- 264 QC seeds (1.4 per acre) were placed to test clearance to 1 foot operations and 261 (98.9%) were recovered. All missed blind seeds were subsequently recovered during rework.
- 453 QC seeds (1.7 per acre) were placed to test clearance to depth operations and 452 (99.8%) were recovered. All missed blind seeds were subsequently recovered during rework. Both DGM and non-DGM (data gap) areas were seeded.
- Of the 1,155 QC seeds placed to test final product clearance work, 1,147 (99.3%) were recovered. All missed blind seeds were subsequently recovered during rework.

QC was implemented as required by the PWP to ensure that a quality MEC clearance work product resulted. Matrix QC signed off on all work products and clearance grids as being of acceptable quality.

A total of 56 Quality Assurance (QA) seeds were placed to test final product clearance work. Of these, all 56 (100%) were recovered. All missed blind seeds were subsequently recovered during rework.

The MEC clearance for MRS-3 has been successfully accomplished IAW with the PWP and associated FCRs. MRS-3 was cleared of MEC to either a depth of one foot (McClellan Park System) or to the depth of detection (all other areas). Step-outs were performed to establish a 200-foot MEC-free buffer zone of appropriate depth around MRS-3 (excepting that step-outs were not extended into MRSs which have been previously cleared or which were slated for future MEC clearance).

This removal action for MRS-3 completes the required response for portions of eight Army-designated subsectors (M3-2H Mortar Area-PR sector, M3-2H Mortar Area-D sector, M3-1L Rocket Area-D sector, M3-1H Rocket Area-PR sector, M3-1H Mixed Use Area-D sector, M3-1H Grenade Area-PR sector, M3-1L 37mm Projectile Area-D sector, and the M3-3H Rocket/Hand Grenade Area –D sector) under the Environmental Services Cooperative Agreement (ESCA) No. W9128F-07-2-0163 and ADEM Clean-up Agreement No. AL4 210 020 562 as approved by ADEM in the Action Memorandum for MRS-3 (MES, 2008). To increase operational efficiencies, the boundary of MRS-3 was adjusted to conform to the bordering MRS boundaries and the McClellan 100-foot state plane coordinate line grid, resulting in a baseline clearance area of 410.14 acres.

Survey and Geographical Information System (GIS) shape files for the MRS-3 boundary and clearance area boundary are presented in Appendix B. All areas cleared to the depth of detection are recommended for unrestricted land use with deed notification. All areas cleared to a depth of 1 ft. are recommended for land use controls (LUCs) including deed restrictions to prohibit digging without UXO construction support. There are no exception areas requiring other future land use controls.

An Environmental Covenant pursuant to the Alabama Uniform Environmental Covenants Act (UECA), Code of Alabama 1975, §§ 35-19-1 to 35-19-14 for MRS-3 filed in Probate on December 28, 2017 is included in Appendix K.

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LIST OF ACRONYMS AND ABBREVIATIONS

ADEM	Alabama Department of Environmental Management
ASR	Archives Search Report
BGS	Below Ground Surface
BIP	Blow In Place
BRAC	Base Realignment and Closure
CD	Compact Disk
DB	database
DFW	Definable Feature of Work
DGM	Digital Geophysical Mapping
DNR	Deficiency Notice Report
DoD	Department of Defense
DoDI	DoD Instruction
DQO	Data Quality Objective
EBP	Eastern Bypass
Earth Tech	Earth Tech, Inc.
EM61-MK2	Geonics EM61-MK2 time domain electromagnetic metal detector
EODT	EOD Technology, Inc. (now Sterling Global Operations)
ERT	Earth Resources Technology Inc.
ESCA	Environmental Services Cooperative Agreement
ESS	Explosives Safety Submission
EZ	Exclusion Zone
FCA	Function Check Area
FCR	Field Change Request
ft.	foot/feet
FTP	File Transfer Protocol website
GeoQA	Geophysical Quality Assurance
GeoQCS	Geophysical QC Specialist
GIS	Geographic Information System
GPO	Geophysical Prove-Out
Harmon	Harmon Engineering & Contracting Co., Inc.
HDTA	High Density Target Area
HE	High Explosive
HVF	HVF, LLC.
in.	inch
LI Smith	L.I. Smith and Associates, Inc.
LUCs	Land Use Controls
McClellan	Former Fort McClellan
MD	Munitions Debris
MDA	McClellan Development Authority
MDAS	Material Documented as Safe
MDEH	Material Documented as Explosively Hazardous
MEC	Munitions and Explosives of Concern
MES	Matrix Environmental Services, LLC.
mm	millimeter
MPPEH	Material Potentially Presenting an Explosive Hazard
MRA	Munitions Response Area
MRS	Munitions Response Site
MSL	Mean Sea Level
mV	millivolt
NAEVA	NAEVA Geophysics, Inc.

PDA	Personal Data Assistant
PIKA	PIKA International, Inc.
PWP	Program-Level Work Plan
QA	Quality Assurance
QAP	Site-Wide DGM QA Plan
QC	Quality Control
SOP	Standard Operating Procedure
SRA	Saturated Response Area
SSWP	Site-Specific Work Plan
TTFW	TetraTech Foster Wheeler, Inc.
UECA	Uniform Environmental Covenants Act
UoP	Unit of Production
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAE	USA Environmental, Inc.
UXO	Unexploded ordnance
UXOQCS	UXO QC Specialist
WP	White Phosphorous

1.0 INTRODUCTION

This Munitions and Explosives of Concern (MEC) After Action Report for MRS-3 Munitions Response Site (MRS) has been prepared by Matrix Environmental Services, LLC (MES) for the McClellan Development Authority (MDA), formerly known as the Anniston-Calhoun County Fort McClellan Development Joint Powers Authority (JPA). MEC remediation was conducted in accordance with (IAW) the *Revision 1 to the Final Program-Level Work Plan Munitions and Explosives of Concern Remediation, Alpha and Bravo Munitions Response Areas of McClellan, Anniston, Alabama* (PWP)(MES, 2007) and the *Munitions Response Site 3 (MRS-3) Site-Specific Work Plan* (SSWP) (MES, 2008). The Alabama Department of Environmental Management (ADEM) concurred with the SSWP in March 2008. Explosives safety was performed in accordance with the McClellan Alpha and Bravo Explosives Safety Submission (ESS)(ECC, 2006) as modified by ESS Amendment 3 for MRS-3 (MES, 2007).

MRS-3 was divided into 8 tracts (3A through 3H) of approximately 50 acres in area based on future land use as shown in Figures 1-4 and 1-5. The MEC remediation activities in the MRS-3 occurred from March 2008 through January 2010. In total, 432.37 acres including step-outs were cleared to the either to the depth of detection or to a depth of 1 ft. and 2,553 MEC items were destroyed. A total of 153,062 pounds of Material Determined as Safe (MDAS) [1] and120,688 pounds of other (non-MEC-related) metallic scrap were removed from the site. Of 1,211 QC and QA blind seeds emplaced to test the effectiveness of the clearance, only eight were missed – 99.3% were recovered. All missed blind seeds were subsequently recovered during rework.

These organizations performed the following tasks as part of this MEC remediation:

- MES – overall management, demolition activities, UXO quality control (QC), Geophysical and UXO quality assurance (QA), data management QA, and MEC remediation
- NAEVA Geophysics (NAEVA) - digital geophysical mapping (DGM), Geophysical QC, and data/database management
- Earth Tech Inc. (Earth Tech) – MEC surface sweep activities from March 2008 through March 2009

[1] Current Department of Defense (DoD) terminology (DODI, 2008) is to refer to non-MEC scrap as Material Documented as Safe (MDAS). Material prior to determination of its explosives safety status, potentially contains explosives or munitions and is referred to as Material Potentially Presenting an Explosive Hazard (MPPEH). MPPEH that cannot be documented as MDAS, that has been assessed and documented as to the maximum explosive hazards the material is known or suspected to present and for which the chain of custody has been established and maintained is referred to as Material Documented as Explosive Hazard (MDEH) and is no longer considered MPPEH. In this report, to be consistent with existing plans and documents, we have continued to use MEC Scrap terminology.

- MES – MEC surface sweep activities from August 2009 through November 2009
- MES – MEC aggressive surface/near surface clearance remediation activities prior to DGM from October 2009 through November 2009
- USA Environmental, Inc. (USAE) – MEC aggressive surface/near surface clearance remediation activities prior to DGM from June 2008 through January 2009
- PIKA International, Inc. (PIKA) – MEC remediation activities from March 2008 through December 2009 – clearance to one foot in Tracts 3A, 3E and 3H
- USAE – MEC remediation activities from October 2008 through August 2009 – clearance to one foot in Tracts 3B, 3C and 3D
- PIKA – MEC remediation activities in clearance to depth of detection tracts from February 2009 through January 2010 in Tracts 3E, 3F, 3G and 3H
- Earth Resources Technology, Inc. (ERT) provided third party geophysical remapping support for QA
- Harmon Engineering & Contracting Co., Inc. (Harmon) performed brush clearing
- L.I. Smith and Associates Inc. (L.I. Smith) provided land surveying
- HVF LLC (HVF) provided destruction and recycling of scrap metal

This report presents the objectives of the remediation, the procedures used, the quality control/quality assurance methods used to verify effectiveness of the remediation activities, and the results of the remediation.

This report includes the following Appendices, which are included electronically on a compact disk (CD):

- Appendix A Geophysical Prove Out (GPO) Certifications
- Appendix B Survey and GIS Data
- Appendix C Project Database
- Appendix D DGM Data
- Appendix E Quality Control
- Appendix F Daily Reports
- Appendix G Field Change Requests
- Appendix H Waste Disposal Records
- Appendix I Photo Log
- Appendix J Quality Assurance
- Appendix K UECA Covenant

1.1 PROJECT DESCRIPTION AND OBJECTIVE

This MEC After Action Report describes the methods, activities, and results of the MEC remediation of MRS-3 at the former Fort McClellan (McClellan). McClellan, which is located in Anniston, Alabama, contains Alpha, Bravo, and Charlie Munitions Response Areas (MRAs) as shown in Figure 1-1. MRS-3 comprises approximately 432 acres and is located in the western portion of the Bravo MRA along the east and west sides of the Eastern Bypass (EBP) tract on McClellan as shown in Figure 1-1. The EBP, formerly Iron Mountain Road, was previously cleared by the U.S. Army (Foster Wheeler, 2006 and EODT, 2001). An interior parcel of approximately 7 acres known as the Water Tank Construction Site - A, was previously cleared by the U.S. Army (TTEC, 2006) and is not part of MRS-3.

The work was completed in MRS-3 between March 2008 and January 2010 in accordance with Revision 1 of the PWP (MES, 2007) and the MRS-3 Site Specific Work Plan (SSWP). During the course of fieldwork, ADEM approved FCRs 5-9 to the PWP (Appendix G). Digital geophysical mapping-based clearance to depth of detection was performed over approximately 238.26 acres comprising MRS-3 Tracts E, F, G, and H. An analog based clearance to a depth of 1 ft. was performed over the 171.88 acres comprising MRS-3 Tracts A, B, C, and D. 18 step-outs totaling 22.23 acres were also cleared to ensure that a 200 foot MEC-free buffer was present around the MRS.

1.2 BACKGROUND INFORMATION AND SITE HISTORY

1.2.1 SITE LOCATION AND DESCRIPTION

McClellan occupies 18,929 acres in the City of Anniston, Calhoun County, Alabama (Figure 1-1). To the west and southwest of McClellan are the commercial and residential areas of Anniston, the cities of Weaver and Blue Mountain, and the (active) Anniston Army Depot. The cities of Jacksonville and Oxford bound McClellan to the north and south, respectively. The eastern half of McClellan is minimally developed and is bounded by the Talladega Forest.

1.2.1.1 Site Description

MRS-3 covers approximately 432 acres and is located in the western portion of the Bravo MRA along the east and west sides of the Eastern Bypass (EBP) tract. on McClellan. The area is moderately to heavily wooded with mixed pines and hardwoods, with some open areas that were cleared for various activities during the active operation of the installation. The MRS passes through eight Army-designated subsectors (M3-2H Mortar Area-PR sector, M3-2H Mortar Area-D sector, M3-1L Rocket Area-D sector, M3-1H Rocket Area-PR sector, M3-1H Mixed Use Area-D sector, M3-1H Grenade Area-PR sector, M3-1L 37mm Projectile Area-D sector, and the M3-3H Rocket/Hand Grenade Area –D sector) (Figure 1-2). Aside from the EBP, the interior portions of MRS-3 are accessed by a few secondary (dirt) roads and trails, in varying stages of disuse. The most prominent cultural feature is the Water Tank Construction Site A

(approximately 7 acres), identified by the Anniston Water Works and Sewer Board as a potential location for a future water tank. This feature, located within the eastern portion of MRS-3, has been previously remediated (TTEC 2006) and is not part of MRS-3.

1.2.1.2 Geology, Hydrology, and Topography

McClellan is situated near the southern terminus of the Appalachian Mountain chain. All but the easternmost portion of the former Main Post lie within the Valley and Ridge Province of the Appalachian Highlands. The portion of McClellan east of Choccolocco Creek lies within the Piedmont Province. The age of consolidated sedimentary and metamorphic rocks ranges from Precambrian to Pennsylvanian. On a large scale, most of the rocks have been intensely folded into an aggregate of northeast-southwest trending anticlines and synclines with associated thrust faults. The shallow geology in the area is characterized by colluvial deposits overlying the Paleozoic metamorphic rocks. The presence of metamorphic rocks, as well as iron-bearing cements within the sedimentary rocks, increases the potential for minerals such as magnetite and other associated magnetic minerals.

There are no standing water bodies in MRS-3. The major surface water features at McClellan include Remount Creek, Cane Creek and Cave Creek. These waterways flow in a general northwest to westerly direction towards the Coosa River on the western boundary of Calhoun County. Perennial and intermittent streams drain MRS-3, flowing to the west, northwest, and north primarily through intermittent tributaries connecting to Remount Creek that flows north along the east side of the EBP.

The elevation of MRS-3 ranges from approximately 800 feet to over 1,250 feet above mean sea level. The lowest elevations occur along Remount Creek (along the EBP). Steep slopes from north-south trending hills face the EBP. East of the EBP are a number of steep sloped hills with elevations ranging from about 950-1,400 feet. West of the EBP Road, the elevations rise to a ridgeline with peaks in excess of 1,200 feet, then gradually decline toward the installation boundary.

1.2.1.3 Climate

Calhoun County sits on 611 square miles in the foothills of the Appalachian Mountains in northeastern Alabama. The mean annual temperature is 61 degrees Fahrenheit, with seasonal averages of 38 in January and 80 in July. The average annual precipitation is 65 inches.

1.2.2 SITE HISTORY

1.2.2.1 McClellan

Military training has been documented in the McClellan area since 1912, when the Alabama National Guard used it for artillery training. However, units stationed at Camp Shipp in the Blue Mountain Area during the Spanish American War could have used the Choccolocco Mountains for artillery training as early as 1898. The 29th Infantry Division also trained in this area prior to

deployment to France during World War I. In 1917, Congress authorized the establishment of Camp McClellan. In 1929, the camp was officially designated Fort McClellan. Prior to World War II, the 27th Infantry Division assembled at Fort McClellan for training, and during the war, many other units used the site for various training purposes. Following World War II, in June 1947, Fort McClellan was placed in inactive status. Fort McClellan was reactivated in January 1950 and the site was used for National Guard training and was selected as the site for the Army's Chemical Corps School.

The history of the McClellan area, as described in the *Archives Search Report* (ASR) *Findings Revision 1* (United States Army Corps of Engineers [USACE], 2001a) and *ASR Conclusions and Recommendations Revision 1* (USACE, 2001b), includes training activities and demonstrations that used conventional weapons (i.e., mortars, anti-tank guns, and artillery pieces). Former ranges and training areas potentially containing MEC cover the majority of McClellan including the subject MRS. McClellan was recommended for closure under the 1995 Base Realignment and Closure (BRAC) Program. McClellan was officially closed in September of 1999 and the property was transferred to the MDA (formerly the Anniston-Calhoun County Fort McClellan Development Joint Powers Authority) and other federal entities.

1.2.3 BRAVO ENGINEERING EVALUATION/COST ANALYSIS (EE/CA)

An EE/CA for the Bravo M 0 RA was performed by Tetra Tech Foster Wheeler, Inc. (TTFW) in 2003. The MRS passes through eight Army-designated subsectors (M3-2H Mortar Area-PR sector, M3-2H Mortar Area-D sector, M3-1L Rocket Area-D sector, M3-1H Rocket Area-PR sector, M3-1H Mixed Use Area-D sector, M3-1H Grenade Area-PR sector, M3-1L 37mm Projectile Area-D sector, and the M3-3H Rocket/Hand Grenade Area –D sector) as shown on Figure 1-2. Grids, delineation transects and mountain transects were previously used to characterize the areas in the Draft Bravo EE/CA (TTFW, 2004).

MEC items were found on the surface and to depths of 13 inches during field activities in seven of the eight Army-designated subsectors. The following types of MEC items were identified (detailed list in Draft Bravo EE/CA, TTFW 2004):

M3-2H Mortar Area-PR: This sector consists of approximately 104 acres in the western Bravo MRA bordering the EBP to the southwest. Grids and delineation transects were previously used to characterize this area. Nine Mortars, 60mm, HE, M49 were found on the surface and to depths of 8 inches during field activities in this sector.

- 60mm Mortar [High Explosive (HE)]

M3-2H Mortar Area-D: This sector consists of approximately 42 acres west of the PR sector. Grids and delineation transects were previously used to characterize this area. Twenty-seven MEC items were found on the surface and to depths of 12 inches during field activities.

- 60mm Mortar (HE)

- 60mm Mortar (Smoke)
- 60mm Mortar [White Phosphorous (WP)]

M3-1L Rocket Area-D: This sector consists of approximately 115 acres along the western border of the Bravo MRA to the west of MRS-3-2H. Grids and delineation transects were previously used to characterize this area. Twenty-eight MEC items were found on the surface during field activities.

- 60mm Mortar (HE)
- 2.36 inch Rocket

M3-1H Rocket Area-PR: This sector consists of approximately 20 acres bounded by the EBP to the east and the Bravo MRA boundary to the west. Grids and delineation transects were previously used to characterize this area. No MEC items were recovered during field activities in this sector.

M3-1H Mixed Use Area-D: This sector consists of approximately 169 acres in the northwestern Bravo MRA, bordering the eastern portion of the EBP. Grids and delineation transects were previously used to characterize this area. Nineteen MEC items were found on the surface and to depths of 13 inches during field activities.

- 75mm Shrapnel
- 75mm Projectile
- 40mm Grenade
- Rifle Grenade (Smoke)
- 3 Inch Stokes Mortar
- 81mm Mortar (HE)
- Illumination Signal
- M1907 Fuze

M3-1H Grenade Area-PR: This sector consists of approximately 86 acres along the northern border of the Bravo MRA and borders the EBP to the west and M3-1H Mixed Use Area-D sector to the south. Grids and delineation transects were previously used to characterize this area. Eleven MEC items were found on the surface and to depths of 6 inches during field activities.

- 2.36 inch Rocket
- Grenade
- Rifle Grenade

M3-1L 37mm Projectile Area-D: This sector consists of approximately 180 acres along the north central portion of the Bravo MRA and overlaps the northeastern portions of MRS-3. Grids and delineation transects were previously used to characterize this area. Five MEC items consisting of Projectiles, 37mm, HE, MKII were found from a depth of 1inch to a depth of 4 inches during field activities.

- 37mm Projectile (HE)

M3-3H Rocket/Hand Grenade Area-D: This sector consists of approximately 97 acres along the northern central portion of the Bravo MRA, borders the eastern portion of MRS-3. Grids and delineation transects were previously used to characterize this area. Twenty MEC items were found on the surface and to depths of 2 inches during field activities in this sector.

- Grenade (Practice)
- 40mm Grenade (HE)
- 66mm Rocket
- 3.5 inch Rocket

1.2.4 CURRENT AND FUTURE SITE USE

MRS-3 consists of mostly undeveloped and wooded areas. No paved roads or structures are present. The generalized future land use for MRS-3 is presented in Figures 1-4 and 1-5. Portions of MRS-3 are planned to be part of the McClellan Park System which will be used for passive recreational activities. The remainder of the area is projected to be developed for both light industrial, commercial, and residential purposes. For the purposes of this clearance, MRS-3 was divided into eight tracts based on the future land use designation as shown in Figure 1-3 and 1-4.

Tract	Size (approx.)	Future Land Use	Clearance
3A	53 acres	McClellan Park System	1-ft
3B	32 acres	McClellan Park System	1-ft
3C	39 acres	McClellan Park System	1-ft
3D	54 acres	McClellan Park System	1-ft
3E	68 acres	Unrestricted	Depth of Detection
3F	62 acres	Unrestricted	Depth of Detection
3G	60 acres	Unrestricted	Depth of Detection
3H	60 acres	Unrestricted	Depth of Detection

Approximately 171.88 acres of the MRS designated as McClellan Park System were cleared to one-foot using mag/dig methods. The McClellan Park System will be a wildlife habitat/conservation area and land use controls (LUCs) including deed restrictions will be implemented prohibiting digging without UXO construction support in these areas consistent with ADEM guidance. Approximately 238.26 acres of the MRS not designated as part of the McClellan Park System were cleared to the depth of detection based on unrestricted future use. An additional 22.23 acres of step-outs were cleared outside of the baseline clearance areas.

1.3 GENERAL OVERVIEW OF TECHNICAL APPROACH

1.3.1 INTRODUCTION

The general approach to the project was to perform brush clearing, land survey, and then either a DGM-based clearance to depth or an analog-based clearance to one-foot. Due to its size (432.37 acres), the MRS was divided into eight smaller tracts, designated 3A through 3H. Analog-based clearance to the depth of one-foot was performed in tracts 3A, 3B, 3C, and 3D corresponding the McClellan Park System. Tracts 3E, 3F, 3G, and 3H were geophysically mapped, targeted, and cleared to the depth of detection. Areas where DGM could not be effectively or safely performed (due to obstructions, structures, steep slopes etc.) had a traditional MEC analog "mag and dig" clearance to the depth of detection of these DGM data gaps using approved handheld instruments IAW the PWP (e.g. UXO technicians establishing 5 ft. wide control lanes and using hand held instruments to detect, flag, and assist in removing subsurface metallic anomalies). 18 boundary step-outs with appropriate clearance were subsequently performed to ensure a 200-ft MEC-free buffer around the MRS.

Quality control was performed to ensure that the MEC clearance was executed in accordance with the SSWP (Section 4 and Appendix E). Quality assurance (QA) was performed to verify QC and to document the acceptability of the clearance (Section 5 and Appendix J).

1.3.2 CLEARANCE GRIDS

To facilitate organization of work activities, safety zones, and data management, the site was divided into standard units of clearance area called grids - which are 100 ft. x 100 ft. in size (except for partial grids truncated by the MRS boundary). The grid network for MRS-3 is shown on Figure 1-4. The north-south and east-west grid boundary lines are coincident with the 100-foot Alabama State Plane coordinate system. Each grid has a unique name indicting its position in the grid system. The leading digit is a grid zone indicator. Northing and easting position are described by a numeric sequence incrementing to the east. For example, grid N181E086 is the northern-most grid in MRS-3.

1.3.3 UNITS OF PRODUCTION (UoPs)

Each grid is associated with a UoP to facilitate QC testing. Each UoP consists of a group of approximately 4 to 9 contiguous grids. UoPs were initially assigned in the SSWP. Additional UoPs were established for each set of step-out grids. The UoPs for MRS-3 are presented in Figure 1-5. UoPs are named by their end use and use a sequential numbering system for the entire McClellan area. The UoP's begin with the letter "P" designating the grids fall in the Park System of McClellan or an "N" designating the grids fall in the Non-Park System of McClellan, for example N03181 is the northern-most UoP.

1.3.4 DEFINABLE FEATURES OF WORK (DFW)

DFWs for the remediation fieldwork are as follows:

- GPO Certification
- UXO Surface Sweep prior to vegetation removal
- Brush Clearing
- Aggressive Surface/Near Surface Clearance prior to DGM
- Land Surveying
- Digital Geophysical Mapping
- Anomaly Reacquisition
- Clearance to Depth of Detection
- Clearance to Depth of One-foot
- MEC-Related Scrap Inspection/Certification
- Data Management
- Backfill and Site Restoration

1.3.5 DATA QUALITY OBJECTIVES (DQO)

DQOs are the performance criteria for the remediation. The DQOs used for this project focus on specific elements of the definable features of work and are discussed in detail in Section 4.1.

1.3.6 DESCRIPTION AND OPERATION OF DATABASE (DB)

A comprehensive site DB was established to:

- Ensure that all project data were properly captured
- Ensure conformity of nomenclature and reporting standards
- Track project progress
- Create forms, tables and reports
- Enable use and synchronization of handheld personal data assistants (PDAs) for field data entry
- Assist in performing systematic QC and QA

DBs for the MRS data were implemented in Microsoft Access 2007 and managed by NAEVA. The DBs are included in this report as Appendix C.

1.3.7 USE OF PERSONAL DATA ASSISTANTS

Electronic personal data assistants (PDAs) were used to record major aspects of data collection including: geophysical mapping, target reacquisition, surface sweep operations, aggressive surface/near surface clearance, mag and dig operations, intrusive investigations, data gap clearances, demolitions operations and blind seed placement. PDA drop-down menus were used to ensure all personnel used consistent terminology and that all data was properly recorded and transcription errors were minimized. Operational results were recorded on the PDAs and synchronized with the site DB daily.

2.0 FIELD OPERATIONS

2.1 FIELD CHANGE REQUESTS

Field work was conducted in accordance with the approved SSWP and PWP. When situations arose that made strict compliance with the SSWP unsafe and/or a more effective method was developed through lessons learned, MES would submit a field change request to ADEM for their review and approval. FCR's are presented in Appendix G. The following table summarizes the FCRs to the PWP for the MRS-3 MEC remediation.

TABLE 2-1: FCR LOG

FCR	Description of Change	Date Initiated	Status	Effective Date
5	Real time EM61 QC check of DGM target excavations.	7/15/2009	Approved by ADEM	7/27/2009
6	Allow for mag and dig to depth of detection for step-outs driven by DMM and non-penetrating ordnance where area not affected by previous earth moving activity.	7/10/2009	Approved by ADEM	7/27/2009
7	Reacquisition interrogation threshold set at 10 mV on EM61 Ch. 2 (targeting threshold remains 7 mV).	7/28/2009	Approved by ADEM	8/31/2009
8	X-Ray imaging approved for use for munitions ID/determination of explosive hazard	8/26/2009	Approved by ADEM	11/5/2009
9	Whites DXF 300 sensor approved for use in surface sweep, aggressive surface/near-near-surface clearance, and clearance to one foot operations.	9/21/2009	Approved by ADEM	11/5/2009

2.2 GEOPHYSICAL PROVE OUT (GPO) AREA

The GPO test grid was previously constructed using inert munitions and simulants at blind locations to test and document that personnel and equipment were successful in locating MEC in a controlled environment.

2.2.1 GEOPHYSICAL PROVE OUT REPORT

A GPO was performed in 2006. The final GPO report was included as Appendix A to the *Munitions and Explosives of Concern After Action Report Munitions Response Site 1 and Southern Alpha, Alpha and Bravo Munitions Response Areas of McClellan, Anniston, Alabama*, (MES, 2009). Applicable personnel and instrument certifications for MRS-3 are included in Appendix A.

2.2.2 INSTRUMENT AND OPERATOR PROFICIENCY TESTING

The GPO was used to test and confirm equipment and operator system performance across all work elements including sensor, positioning, personnel, data processing, and quality control. The sensor used for DGM was the Geonics EM61-MK2 metal detector. Before and throughout

the fieldwork, the GPO was utilized to confirm that detection systems operated within expected parameters. As the project progressed, geophysical mapping teams were required to perform daily quality control tests at the grid location. Field teams did not begin mapping grids until equipment function and personnel performance were proven acceptable. The only sensor used for DGM and reacquisition was the Geonics EM61-MK2 metal detector.

Handheld geophysical instruments approved for use in clearance to depth in non-DGM areas included the Schonstedt 52cX and Vallon VHM3CS (large and small head). The Whites XLT was only used to assist during intrusive operations to gauge the completion of a dig in the clearance to depth areas. The Vallon VHM3CS (large and small head) and Schonstedt 52cX were used during clearance to one foot operations. Not all personnel were certified on all sensors. As limited numbers of Vallons were available, UXO staff were primarily certified on Schonstedts and Whites, and only on Vallons as required. IAW FCR 9, the Whites DXF 300 sensor was approved for use in surface sweep, aggressive surface/near-near-surface clearance, and clearance to one foot operations.

2.2.3 FUNCTION CHECK AREA (FCA)

A permanent FCA near the GPO was established to allow UXO personnel to perform daily function tests of handheld (analog) equipment. Inert munitions items were buried with location and depth known to field crews so they could verify their handheld instrument's operability/battery condition daily prior to use.

Geophysical personnel established temporary FCAs in the field. Daily pre- and post-data collection function tests of DGM sensors (static, static-spike with a calibration jig, and cable shake tests) were performed in the grid.

2.3 SURFACE SWEEP (SITE PREPARATION)

For this operation (not final product), a magnetometer assisted surface sweep was conducted by Earth Tech UXO Technicians to identify and remove surficial MEC hazards and metallic debris prior to brush clearing operations. In addition to the safety function, removal of metallic objects was performed to eliminate or reduce the number of anomalies for subsequent clearance activities. UXO personnel swept in advance of the brush cutters to identify, remove, eliminate MEC, and/or reduce metallic objects. Large pieces of debris were flagged and moved prior to brush clearing. The UXO Team Leader was responsible for team activities, identification and inspection of MEC items, and for entering data from the clearance into the team PDA. Total Other Debris and total MDAS weights for each grid and additional positional and descriptive data for MEC items were entered into the PDA for synchronization to the project databases.

2.4 BRUSH CLEARING

Brush clearing was performed by Harmon Engineering and Contracting Co., Inc. to allow access for DGM and intrusive activities in accordance with the SSWP. UXO personnel also provided oversight and MEC avoidance support during brush clearing operations. The UXO escort walked ahead of the brush cutters and performed an additional visual and hand-held magnetometer assisted surface sweep to identify and remove all MEC and non-MEC hazards. In addition, the escort acted as a safety observer to insure compliance with prescribed procedures.

2.5 LAND SURVEYING

Surveying of boundaries and grid corners was performed by L.I. Smith, an Alabama licensed professional land surveyor, in Alabama State Plane East Zone coordinates (1983) in U.S. Survey Feet in accordance with the SSWP. An MES UXO Technician escorted the survey crew and provided anomaly avoidance support. Survey data and reports are included in Appendix B.

A 100 ft. by 100 ft. grid system was established throughout the work site. A six inch survey nail was placed to identify the southwest corner of each grid. A 3-foot wooden stake was used as a visual reference for each corner point and was marked with the corresponding grid number. The grid network, including step outs, is presented in Figures 1-6 and 1-7.

Step-out boundaries comprising 200-foot radius arcs from MEC find locations were established as needed. The surveyors emplaced additional survey nails and witness stakes at included grid corners, intersection points of the grid lines and the boundary arcs, and approximately every 20-feet along the boundary arc.

2.6 CLEARANCE TO ONE FOOT

UXO teams led by a UXO Tech III (Team Leader) conducted a MEC clearance to a depth of 1 foot over designated areas. The clearance teams utilized standard mag and dig clearing techniques, establishing 5-foot wide control lanes, and used approved hand held magnetometers and all metal detectors to assist in detection of MEC and MEC-like metal objects. The approved sensors for this effort were the Schonstedt GA-92XT/52CX, Vallon VMH (large and small head), and Whites DFX 300 (per FCR 9).

MEC was consolidated within the grid for disposal and items unacceptable to move were marked for blow in place (BIP) procedures at the end of each day. All scrap was identified, inspected, and segregated into MEC scrap and non-MEC scrap. MEC scrap and non-MEC scrap were re-inspected for subsequent pickup and transported to a temporary holding area for QC and QA inspection, certification and final disposition.

The UXO Team Leader was responsible for team activities, identification and inspection of MEC items, and for entering data from the clearance into the team PDAs. Total non-MEC and total

MEC scrap weights for each grid and additional positional and descriptive data for MEC items were entered into the PDA for synchronization to the project databases.

2.7 AGGRESSIVE SURFACE/NEAR-SURFACE CLEARANCE

In accordance with the SSWP, an additional aggressive surface/near-surface (0 – 6 inch) clearance was conducted by MES to identify and remove MEC and non-MEC scrap after brush cutting and before conducting DGM. This operation was not a final product operation; its objective was to reduce the number of near surface metallic anomalies that could interfere with DGM. This operation is referred to as "UXO surface and near surface clearance after vegetation is removed" in Table 10-3 of the SSWP.

This operation was conducted utilizing the industry standard mag/dig procedures. Teams would delineate five-foot lanes using ropes and search the area using hand-held magnetometers. This proved to be effective in reducing the overall number of DGM anomalies, which improved production rates and directed focus on clearance of subsurface items.

2.8 DIGITAL GEOPHYSICAL MAPPING

NAEVA performed all DGM tasks in MRS-3 using two-person teams operating Geonics EM61-MK2 metal detectors IAW the PWP. The second EM61-MK2 time gate, which is also known as Channel 2, was the primary data channel used for geophysical mapping and interpretation. A custom electronic odometer built into one of the wheels triggered the recording of geophysical data at a rate of one reading every 10 cm (approximately 3 readings per foot, twice the standard EM61-MK2 wheel-mode sampling rate). A mosaic of all DGM survey results for MRS-3 is presented on Map 1. DGM data and grid maps are compiled in Appendix D. QC and QA DGM remapping data and grid maps are included in Appendices E and J respectively.

2.8.1 GEOLOCATION USING FIDUCIAL METHODS

The use of GPS was generally precluded due to the presence of heavy woods with dense tree canopy conditions throughout the area of investigation. The use of local (fiducial) coordinates relative to the surveyed grid corners was selected in the GPO as the most appropriate means of achieving accurate data positioning. NAEVA's data acquisition teams pulled tape measures between the grid corner stakes. Survey ropes were laid perpendicular to the tape measures at 25 foot intervals and were marked with alternating paint dots every 2.5 feet to facilitate straight-line data collection paths. Geophysical data was collected every 10 cm along these data collection lines using the EM61-MK2's integrated survey wheel.

In addition to providing lateral control marks, the ropes also allowed the insertion of distance control fiducial marks into the dataset as the EM61-MK2 crossed the 25 foot increments. During pre-processing of the data, those marks were used to adjust the along-line locations of the data points.

2.8.2 IDENTIFICATION OF NON-DGM AREAS DURING DATA COLLECTION

The use of the DGM methods described above requires that all data be collected along straight, parallel transects to maintain accurate positioning. Obstacles encountered along the transects frequently required the field teams to pause data collection, maneuver around the obstacle, and then resume data collection along the same line. At each of the line breaks (data gaps), the field team recorded the end point of the line segment, the start point of the new segment, and the reason for the gap in a specially designed drop down menu on the team PDA. The majority of data gaps were caused by trees, but other obstacles included creeks, steep slopes, and standing water. These data gaps, called non-DGM (clearance) areas, were identified on maps for separate clearance using hand held instruments.

2.9 DATA PROCESSING

NAEVA utilized qualified geophysicists to perform all data processing tasks for MRS-3. The raw and processed data files, contour maps, and target lists were posted to the project file transfer protocol (FTP) site for review by project QC and MES QA personnel.

2.9.1 PRE-PROCESSING

Digital geophysical data was reviewed to ensure complete coverage and data quality by a qualified geophysicist. Data was edited for line ends and fiducial positions using Geonics DAT61-MK2 software, and then exported to an ASCII file format to allow for initial contouring and evaluation. If any data was found to be missing or unacceptable, the data collection team would be directed to return to the grid for recollection. Once the data was prepared, evaluated, and determined to be complete and accurate, raw Geosoft XYZ files were generated and electronically transferred to the FTP site.

2.9.2 INITIAL PROCESSING

Upon completion of pre-processing and a review of the acceptability of the associated DGM team QC data, the digital geophysical data was further evaluated and processed to generate the final processed data files and associated maps using Geosoft's Oasis Montaj processing software with the UX-Detect module. The data processing procedures include:

- Data evaluation for down-line data density and coverage
- Auto-leveling of four bottom coil channels, with additional leveling refinement of Channel 2 data
- Lag correction
- Gridding of data
- Additional filtering and data enhancement, as necessary
- Generation of polygon files to clip gridded data at line breaks
- Spatial referencing of culture features noted during data collection

- Target selection and evaluation of anomalies at or above the designated 7 millivolt (mV) threshold
- Conversion of data from local coordinates to State Plane coordinates
- Generation of final geophysical maps (local and State Plane coordinates), target lists and XYZ files

The data processing methods and parameters for each grid are documented in the Data Processing tables of the project DB (Appendix C). Individual grid maps showing the geophysical data and selected targets are included in the grid packages in Appendix D.

2.9.2.1 Target Selection

Initial target selections were made using automated processing routines within UX-Detect software. In areas exhibiting low target density and discrete features initial target selections were made from the profile data. Within high target density areas where anomaly footprints overlapped, the initial target selections were made based on the gridded data. Data and targets were evaluated by qualified geophysicists as to their validity and position. Targets found to be invalid or incorrectly located were removed or adjusted. Additionally, anomalies that were not selected by the UX-Detect module, yet deemed to represent a potential target, were manually selected. Each target list provides a unique Target ID, x and y location for each target (in local grid coordinates and state plane coordinate), the recorded peak response, and any appropriate comments (i.e. culture, suspected utility, possible geologic response, or relationships with adjacent anomalies/targets). The target selection threshold based on the approved GPO results was 7 mV on Channel 2. The targets selected for each grid are documented and tracked in the Anomaly Tracking Sheet table of the project DB (Appendix C).

2.9.2.2 Identification of Saturated Response Areas (SRAs) and High Density Target Areas (HDTAs)

SRAs are defined as areas of high anomalous response where discrete point targets are not easily identified. SRAs are caused by strong and overlapping responses from multiple metallic items. These areas could be cultural (buried construction debris, buried utilities, waste burial pits, etc.) or MEC related (impact area, demolition areas, discarded military munitions disposal areas, etc.). SRAs are denoted on the map by a polygon and a unique SRA number. The criteria used to identify SRAs was a “large” continuous area with the majority of response above 75 mV such that the selection and excavation of individual targets would not effectively remediate the given area. The SRA boundary was generated in as regular a shape as possible while minimizing the amount of included background or below threshold values.

High Density Target Areas (HDTAs), where discrete point targets were present in elevated response areas, were identified in multiple grids. Individual point targets were selected and cleared within these areas as appropriate and a follow-on mag and dig clearance to the depth of detection was then performed to the identified boundary of each HDTA.

2.9.2.3 Delineation of Non-DGM Areas

In some areas, digital geophysical data could not be collected due to the presence of trees, creeks, steep slopes or other obstructions. In such cases, polygon files were generated based on the line paths to show breaks in the data collection line. The polygon files were drawn on the geophysical maps and used to mask areas in which no DGM actually occurred. Field notes collected during DGM were imported into Oasis Montaj and noted culture was placed on the map. It was agreed prior to the start of the project that any unlabeled data gaps shown on the grid maps would be assumed to be the result of single trees.

2.10 REACQUISITION

All targets selected by NAEVA's data processors as well as any QA/QC picks made by the QC Geophysicist or the QA Geophysicist, were reacquired in the field by NEAVA DGM teams using an EM61-MK2 operated in analog mode. The location of peak response was found for each target using the EM61-MKJ2 in analog mode and the peak response was measured. Initially all reacquired targets were intrusively investigated and cleared. After acceptance of FCR 7, all targets with a reacquired Channel 2 peak response of at least 10 mV were intrusively investigated and cleared. The reacquisition data for each target was documented and tracked in the Anomaly Tracking Sheet table of the project DB (Appendix C). In addition, the reacquisition teams marked the boundaries of the special case areas noted in Sections 2.8.2.2 and 2.8.2.3 with spray paint.

2.10.1 FIELD METHODS

Upon arriving at the grid, the team located the targets based on the geophysical maps and marked each target with a uniquely numbered pin flag IAW the SSWP. Each flagged location was then interrogated with an EM61-MK2 to find the peak response location. The peak response, offset, and any comments from the instrument operator were entered into the PDA.

The benefit of reacquiring selected targets with the original mapping instrument comes in the reduced time and effort required of the dig teams. In addition to adjusting the target location directly over the peak value, the reacquisition teams had the ability to add or remove (merge) targets as necessary (which were fully documented on the team PDAs). If any related or adjacent sub-peaks above the targeting threshold were identified in the field, they were flagged and added (daughter anomalies) to the dig list by the reacquisition team. Occasionally, rough terrain or other outside interference will result in elevated instrument response and the selection of a target where none is necessary. Reacquisition teams searched a minimum of 2.5 ft. around each target. If they could not locate a peak response above the target threshold, the flag would not be placed and an appropriate comment recorded in their PDA.

2.11 UXO INTRUSIVE INVESTIGATIONS

2.11.1 INTRUSIVE OPERATIONS

Intrusive teams were provided a grid information package containing DGM grid maps and target lists with mV readings and comments. The basic tactical approach to intrusive operations remained consistent throughout the clearance phases. All targeted locations were excavated until the geophysical response was below the 10mV threshold criteria or the dig was inspected and approved by QC. FCR 5 included embedding a dedicated Geophysical QC EM61-MK2 operator to perform real-time QC of excavations.

2.11.2 NON-DGM AREAS

UXO teams were required to check their DGM maps and identify any data gaps present in the grid. UXO teams used a Vallon, Schonstedt or Garrett detector or an EM61-MK2 in analog mode to clear around obstructed data gaps (trees, deadfall, fences, etc.) and 100% of the area of non-obstructed data gaps (such as creeks, swamps, steep slopes, unimproved roads, trenches, etc.).

2.11.2.1 Creek Areas

Several unnamed creeks are present in MRS-3. Most creek beds were not accessible for DGM. These areas were deemed data gaps and were cleared using handheld instruments.

2.11.2.2 Tree Gaps

The MRS is heavily wooded. The Vallon or Schonstedt was required to be used to clear to the depth of detection all data gaps around trees to a radius of 2 feet using mag and dig methodology.

2.11.2.3 Steep Slopes

In some isolated areas and drainages, the terrain was too steep to be safely mapped using an EM61-MK2. These non-DGM areas were marked in the field during reacquisition and were subsequently cleared using mag and dig methods with approved clearance to depth instruments.

2.11.2.4 Structures

There are no paved roads or permanent operational structures in MRS-3. Two small earthen-wood bunkers and several small concrete pads/foundations of former structures were removed by UXO teams assisted with heavy equipment as necessary during the clearance such that there were no residual exception areas.

2.11.2.5 Other Non-DGM Areas

Downfall, logs, trenches, swamps, gullies, mounds, rocks, etc. were also identified on the DGM maps. UXO teams used a Vallon or Schonstedt to clear obstruction-caused data gaps (downfall, logs, rocks, etc.) and to clear 100% of other data gaps (trenches, swamps, gullies, mounds, etc.).

2.11.2.6 SRAS and HDTAs

SRAs consist of dense, overlapping geophysical anomalies that made prosecuting individual targets impractical. Most SRAs were related to other debris fill materials, such as construction debris with reinforced concrete or were undocumented trash dump sites, although a few were related to high use impact areas. Each of the SRAs were cleared by the UXO teams assisted by heavy equipment as necessary.

Eight High Density Target Areas (HDTAs), where discrete point targets were present in elevated response areas, were identified in seven grids: N131E025, N165E094, N166E096, N169E092, N170E092, N170E0911S, and N171E092. Individual point targets were selected and cleared within these areas as appropriate and a follow-on mag and dig clearance to the depth of detection was then performed to the identified boundary of each HDTA.

2.12 STEP-OUTS

The Step-out approach was performed in accordance with the WP. If a MEC item was identified within 200 feet of the boundary of the MRS-3, a step-out was performed to ensure a 200 foot buffer free of MEC. However, step-outs were not performed into adjacent MRSs which were either previously cleared or scheduled for MEC clearance. Grids and UoPs were assigned to each step-out (Figures 2-5 to 2-8). The MEC finds and associated MRS-3 step-outs are shown on Figures 3-1 and 3-2. FCR 6 was approved which allowed for mag and dig to depth of detection for step-outs driven by DMM and non-penetrating ordnance in areas not affected by previous earth moving activity.

2.13 DEMOLITION OPERATIONS

Demolition operations were conducted throughout all phases of the MRS-3 remediation in accordance with the SSWP. For items determined to be safe to move, consolidated demolition operations were conducted within the grid. Items deemed not safe to move were rendered safe by blow in place (BIP) demolition procedures. Positive identification, location, and condition of the MEC item determined whether blast mitigation was required. For intentional detonations where blast mitigation was required (adjacent to roads, buildings, workers) procedures in *Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions*, HNC-ED-CS-S-98-7 (USACE, 1998) were used. No unintentional detonations occurred.

A total of 3,401 MPPEH items were found. Of these, 2,553 were determined to be MEC by explosive investigation or x-ray (per FCR 8) operations as summarized below in Table 2-2 below. Photographs of all demolition items are included in the demolition records in Appendix I.

TABLE 2-2: DEMOLITION ITEMS DETERMINED TO BE MEC

MEC Item	Total
37mm (HE)	177
3.8-in Shrapnel	1
60mm Mortar (HE)	1,417
60mm Mortar (Illumination)	4
60mm Mortar (WP)	3
81mm Mortar (HE)	2
40mm Grenade (HE)	3
Grenade (HE)	222
Grenade (Various)	18
Rifle Grenade (HE)	396
Rifle Grenade (WP)	2
Rifle Grenade (Various)	16
2.36-in Rocket	123
Fuze (Various)	139
Trip Flare	4
Other	26
Totals	**2,553**

2.14 WASTE DISPOSAL

MEC-related scrap and non–MEC-related scrap were sorted and inspected in accordance with the SSWP and DODI 4140.62 *Material Potentially Presenting an Explosive Hazard,* (November 2008)[2]. This inspection process insured that MEC and non-MEC-scrap were properly identified and did not present an explosive hazard. The process included sorting, 100 % inspection and 100% re-inspection, demilitarization as needed, and securing in separate locked containers. Following this inspection program, non-MEC scrap and demilitarized MEC scrap was released to HVF LLC with a signed 1348-1A custody document. The containers of all scrap remained secured until they were processed and a certificate of disposition issued. MEC certification and disposal documents are included in Appendix H.

Scrap weights recycled were as follows:

- MDAS (MEC scrap) – 153,062 lbs.
- Other metallic debris (Non-MEC scrap) – 120,688 lbs.

[2] Current DOD terminology (DODI, 2008) is to refer to non-MEC scrap as MDAS. Material prior to determination of its explosives safety status, potentially contains explosives or munitions and is referred to as MPPEH. MPPEH that cannot be documented as MDAS, that has been assessed and documented as to the maximum explosive hazards the material is known or suspected to present and for which the chain of custody has been established and maintained is referred to as MDEH and is no longer considered MPPEH. In this report, to be consistent with existing plans and documents, we have continued to use MEC Scrap terminology.

3.0 MEC REMEDIATION RESULTS

3.1 MEC ITEMS RECOVERED

A total of 2,553 MEC items were recovered from MRS-3 as itemized in Table 2-2. The locations of all MEC found are shown in Figures 3-1 and 3-2. The MEC found consisted of 55.54% 60mm Mortar (HE), 15.51% Rifle Grenade (HE), 8.70% Grenade (HE), 6.93% 37mm (HE), 4.97% Grenade Fuzes, 4.82% 2.36 inch Rocket, and 3.53% miscellaneous projectiles, grenades mortars, and fuzes. Five inert (non-MEC) chemical training aids, including an empty GB bomb, were blown in place. Clustering of MEC indicating target or impact areas was observes in multiple locations in Tracts 3A, 3C, 3G, and 3H. Otherwise, MEC was scattered across all of the tracts in patterns more indicative of indirect fire range training. These results are consistent with the previous use of the area as a mixed projectile training area. The MEC density for the MRS-3 clearance is 5.9 MEC/acre. The MEC items were recovered from the clearance operations as follows:

- 424 MEC items were recovered during the surface sweep
- 618 MEC items were recovered during the aggressive surface/near surface clearance operation
- 1052 MEC items were recovered during the analog clearance to one-foot operation
- 459 MEC items were recovered during the clearance to depth operation

Table 3-1 DGM Target Resolution

Total	%	Type	Comments
3,294	6.98%	Removed in Reacquisition.	<10mV, same as adjacent target, checked pins in grid corners
560	1.2%	MEC	60mm Mortar, 3 Inch Stokes Mortar, Grenade (HE)
3,602	7.63%	MEC Scrap	37mm APT, 2.36 Inch Rocket, Grenade (Practice)
15,273	32.34%	MEC Fragmentation	37mm (HE), 60mm Mortar (HE), Rifle Grenade (HE)
14,667	31.06%	Non-MEC Scrap	Nails, wire, barbed wire
9,087	19.24%	SAA	
269	1%	Seeds	
471	1%	Geologic	
0	0%	No Finds	
0	0%	Other	
47,223	**100%**	**Totals**	

3.2 ANOMALY TRACKING

A total of 47,223 DGM anomalies were tracked during the DGM-based clearance (Table 3-1). The DGM target density for the clearance to depth of detection tracts is approximately 195 targets per acre. Of these, only 1.2% were MEC, 7.63% were MEC-scrap, 32.34% were identified as MEC fragmentation, and 19.24% were small arms ammunition (SAA). Of the MEC-scrap recovered, 7% were fuzes (Table 3-2).

Table 3-2: DGM Target MEC Scrap/MEC Fragmentation

Quantity	%	Depth(in)	Type	Items
21,236	45.78%	0-48	MEC Fragmentation	60mm Mortar (HE)
5,414	11.67%	0-24	MEC Fragmentation	37mm (HE)
5,043	10.87%	0-24	MEC Fragmentation	Grenade (HE)
3,016	6.50%	0-36	MEC Fragmentation	Rifle Grenade (HE)
1,422	3.08%	0-16	MEC Fragmentation	37mm (HE) plus other
620	1.33%	0-24	MEC Fragmentation	60mm Mortar (HE) plus other
388	0.84%	2-8	MEC Fragmentation	Grenade (HE) plus other
19	0.04%	3	MEC Fragmentation	2.36 Inch Rocket plus other
17	0.04%	0-12	MEC Fragmentation	75mm (HE)
4	0.01%	7	MEC Fragmentation	155mm Shrapnel plus other
4	0.01%	5	MEC Fragmentation	40mm Grenade (HE) plus other
3,249	7.00%	0-48	MEC Scrap	Fuze
3,527	7.60%	0-48	MEC Scrap	37mm APT plus other
1,023	2.21%	5-60	MEC Scrap	Grenade (Smoke) plus other
846	1.82%	0-48	MEC Scrap	Grenade (Practice) plus other
151	0.33%	0-36	MEC Scrap	2.36 Inch Rocket plus other
84	0.18%	0-12	MEC Scrap	66mm Rocket plus other
61	0.13%	0-16	MEC Scrap	75mm Shrapnel
57	0.12%	0-15	MEC Scrap	3.5 Inch Rocket plus other
52	0.11%	4-48	MEC Scrap	Landmine (Practice)
51	0.11%	0-24	MEC Scrap	3 Inch Stokes Mortar plus other
35	0.08%	1-16	MEC Scrap	Rifle Grenade (Illum.)
16	0.03%	4	MEC Scrap	40mm Grenade (Smoke) plus other
15	0.03%	0-16	MEC Scrap	81mm Mortar
13	0.03%	0-6	MEC Scrap	155mm Shrapnel plus other
10	0.02%	8-24	MEC Scrap	60mm Mortar (Illum.)
7	0.02%	4-12	MEC Scrap	SAA
4	0.01%	0-5	MEC Scrap	Slap Flare
46,384	**100%**	**Note: multiple (up to 25) items in some excavations**		

3.3 EXCEPTION AREAS

No exception areas requiring future construction support are present within MRS-3. Water Tank Construction Site A and the Eastern Bypass right of way which were previously cleared by the U.S. Army are not exception areas (Figure 1-3).

3.4 FUTURE UXO CONSTRUCTION SUPPORT AREAS

The areas in MRS-3 within the McClellan Park system which were cleared to one foot will require future UXO construction support if intrusive activities are required there in the future.

4.0 QUALITY CONTROL (QC) TESTING

This section discusses the QC program that was implemented during the remediation of MRS-3. This section summarizes the DQOs and discusses the three phases of (quality) control, and the results of the QC program.

4.1 DATA QUALITY OBJECTIVES

Per the SSWP, the following approved DQOs were used for this project:

4.1.1 LAND SURVEYING

- Survey/positional accuracy – due to canopy cover, conventional survey methods were used to survey boundaries and grid corners, by L.I. Smith & Associates, an Alabama licensed professional land surveyor. Accuracy of these systems was within +/- 1 inch for the boundary survey and +/- 1 foot for the internal grid corners.

4.1.2 GEOPHYSICAL INVESTIGATION

- The geophysical contractor personnel and equipment were certified as passing the GPO at a 95% seed detection level.
- Daily function checks of the geophysical instruments were within tolerances specified in the PWP and finalized in the GPO.
- There were no unexplained sensor or positional gaps in the geophysical data.
- DGM target anomaly were reacquired to within a critical radius of 2.5 feet at a greater than 99.5% rate.
- All blind seed items in DGM coverage areas were targeted.
- Along track sample density of at least 20 cm (10cm via survey wheel) and an across track spatial density of 2.5 feet for DGM, excepting obstacles, was achieved at a greater than 99.5% rate.

4.1.3 INTRUSIVE INVESTIGATION

- Daily performance checks of all hand-held detectors and data collection and positioning systems were performed IAW standard operating procedures (SOPs) or manufacturer's specifications at a FCA.
- The DGM sensor (Geonics EM61-MK2) was used for reacquisition of all DGM targets and to interrogate all no-find/geologic locations.
- All MEC items were positively identified as to type, fuze, condition, and filler.
- The UXOQCS verified the identification of all MEC items.

4.1.4 MEC ITEM PERFORMANCE CLEARANCE DEPTHS

Performance clearance depths specified in the PWP are presented in Table 4-1.

TABLE 4-1: Performance Clearance Depths For MEC Items

MEC Item	Clearance Depth
Mk II Hand Grenade	0 – 14 in.
37mm Projectile	0 – 14 in.
M9 Rifle Grenade	0 – 18 in.
2.36-in. Rocket	0 – 24 in.
3.5-in. Rocket	0 – 24 in.
75mm Projectile	0 – 30 in.
3-in. Stokes Mortar	0 – 32 in.
60mm Mortar Projectile	0 – 24 in.
81mm Mortar Projectile	0 – 30 in.
3.8-in. Projectile Shrapnel	0 – 24 in
4.2-in. Mortar Projectile	0 – 36 in.
105mm Projectile	0 – 36 in.
155mm Projectile	0 – 48 in.
AT Mine	0 – 6 in.

4.2 THREE PHASE QC PROGRAM

A three-phase QC program was implemented as a means to verify accomplishment of the Definable Features of Work. This program consisted of Preparatory, Initial, and Follow-up QC inspections. QC inspections are documented in Appendix E.

4.2.1 PREPARATORY PHASE INSPECTION

The Preparatory Phase was a pre-operational briefing and training prior to production start. It consisted of a briefing by the QC team for specific tasks. The briefing covered QC check sheet specifics and any SOPs relating to the task. During the briefing, the QC team and operations personnel identified specific procedures, and equipment needed to accomplish the task. Because many of the MRS-3 tasks were performed by contractor teams moved from performing the identical work tasks in previous MRS clearances, legacy initial inspections were used as appropriate.

4.2.2 INITIAL PHASE INSPECTION

The QC team conducted an initial phase inspection the first time a DFW was performed. This inspection checked that preliminary work met contract specifications, was safely executed, and that an acceptable level of workmanship was achieved. Because many of the MRS-3 tasks were performed by contractor teams moved from performing the identical work tasks in previous MRS clearances, legacy initial inspections were used as appropriate.

4.2.3 FOLLOW-UP PHASE INSPECTION

Follow-up inspections ensured continued PWP compliance, workmanship quality, and safety. The QC team observed specific portions of the task in progress while on site. Established procedures briefed at the QC preparatory briefings and initial inspections were observed.

4.3 UOP CERTIFICATION PROCESS

The UoP certification process was implemented IAW the PWP and incorporates the major QC steps. Verification of these steps are documented in the UoP Certification Process Spreadsheet Log and Certification Packages in Appendix E. Note that QC Steps 3 and 6 are applicable only where DGM was utilized (not for clearance to one foot or clearance to depth of detection non-DGM areas). Verification of these steps are documented in the UoP Certification Process Spreadsheet Log and Certification Packages in Appendix E.

4.3.1 QC STEP 1: GPO, FCA, PREPARATORY AND INITIAL QC INSPECTION

The FCA and GPO were used to certify operators and instruments prior to commencing field operations. Operators were tested for their ability to detect buried seed items with specified equipment. GPO and FCA certifications are included in Appendix A. The preparatory phase inspection was conducted by QC personnel prior to contractor work team field deployment. The initial QC inspection was performed the first time selected DFWs were performed. Preparatory and Initial inspections are documented on the QC Surveillance Reports in Appendix E.

4.3.2 QC STEP 2: FOLLOW-UP QC PHASE INSPECTION

Follow-up QC Phase Inspections for each DFW were conducted IAW Table 10-3 of the PWP per the QC state (normal-25%, relaxed-15%, or tightened-35%) to ensure the tasks were being performed to the required PWP standards. For clearance to depth of detection operations, Matrix QC inspected 100% of the target locations during the main phase of work.

4.3.3 QC STEP 3: GEOPHYSICAL DATA REPROCESSING

The Geophysical QC Specialist (GeoQCS) independently reprocessed the geophysical data for on average one grid in each UoP and developed maps and target lists which were compared to the grid maps and target lists. Minor discrepancies in target selection existed due to the interpretative nature of geophysical target selection. If discrepancies between the grid maps and target lists existed, the GeoQCS and the geophysical data processor compared processing techniques and agreed to standard processing procedures. At this time, the GeoQCS also checked the blind QC seed items against the DGM results and target lists for this UoP. If any QC issues were identified, the QC team would conduct a root cause analysis documenting what, when and where the problem occurred and who was involved and recommend potential solutions and corrective actions.

4.3.4 QC STEP 4: BLIND QC SEEDS

QC seed items were placed by the QC team at a minimum density of one seed item per UoP to monitor the (not final product) surface and aggressive surface and near-surface clearance operations. For final product clearance to one foot and clearance to depth of detection operations, QC seeds were installed at a minimum density of one seed item per UoP. Seed items consisted of inert munitions items and simulants placed below the vegetative mat for surface operations and up to one foot or the performance clearance depth, as appropriate, for subsurface operations. QC seeding results are discussed in Section 4.8.

4.3.5 QC STEP 5: EXCAVATION SAMPLING REPORTS

Step 5 of the QC process consisted of post excavation dig checks and data gap checks to verify workmanship. This QC step utilized MIL-STD-1916, verification level III. The PWP specified three levels of QC state (tightened-35%, normal-25%, or relaxed-15%) which determined the *minimum* percentage of targets in a UoP that QC was required to check. The QC state for each team was based on its work history and quality performance. All teams started at the normal state. The QC state for each grid is recorded on each QC/QA Inspection report contained in Appendix E. Matrix QC exceeded the minimum requirements and performed post-excavation inspection of all DGM target excavations.

4.3.6 QC STEP 6: TARGET DATA MV COMPARISON TO EXCAVATION RESULTS

This step was actually performed prior to QC Step 5. Upon contractors's completion of all excavations in a UoP, the GeoQCS would compare the reacquisition team's target mV reading with intrusive results. If a mV response was inconsistent with the excavation results (based on GPO and intrusive history), GeoQCS selected that target for QC Step 5 inspection. These comparisons are documented on the mV Comparison Tracking Sheets in Appendix E.

4.4 UOP CERTIFICATION

The UoP Certification Packages document each UoP successfully passing the UoP certification QC steps and are included in Appendix E. DGM UoPs contain the six QC certification steps and non-DGM UOPs contain the applicable four QC certification steps. Part of the UoP certification process required that for DGM areas at least one grid from a UoP be selected and reprocessed by GeoQCS. Initially, grids were selected randomly from each UoP. However, as work progressed, grids with blind QC seed items and grids containing SRAs were determined to be of greater QC value and were preferentially selected. A table showing the UoP QC certification process checkoffs is included in Appendix E. All grid QC inspections are documented in the QC grid acceptance reports in Appendix E.

4.4.1 UOP CERTIFICATION REQUIREMENTS

All UoPs passed the certification requirements as indicated on Table 4-2. A UoP tracking spreadsheet documents the completion of the applicable QC steps for each UoP. The

geophysical data that comprises the UoP is included in Appendix D. UoP certification data included in Appendix E include:

- GeoQC grid data reports with checklists and reprocessed data
- GeoQC mV comparison tracking sheet
- GeoQC QA-QC geo tracking sheet
- QC Surveillances
- QC acceptance reports.
- QA/QC grid tracking tables

MES QC grid inspections (Step 5 and Step 6) checked (25%) of DGM targets and data gaps in the DGM-based clearance grids. All grid QC inspections are documented in the QC inspection sheets in Appendix E.

4.5 QC FUNCTION TESTS

To ensure quality DGM data, NAEVA conducted daily QC tests, which were evaluated on a daily basis to ensure that both personnel and equipment were functioning at optimal levels. Each NAEVA DGM team conducted daily morning and end of day (AM and PM) static tests and lag tests to document proper instrument function. In addition a set of repeat data lines were collected for every grid dataset. All QC tests were reviewed by the GeoQCS. The QC test data and results are compiled in Appendix E.

TABLE 4-2: UoP QC Verification

UoP Certification Process Verification MRS-3								
UoP	**Step 1**	**Step 2**	**Step 3**	**Step 4**	**Step 5**	**Step 6**	**QC Complete**	**Verified By**
	FCA, GPO, Prep, Initial	Follow-up Inspection	Data Reprocessing	Blind QC Seeding	QC Grid Inspection	Target mV Comparison	Date	QC
P03001	YES	YES	YES	YES	N/A	N/A	5/14/2009	JBS
P03002	YES	YES	YES	YES	N/A	N/A	8/5/2009	JBS
P03003	YES	YES	YES	YES	N/A	N/A	6/29/2009	JBS
P03004	YES	YES	YES	YES	N/A	N/A	8/10/2009	JBS
P03005	YES	YES	YES	YES	N/A	N/A	9/15/2009	JBS
P03006	YES	YES	YES	YES	N/A	N/A	9/15/2009	JBS
P03007	YES	YES	YES	YES	N/A	N/A	6/29/2009	JBS
P03008	YES	YES	YES	YES	N/A	N/A	6/29/2009	JBS
P03009	YES	YES	YES	YES	N/A	N/A	9/15/2009	JBS
P03010	YES	YES	YES	YES	N/A	N/A	9/15/2009	JBS
P03011	YES	YES	YES	YES	N/A	N/A	6/29/2009	JBS
P03012	YES	YES	YES	YES	N/A	N/A	5/14/2009	JBS
P03013	YES	YES	YES	YES	N/A	N/A	5/5/2009	JBS
P03014	YES	YES	YES	YES	N/A	N/A	5/5/2009	JBS
P03015	YES	YES	YES	YES	N/A	N/A	2/9/2009	JBS
P03016	YES	YES	YES	YES	N/A	N/A	5/14/2009	JBS
P03017	YES	YES	YES	YES	N/A	N/A	4/6/2009	JBS
P03018	YES	YES	YES	YES	N/A	N/A	2/4/2009	JBS
P03019	YES	YES	YES	YES	N/A	N/A	3/31/2008	JBS
P03020	YES	YES	YES	YES	N/A	N/A	2/4/2009	JBS
P03021	YES	YES	YES	YES	N/A	N/A	2/4/2009	JBS
P03022	YES	YES	YES	YES	N/A	N/A	2/3/2009	JBS
P03023	YES	YES	YES	YES	N/A	N/A	3/26/2008	JBS
P03024	YES	YES	YES	YES	N/A	N/A	3/26/2008	JBS
P03025	YES	YES	YES	YES	N/A	N/A	6/18/2009	JBS
P03026	YES	YES	YES	YES	N/A	N/A	6/18/2009	JBS
P03027	YES	YES	YES	YES	N/A	N/A	6/18/2009	JBS
P03028	YES	YES	YES	YES	N/A	N/A	5/17/2009	JBS
P03029	YES	YES	YES	YES	N/A	N/A	5/17/2009	JBS
P03030	YES	YES	YES	YES	N/A	N/A	6/17/2009	JBS
P03031	YES	YES	YES	YES	N/A	N/A	3/30/2009	JBS
P03032	YES	YES	YES	YES	N/A	N/A	3/30/2009	JBS
P03033	YES	YES	YES	YES	N/A	N/A	3/31/2009	JBS
P03034	YES	YES	YES	YES	N/A	N/A	4/29/2009	JBS
P03035	YES	YES	YES	YES	N/A	N/A	4/29/2009	JBS
P03036	YES	YES	YES	YES	N/A	N/A	4/30/2009	JBS
P03037	YES	YES	YES	YES	N/A	N/A	4/28/2009	JBS
P03038	YES	YES	YES	YES	N/A	N/A	7/10/2009	JBS
P03039	YES	YES	YES	YES	N/A	N/A	1/20/2009	JBS
P03040	YES	YES	YES	YES	N/A	N/A	4/28/2009	JBS
P03041	YES	YES	YES	YES	N/A	N/A	4/28/2009	JBS
P03042	YES	YES	YES	YES	N/A	N/A	7/9/2009	JBS
P03043	YES	YES	YES	YES	N/A	N/A	7/14/2009	JBS
P03044	YES	YES	YES	YES	N/A	N/A	7/9/2009	JBS
P03045	YES	YES	YES	YES	N/A	N/A	5/12/2009	JBS
P03046	YES	YES	YES	YES	N/A	N/A	7/10/2009	JBS

P03047	YES	YES	YES	YES	N/A	N/A	7/16/2009	JBS
P03048	YES	YES	YES	YES	N/A	N/A	7/10/2009	JBS
P03049	YES	YES	YES	YES	N/A	N/A	7/9/2009	JBS
P03050	YES	YES	YES	YES	N/A	N/A	7/14/2009	JBS
P03051	YES	YES	YES	YES	N/A	N/A	5/12/2009	JBS
P03052	YES	YES	YES	YES	N/A	N/A	11/11/2008	JBS
P03053	YES	YES	YES	YES	N/A	N/A	11/6/2008	JBS
P03054	YES	YES	YES	YES	N/A	N/A	11/24/2008	JBS
P03055	YES	YES	YES	YES	N/A	N/A	11/11/2008	JBS
P03056	YES	YES	YES	YES	N/A	N/A	11/6/2008	JBS
P03057	YES	YES	YES	YES	N/A	N/A	11/6/2008	JBS
P03058	YES	YES	YES	YES	N/A	N/A	12/2/2008	JBS
P03059	YES	YES	YES	YES	N/A	N/A	11/11/2008	JBS
P03060	YES	YES	YES	YES	N/A	N/A	11/5/2008	JBS
P03061	YES	YES	YES	YES	N/A	N/A	11/5/2008	JBS
P03062	YES	YES	YES	YES	N/A	N/A	11/6/2008	JBS
P03063	YES	YES	YES	YES	N/A	N/A	12/2/2008	JBS
P03064	YES	YES	YES	YES	N/A	N/A	11/20/2008	JBS
P03065	YES	YES	YES	YES	N/A	N/A	12/31/2008	JBS
P03066	YES	YES	YES	YES	N/A	N/A	12/31/2008	JBS
P03067	YES	YES	YES	YES	N/A	N/A	12/2/2008	JBS
P03068	YES	YES	YES	YES	N/A	N/A	12/5/2008	JBS
P03069	YES	YES	YES	YES	N/A	N/A	12/5/2008	JBS
P03070	YES	YES	YES	YES	N/A	N/A	12/31/2008	JBS
P03071	YES	YES	YES	YES	N/A	N/A	12/31/2008	JBS
P03072	YES	YES	YES	YES	N/A	N/A	12/31/2008	JBS
P03073	YES	YES	YES	YES	N/A	N/A	12/4/2008	JBS
P03074	YES	YES	YES	YES	N/A	N/A	11/24/2008	JBS
P03075	YES	YES	YES	YES	N/A	N/A	11/24/2008	JBS
P03076	YES	YES	YES	YES	N/A	N/A	12/8/2008	JBS
P03077	YES	YES	YES	YES	N/A	N/A	1/13/2009	JBS
P03078	YES	YES	YES	YES	N/A	N/A	3/19/2009	JBS
P03079	YES	YES	YES	YES	N/A	N/A	3/19/2009	JBS
P03080	YES	YES	YES	YES	N/A	N/A	3/22/2009	JBS
P03081	YES	YES	YES	YES	N/A	N/A	12/9/2008	JBS
P03082	YES	YES	YES	YES	N/A	N/A	11/18/2008	JBS
P03083	YES	YES	YES	YES	N/A	N/A	3/22/2009	JBS
P03084	YES	YES	YES	YES	N/A	N/A	3/22/2009	JBS
P03085	YES	YES	YES	YES	N/A	N/A	12/9/2008	JBS
P03086	YES	YES	YES	YES	N/A	N/A	3/18/2009	JBS
P03087	YES	YES	YES	YES	N/A	N/A	3/18/2009	JBS
P03088	YES	YES	YES	YES	N/A	N/A	11/20/2008	JBS
P03089	YES	YES	YES	YES	N/A	N/A	3/18/2009	JBS
P03090	YES	YES	YES	YES	N/A	N/A	3/18/2009	JBS
P03091	YES	YES	YES	YES	N/A	N/A	12/12/2008	JBS
P03092	YES	YES	YES	YES	N/A	N/A	3/18/2009	JBS
P03093	YES	YES	YES	YES	N/A	N/A	3/18/2009	JBS
P03094	YES	YES	YES	YES	N/A	N/A	12/12/2008	JBS
P03095	YES	YES	YES	YES	N/A	N/A	12/30/2008	JBS
P03096	YES	YES	YES	YES	N/A	N/A	12/30/2008	JBS
P03097	YES	YES	YES	YES	N/A	N/A	12/30/2008	JBS
P03098	YES	YES	YES	YES	N/A	N/A	12/30/2008	JBS
P03099	YES	YES	YES	YES	N/A	N/A	12/30/2008	JBS
P03100	YES	YES	YES	YES	N/A	N/A	12/30/2008	JBS

P03101	YES	YES	YES	YES	N/A	N/A	12/29/2008	JBS
P03102	YES	YES	YES	YES	N/A	N/A	12/30/2008	JBS
P03103	YES	YES	YES	YES	N/A	N/A	1/20/2009	JBS
P03104	YES	YES	YES	YES	N/A	N/A	12/30/2008	JBS
P03105	YES	YES	YES	YES	N/A	N/A	12/30/2008	JBS
P03106	YES	YES	YES	YES	N/A	N/A	12/30/2008	JBS
N03107	YES	YES	YES	YES	100%	4/17/2009	5/11/2009	JBS
N03108	YES	YES	YES	YES	100%	4/20/2009	5/11/2009	JBS
N03109	YES	YES	YES	YES	100%	4/15/2009	6/10/2009	JBS
N03110	YES	YES	YES	YES	100%	6/12/2009	6/25/2009	JBS
N03111	YES	YES	YES	YES	100%	4/13/2009	4/17/2009	JBS
N03112	YES	YES	YES	YES	100%	4/13/2009	4/17/2009	JBS
N03113	YES	YES	YES	YES	100%	3/27/2009	4/17/2009	JBS
N03114	YES	YES	YES	YES	100%	4/8/2009	4/17/2009	JBS
N03115	YES	YES	YES	YES	100%	3/31/2009	5/29/2009	JBS
N03116	YES	YES	YES	YES	100%	4/2/2009	5/29/2009	JBS
N03117	YES	YES	YES	YES	100%	4/23/2009	5/29/2009	JBS
N03118	YES	YES	YES	YES	100%	6/12/2009	6/25/2009	JBS
N03119	YES	YES	YES	YES	100%	3/18/2009	6/9/2009	JBS
N03120	YES	YES	YES	YES	100%	3/27/2009	5/11/2009	JBS
N03121	YES	YES	YES	YES	100%	6/30/2009	6/25/2009	JBS
N03122	YES	YES	YES	YES	100%	4/23/2009	6/10/2009	JBS
N03123	YES	YES	YES	YES	100%	4/15/2009	6/17/2009	JBS
N03124	YES	YES	YES	YES	100%	5/21/2009	6/17/2009	JBS
N03125	YES	YES	YES	YES	100%	3/5/2009	6/3/2009	JBS
N03126	YES	YES	YES	YES	100%	3/18/2009	9/23/2009	JBS
N03127	YES	YES	YES	YES	100%	4/20/2009	8/10/2009	JBS
N03128	YES	YES	YES	YES	100%	5/11/2009	6/3/2009	JBS
N03129	YES	YES	YES	YES	100%	5/11/2009	6/16/2009	JBS
N03130	YES	YES	YES	YES	100%	3/25/2009	6/9/2009	JBS
N03131	YES	YES	YES	YES	100%	3/9/2009	6/18/2009	JBS
N03132	YES	YES	YES	YES	100%	3/10/2009	6/18/2009	JBS
N03133	YES	YES	YES	YES	100%	3/18/2009	6/25/2009	JBS
N03134	YES	YES	YES	YES	100%	3/25/2009	6/25/2009	JBS
N03135	YES	YES	YES	YES	100%	4/23/2009	6/18/2009	JBS
N03136	YES	YES	YES	YES	100%	4/20/2009	6/18/2009	JBS
N03137	YES	YES	YES	YES	100%	4/15/2009	6/15/2009	JBS
N03138	YES	YES	YES	YES	100%	4/17/2009	9/23/2009	JBS
N03139	YES	YES	YES	YES	100%	3/23/2009	9/23/2009	JBS
N03140	YES	YES	YES	YES	100%	4/2/2009	5/29/2009	JBS
N03141	YES	YES	YES	YES	100%	4/8/2009	6/30/2009	JBS
N03142	YES	YES	YES	YES	100%	3/5/2009	6/11/2009	JBS
N03143	YES	YES	YES	YES	100%	3/3/2009	6/11/2009	JBS
N03144	YES	YES	YES	YES	100%	3/4/2009	6/11/2009	JBS
N03145	YES	YES	YES	YES	100%	2/21/2009	6/11/2009	JBS
N03146	YES	YES	YES	YES	100%	2/24/2009	4/7/2009	JBS
N03147	YES	YES	YES	YES	100%	2/26/2009	4/14/2009	JBS
N03148	YES	YES	YES	YES	100%	2/21/2009	6/30/2009	JBS
N03149	YES	YES	YES	YES	100%	3/4/2009	4/14/2009	JBS
N03150	YES	YES	YES	YES	100%	2/25/2009	6/30/2009	JBS
N03151	YES	YES	YES	YES	100%	2/21/2009	2/23/2009	JBS
N03152	YES	YES	YES	YES	100%	4/13/2009	6/11/2009	JBS
N03153	YES	YES	YES	YES	100%	2/17/2009	6/30/2009	JBS
N03154	YES	YES	YES	YES	100%	3/4/2009	4/8/2009	JBS

N03155	YES	YES	YES	YES	100%	2/26/2009	4/8/2009	JBS
N03156	YES	YES	YES	YES	100%	2/21/2009	4/7/2009	JBS
N03157	YES	YES	YES	YES	100%	2/13/2009	4/8/2009	JBS
N03158	YES	YES	YES	YES	100%	2/21/2009	2/23/2009	JBS
N03159	YES	YES	YES	YES	100%	2/21/2009	6/11/2009	JBS
N03160	YES	YES	YES	YES	100%	2/26/2009	4/8/2009	JBS
N03161	YES	YES	YES	YES	100%	2/26/2009	6/30/2009	JBS
N03162	YES	YES	YES	YES	100%	2/21/2009	3/29/2009	JBS
N03163	YES	YES	YES	YES	100%	2/17/2009	3/29/2009	JBS
N03164	YES	YES	YES	YES	100%	2/21/2009	3/29/2009	JBS
N03165	YES	YES	YES	YES	100%	2/13/2009	4/8/2009	JBS
N03166	YES	YES	YES	YES	100%	2/13/2009	4/8/2009	JBS
N03167	YES	YES	YES	YES	100%	2/13/2009	4/8/2009	JBS
N03168	YES	YES	YES	YES	100%	2/10/2009	4/8/2009	JBS
N03169	YES	YES	YES	YES	100%	2/21/2009	2/23/2009	JBS
N03170	YES	YES	YES	YES	100%	2/21/2009	2/23/2009	JBS
N03171	YES	YES	YES	YES	100%	2/25/2009	3/25/2009	JBS
N03172	YES	YES	YES	YES	100%	2/25/2009	3/25/2009	JBS
N03173	YES	YES	YES	YES	100%	3/9/2009	3/25/2009	JBS
N03174	YES	YES	YES	YES	100%	2/10/2009	2/23/2009	JBS
N03175	YES	YES	YES	YES	100%	2/10/2009	2/23/2009	JBS
N03176	YES	YES	YES	YES	100%	2/13/2009	2/23/2009	JBS
N03177	YES	YES	YES	YES	100%	2/21/2009	2/23/2009	JBS
N03178	YES	YES	YES	YES	100%	3/3/2009	6/15/2009	JBS
N03179	YES	YES	YES	YES	100%	4/13/2009	6/11/2009	JBS
N03180	YES	YES	YES	YES	100%	3/23/2009	3/25/2009	JBS
N03181	YES	YES	YES	YES	100%	3/23/2009	3/25/2009	JBS
N03182	YES	YES	YES	YES	100%	6/12/2009	7/21/2009	JBS
N03183	YES	YES	YES	YES	100%	7/10/2009	7/21/2009	JBS
N03184	YES	YES	YES	YES	100%	7/10/2009	7/20/2009	JBS
N03185	YES	YES	YES	YES	100%	6/19/2009	6/28/2009	JBS
N03186	YES	YES	YES	YES	100%	6/12/2009	7/10/2009	JBS
N03187	YES	YES	YES	YES	100%	6/12/2009	7/10/2009	JBS
N03188	YES	YES	YES	YES	100%	5/1/2009	5/27/2009	JBS
N03189	YES	YES	YES	YES	100%	5/11/2009	5/27/2009	JBS
N03190	YES	YES	YES	YES	100%	5/21/2009	5/27/2009	JBS
N03191	YES	YES	YES	YES	100%	6/12/2009	8/27/2009	JBS
N03192	YES	YES	YES	YES	100%	6/12/2009	8/26/2009	JBS
N03193	YES	YES	YES	YES	100%	6/2/2009	7/21/2009	JBS
N03194	YES	YES	YES	YES	100%	5/1/2009	5/27/2009	JBS
N03195	YES	YES	YES	YES	100%	5/11/2009	5/27/2009	JBS
N03196	YES	YES	YES	YES	100%	5/18/2009	5/27/2009	JBS
N03197	YES	YES	YES	YES	100%	7/10/2009	7/22/2009	JBS
N03198	YES	YES	YES	YES	100%	7/2/2009	7/22/2009	JBS
N03199	YES	YES	YES	YES	100%	6/12/2009	7/21/2009	JBS
N03200	YES	YES	YES	YES	100%	5/18/2009	7/28/2009	JBS
N03201	YES	YES	YES	YES	100%	6/2/2009	7/28/2009	JBS
N03202	YES	YES	YES	YES	100%	6/19/2009	7/22/2009	JBS
N03203	YES	YES	YES	YES	100%	7/24/2009	8/24/2009	JBS
N03204	YES	YES	YES	YES	100%	8/11/2009	8/21/2009	JBS
N03205	YES	YES	YES	YES	100%	7/23/2009	8/12/2009	JBS
N03206	YES	YES	YES	YES	100%	8/18/2009	10/14/2009	JBS
N03207	YES	YES	YES	YES	100%	7/23/2009	10/14/2009	JBS
N03208	YES	YES	YES	YES	100%	6/2/2009	6/1/2009	JBS

N03209	YES	YES	YES	YES	100%	7/24/2009	6/28/2009	JBS
N03210	YES	YES	YES	YES	100%	7/24/2009	8/24/2009	JBS
N03211	YES	YES	YES	YES	100%	6/30/2009	9/23/2009	JBS
N03212	YES	YES	YES	YES	100%	7/24/2009	9/23/2009	JBS
N03213	YES	YES	YES	YES	100%	5/14/2009	6/1/2009	JBS
N03214	YES	YES	YES	YES	100%	6/2/2009	6/1/2009	JBS
N03215	YES	YES	YES	YES	100%	5/21/2009	6/1/2009	JBS
N03216	YES	YES	YES	YES	100%	6/19/2009	7/28/2009	JBS
N03217	YES	YES	YES	YES	100%	4/29/2009	6/1/2009	JBS
N03218	YES	YES	YES	YES	100%	4/29/2009	6/28/2009	JBS
N03219	YES	YES	YES	YES	100%	4/23/2009	5/28/2009	JBS
N03220	YES	YES	YES	YES	100%	10/30/2009	12/17/2009	JBS
N03221	YES	YES	YES	YES	100%	10/30/2009	1/7/2010	JBS
N03222	YES	YES	YES	YES	100%	9/17/2009	11/4/2009	JBS
N03223	YES	YES	YES	YES	100%	9/17/2009	11/3/2009	JBS
N03224	YES	YES	YES	YES	100%	8/31/2009	11/3/2009	JBS
N03225	YES	YES	YES	YES	100%	8/18/2009	9/16/2009	JBS
N03226	YES	YES	YES	YES	100%	7/30/2009	9/16/2009	JBS
N03227	YES	YES	YES	YES	100%	8/18/2009	9/16/2009	JBS
N03228	YES	YES	YES	YES	100%	7/24/2009	1/13/2009	JBS
N03229	YES	YES	YES	YES	100%	7/24/2009	9/16/2009	JBS
N03230	YES	YES	YES	YES	100%	7/24/2009	9/16/2009	JBS
N03231	YES	YES	YES	YES	100%	7/30/2009	8/6/2009	JBS
N03232	YES	YES	YES	YES	100%	9/22/2009	8/6/2009	JBS
N03233	YES	YES	YES	YES	100%	8/31/2009	9/15/2009	JBS
N03234	YES	YES	YES	YES	100%	8/18/2009	9/15/2009	JBS
N03235	YES	YES	YES	YES	100%	8/21/2009	9/15/2009	JBS
N03236	YES	YES	YES	YES	100%	8/18/2009	8/20/2009	JBS
N03237	YES	YES	YES	YES	100%	8/18/2009	8/20/2009	JBS
N03238	YES	YES	YES	YES	100%	8/11/2009	8/12/2009	JBS
N03239	YES	YES	YES	YES	100%	7/24/2009	9/9/2009	JBS
N03240	YES	YES	YES	YES	100%	7/24/2009	9/9/2009	JBS
N03241	YES	YES	YES	YES	100%	7/24/2009	8/3/2009	JBS
N03242	YES	YES	YES	YES	100%	7/24/2009	8/3/2009	JBS
N03243	YES	YES	YES	YES	100%	7/24/2009	8/3/2009	JBS
N03244	YES	YES	YES	YES	100%	7/24/2009	8/13/2009	JBS
N03245	YES	YES	YES	YES	100%	7/15/2009	8/10/2009	JBS
N03246	YES	YES	YES	YES	100%	7/15/2009	8/3/2009	JBS
N03247	YES	YES	YES	YES	100%	7/15/2009	8/3/2009	JBS
N03248	YES	YES	YES	YES	100%	7/15/2009	8/3/2009	JBS
N03249	YES	YES	YES	YES	100%	7/2/2009	7/30/2009	JBS
N03250	YES	YES	YES	YES	100%	7/15/2009	7/15/2009	JBS
N03251	YES	YES	YES	YES	100%	7/2/2009	8/10/2009	JBS
N03252	YES	YES	YES	YES	100%	7/15/2009	7/15/2009	JBS
N03253	YES	YES	YES	YES	100%	7/2/2009	8/13/2009	JBS
N03254	YES	YES	YES	YES	100%	7/2/2009	7/15/2009	JBS
N03255	YES	YES	YES	YES	100%	7/2/2009	7/14/2009	JBS
SP001	YES	YES	YES	YES	N/A	N/A	7/20/2009	JBS
SP002	YES	YES	YES	YES	N/A	N/A	7/20/2009	JBS
SP003	YES	YES	YES	YES	N/A	N/A	7/20/2009	JBS
SP004	YES	YES	YES	YES	N/A	N/A	7/10/2009	JBS
SP005	YES	YES	YES	YES	N/A	N/A	9/10/2009	JBS
SP006	YES	YES	YES	YES	N/A	N/A	9/10/2009	JBS
SP007	YES	YES	YES	YES	N/A	N/A	9/10/2009	JBS

SP008	YES	YES	YES	YES	N/A	N/A	8/30/2009	JBS
SP009	YES	YES	YES	YES	N/A	N/A	8/30/2009	JBS
SN001	YES	YES	YES	YES	100%	2/16/2010	12/16/2009	JBS
SN002	YES	YES	YES	YES	N/A	N/A	12/16/2009	JBS
SN003	YES	YES	YES	YES	100%	11/10/2009	10/22/2009	JBS
SN004	YES	YES	YES	YES	100%	11/9/2009	11/18/2009	JBS
SN005	YES	YES	YES	YES	100%	11/10/2009	11/18/2009	JBS
SN006	YES	YES	YES	YES	N/A	N/A	11/10/2009	JBS
SN007	YES	YES	YES	YES	100%	2/16/2010	12/16/2009	JBS
SN008	YES	YES	YES	YES	N/A	N/A	12/8/2009	JBS
SN009	YES	YES	YES	YES	N/A	N/A	12/8/2009	JBS

4.6 CONFIRMATION MAPPING

After a UoP successfully passed the UoP certification (QC) process, it was then eligible for geophysical confirmation mapping and intrusive reinvestigation if needed.

The primary goal of confirmation mapping was to provide a means of assessing the effectiveness of the grid clearance process by providing a "snapshot" of the geophysical conditions within the grids following intrusive operations. The project team recognized that at any site some residual response will remain after the first remediation pass, primarily in the spoils of the initial digs. With this in mind, the secondary goal of the confirmation mapping process was to assess the nature of the residual geophysical anomalies and whether any MEC remained. NAEVA performed QC confirmation remapping on 44 of 1172 grids, and the residual anomalies were targeted and investigated. QC confirmation remapping data is included in Appendix E. Additional third-party QA remapping and summary of the overall remapping results are discussed in Section 5.1.2.

4.6.1 SELECTION OF CONFIRMATION MAPPING GRIDS

MES took into account several factors when selecting grids in the clearance to depth of detection tracts for confirmation mapping. These included:

- Spatial distribution
- Including as many UoPs as practical
- Representing the full range of vegetation and terrain conditions
- Presence of MEC
- Field efficiency/team spacing considerations

4.6.2 CONFIRMATION MAPPING PROCEDURES

QC confirmation mapping was performed using the same methods and equipment as the initial DGM phase. QA confirmation mapping was performed using the EM61-MK2 and the robotic total station for positioning. The labels for all data files generated during QC confirmation mapping were preceded by the letter "C" standing for confirmation. The labels for all data files

generated during QA confirmation mapping were preceded by the letters "QA" standing for quality assurance.

4.6.3 CONFIRMATION MAPPING RESULTS

Table 4-3 illustrates the intrusive results of the QC remapping for 44 QC remapping grids conducted in MRS-3. One MEC item (60mm Mortar) was found in grid CN129E039 at a depth of 12 inches, below the previous location of a 60mm mortar. Residual targets were mostly small 60mm, 37mm, and grenade fragmentation. The largest pieces of scrap were metal spikes. The remapping was made more difficult by the presence of open excavations and spoils piles from the initial prosecution of the grids. In many cases, small bits of metal in spoils piles which were previously buried, showed higher geophysical response during remapping because they were now located above the original ground surface and closer to the EM61-MK2 sensor coils. The results of the QC confirmation mapping over 44 grids were determined to be acceptable.

4.7 DEFICIENCY NOTICE REPORTS

The QC staff identified, documented, and tracked deficiencies during the course of field activities. In addition, they were tasked to recommend corrective actions, through a "root cause analysis" approach, and verify corrective actions were implemented and any rework satisfactorily accomplished. During the work in MRS-3 a total of 432.37 acres were cleared to one foot or to the depth of detection. The QC staff issued one Deficiency Notice Report (DNR) (Table 4-4) to NAEVA for geophysical field notation, one DNR to Earth Tech for MEC item accountability, one DNR to LI Smith for survey procedure, nine DNR's to USAE for clearance work, and one DNR to PIKA for clearance work. The DNRs are included in Appendix E.

4.8 QC SEEDING

QC blind seeds were systematically placed in advance of DGM and UXO operations (Table 4-5). A minimum of one blind seed item per acre was installed IAW the PWP. 438 QC seeds were placed to test the aggressive surface/near surface clearance operation performed in advance of DGM (Appendix E). 264 QC seeds were placed to test the analog clearance to one-foot operation performed in the non-DGM areas. A total of 453 QC seeds (1.87 per acre) were placed to test clearance to depth operations. Both DGM and non-DGM areas (data gaps) were seeded. The total number of seeds placed and recovered is depicted in Table 4-5 below:

All but 8 seeds were recovered (99.3%) resulting in seven DNR's being issued. The contractor dig teams recovered 1147 of the 1155 seeds during initial prosecution of the grids. All missed blind seeds were subsequently recovered during rework.

TABLE 4-3: QC Confirmation Remapping and Dig Results

Tract	Grid ID	Targets	MEC	Quantity	Weight (lbs.)	Comments
3-H	CN107E040	179	0	76	45.5	60mm Mortar frag, fuze
3-H	CN107E041	274	0	51	22.5	60mm Mortar frag, fuze scrap
3-H	CN109E038	400	0	34	16.5	60mm Mortar frag, fuze scrap
3-H	CN109E039	385	0	12	4.5	60mm Mortar frag
3-H	CN110E041	20	0	18	11	60mm Mortar frag
3-H	CN111E041	16	0	13	7.5	60mm Mortar frag
3-H	CN117E042	4	0	1	0.5	60mm Mortar frag
3-H	CN118E042	0	0	0	0	no targets selected
3-H	CN129E039	22	1	11	8	60mm Mortar (HE), 60mm Mortar frag
3-H	CN129E040	44	0	40	20.5	60mm Mortar frag
3-H	CN131E030	8	0	0	0	no targets after reacquisition
3-H	CN131E031	6	0	0	0	no targets after reacquisition
3-H	CN138E036	17	0	111	8.5	nails
3-H	CN139E036	0	0	0	0	no targets selected
3-G	CN140E063	18	0	36	10	37mm APT scrap, SAA
3-G	CN140E064	31	0	99	18	37mm APT scrap, SAA
3-H	CN149E037	0	0	0	0	no targets selected
3-F	CN149E071	4	0	4	2	SAA
3-H	CN150E037	1	0	1	0.5	nails
3-F	CN150E071	6	0	3	1.5	37mm frag, SAA
3-G	CN151E066	24	0	18	4	SAA, nails
3-G	CN151E067	5	0	4	0.5	nails
3-G	CN153E069	14	0	12	8	37mm, Grenade, 60mm Mortar frag/37mm APT, fuze
3-G	CN154E069	14	0	15	9.5	37mm, Grenade frag/37mm APT, fuze scrap
3-F	CN154E071	9	0	9	4.5	37mm frag, SAA, barbed wire
3-E	CN154E091	11	0	22	5.5	nails
3-E	CN154E092	16	0	20	5.5	nails, metal spike
3-F	CN155E071	14	0	6	3	Grenade, fuze scrap, SAA
3-G	CN157E068	35	0	22	12	37mm, grenade frag, SAA
3-G	CN157E069	14	0	18	6.5	37mm frag, SAA
3-F	CN158E082	0	0	0	0	no targets selected
3-F	CN159E082	0	0	0	0	no targets selected
3-E	CN161E108	39	0	47	28	grenade, fuze scrap, nails
3-E	CN161E109	0	0	0	0	no targets selected
3-F	CN162E073	8	0	1	0.5	37mm frag
3-F	CN162E074	0	0	0	0	no targets selected
3-F	CN164E077	2	0	0	0	no targets after reacquisition
3-E	CN164E089	7	0	11	4.5	37mm, fuze frag, fuze scrap, nails, barbed wire, wire
3-F	CN165E077	0	0	0	0	no targets selected
3-E	CN165E089	17	0	24	9.5	37mm, fuze frag, fuze scrap, nails, barbed wire, wire
3-E	CN170E087	54	0	58	35	Grenade scrap, nails, wire, metal debris
3-E	CN171E087	80	0	101	50	37mm frag, nails, wire, barbed wire, metal debris
3-F	CN178E083	40	0	56	21.5	Grenade scrap, nails, metal spikes, wire, barbed wire
3-F	CN178E084	25	0	71	13	37mm frag, SAA, nails, metal debris

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Table 4-4: QC Deficiency Notice Reports

DNR	Description	Root Cause Analysis	Corrective Action Taken
DN-001	Earth Tech reported that a PUCA item had been lost. The item was recovered 30 - 40 feet from the original waypoint.	Failure to control and account for MEC items found. Failure to immediately report loss of a MEC item.	Replaced Team Leader on June 9, 2008. Began flagging item locations. Earth Tech UXOQCS will check the inventory of items throughout the day.
DN-002	USAE Team 3 missed Blind seed #226 in grid N135E061, and #232 in grid N138E064.	Poor sweep technique.	Reworked grids N135E061, N135E063, N138E064, and N138E066.
DN-003	USAE Team 1 missed a 37mm APT in grid N150E063.	Poor sweep procedures.	USAE TEAM 1 reworked grid N150E063.
DN-004	USAE Team 2 missed blind seed #338 in grid N171E086.	Poor sweep technique.	Reworked grid N171E086.
DN-005	LI Smith Survey Team set survey points in northern 3-H and 3-C that were 100x100 ft. square but were offset on a rotation relative to plan.	The surveyor's shot a bad angle and propagated the grid system south into 3-C without adequately tying the subsequent daily traverses into established control.	Additional controls were implemented. Tract 3-H south has been set on the originally proposed grid.
DN-006	USAE Team 2 missed blind seed #490 in grid N132E028.	Poor sweep technique.	USAE Team 2 reworked grid N132E028.
DN-007	USAE Team 2 missed blind seeds: #589 in grid N124E028, and #555 in grid N125E028.	Moving too quickly through grid and not getting complete coverage.	All team personnel reviewed clearance procedures and grids N124E028 and N125E028 were reworked.
DN-008	USAE Team 2 missed blind seed #338 in grid N171E086.	Poor sweep technique.	USAE Team 2 reworked grid N171E086.
DN-009	USAE Team 1 missed a 60mm Mortar in grid N107E043. USAE Team 1 missed blind seed #618 in grid N116E046.	Moving too quickly through grid.	All team personnel were retrained on clearance procedures. Grids N107E143 and N116E046 were reworked.
DN-010	During QC operations of one-foot clearance in grid N137E058 and grid N137E059 several items of concern were recovered.	Moving too quickly through grid.	USAE Team 3 reworked UoP P03037.
DN-011	QC Seed #3131G was not retrieved during intrusive operations. Upon further investigation, the seed was determined to lie within an unmasked data gap on the NAEVA map.	During the geophysical mapping operation the geophysical team noted the data gap where the seed was placed as a single tree rather than as multiple trees.	All geophysical field personnel were reviewed on proper notetaking procedures and the importance of noting a singletree gap versus multiple tree data gaps.
DN-012	During QC of one-foot operations items were recovered in UOP P03042, P03046, P03048, and P03050 that USAE teams missed.	Moving between tracts and leaving grids partially complete for prolonged periods. Relying on only the White metal detector. Moving too quickly. Improper supervision.	All team personnel reviewed clearance procedures and the affected grids were reworked.
DN-013	PIKA Team 6 missed blind seed #3437G in grid N129E029.	The data gaps were not fully investigated and cleared with the Vallon handheld instrument.	The data gaps within grid N129E029 were reworked by PIKA Team 6.

TABLE 4-5: QC Seeding Results

Operation	Number of Seeds	Seeds Recovered	Seeds Missed*	Acres/Seeding Density
Aggressive Surface/Near Surface Clearance	438	434	4 (0.91%)	241.89 (1.81/acre)
Clearance to 1 Foot	264	261	3 (1.14%)	190.25 (1.39/acre)
Clearance to Depth of Detection	453	452	1 (0.22%)	242.12 (1.87/acre)
Totals	**1155**	**1147 (99.31%)**	**8 (0.69%)**	**674.26 (1.71/acre)**

* All missed blind seeds were subsequently recovered during rework.

4.8.1 QC CONCLUSIONS

MES QC was implemented as required by the PWP and SSWP to ensure that a quality MEC clearance work product was performed. Per FCR 5, embedding experienced NAEVA EM61 operators with the dig teams as essential personnel to perform real time QC via 100% hole checks and to help verify data gaps measurably increased quality of turned over grids vs previous MRS remediations. Matrix significantly overseeded MRS-3 areas and Contractor performance on recovering QC seeds was outstanding. QC remapping results also indicated that specified quality was met.

Matrix QC imposed sufficient rework and other measures such that all grids ultimately passed QC inspection. MES QC signed off on all work products and clearance grids as being of acceptable quality.

5.0 QUALITY ASSURANCE (QA)

MES was responsible for both UXO QA and Geophysical QA (GeoQA), which are discussed separately as most DGM QA related to pre-dig activities and most UXO QA related to post-dig activities. DGM QA was performed in accordance with the *Site-Wide Digital Geophysical Mapping Quality Assurance Plan, McClellan, Anniston, Alabama* dated November 2004 (QAP). ERT provided DGM QA remapping support for MES. QA documentation is presented in Appendix J.

5.1 DGM QA

DGM QA was performed in accordance with the requirements stipulated in the QAP. The goal of the geophysical QA program is to ensure that the type and quantity of geophysical data collected are useable and sufficient to support the clearance of all detectable MEC from the removal action areas. The DGM QA process and results are summarized below.

The DGM related portions of the MEC Removal Action for MRS-3 were performed from September 2008 through January 2010. As outlined in the QAP, DGM QA measures performed are organized and discussed as follows:

- Review of work plan and GPO results
- Review of pre-dig DGM data packages
- Reprocessing of raw data
- Review of QC measures and reports
- Review of reacquisition and post-dig DGM DB
- DGM targeting of blind QA seeds
- QA remapping and confirmation sampling

5.1.1 DGM QA REVIEW

All SSWP changes were reviewed by GeoQA for technical acceptability and conformance with the project goals. FCR's-5 though -9 were reviewed for technical acceptability before submission to ADEM and ADEM approval (Table 2-1).

All contractor geophysical teams and equipment were certified for field operations in the existing GPO Plot. As most teams and equipment had been in continuous use at McClellan, previously certified teams and equipment were not required to be recertified unless new personnel or equipment were utilized. GPO certifications are included in Appendix A.

The GPO was originally performed and approved by ADEM as part of the *MEC Remediation After Action Report, MRS-1 and Southern Alpha* (MES, 2010 Appendix A). Metrics for the ten critical Contractor DGM QC measures identified in the QAP were evaluated and finalized after review of the GPO data as follows:

Table 5-1: Contractor Critical DGM QC Measures and Metrics

Critical QC Measures	Metric
Blind Seeded QA Items	Target and recover all QA seeds
Background Noise	3.5mV peak-to-peak (Ch2) in static tests and "normal" histograms
Along Track Sampling	0.31 feet
Across Track Sampling	2.5 feet
Latency Correction	No visible "herring bones"
Data Leveling	Geosoft leveling - rolling window ≥ 100 points to baseline response
Signal to Noise Ratio Variance	Static noise 3.5mV peak-to-peak (Ch2) and standard static response variance ≤20%
Anomaly Selection	Geosoft UX-Detect threshold selection: 7mV (Ch2). Acceptable targeting of compound anomalies and delineation of SRAs. Flagging of special case targets (HDTAs, by fence, etc.).
Positioning Errors	Total error ≤2.5 feet for DGM data/targets
Reacquisition	Comparable mV response, position <2.5 feet

A total of 146 (12.01%) of the 1,216 DGM grid data and accompanying DGM QC packages (which includes data packages for 44 remapped grids) for MRS-3 underwent QA review (Table 5-2). Over 50% of this data was reprocessed, compared to the DGM data package, and found to be of acceptable quality. Additionally the daily geophysical function test data were reviewed and determined to be of acceptable quality. Systematic discrepancies were not found. During QA review of 146 grid data packages, 137 data packages passed, 9 passed with minor edits, and 0 failed. Background noise levels, along track and across track sampling densities, latency corrections, data leveling, and anomaly selection and positioning were found to be of acceptable quality with respect to the established QC metrics.

TABLE 5-2: QA Review of DGM Data Packages

MRS	Grids	DGM Grid Packs Selected for QA			
		Pass	Check/Edit Pass	Fail	QA Targets
MRS-3	1,216	137	9	0	129

All QA seeds in mapped DGM areas were successfully targeted (and later recovered). There were no DGM targets which were not reacquired, although 1% were determined to be due to geologic response. The false alarm rate was acceptable (0%). No MEC or MEC-like items were found in 129 additional QA targets which were selected for intrusive investigation, although 51 were 37mm MD, 60mm MD, 75mm Shrapnel MD, 2.36 in. Rocket MD, Grenade MD, or SAA

MD not exceeding ten pounds in weight. The reviews and QC-QA acceptances tracking of the DGM grid data packages and anomaly targeting are included in Appendix J.

Anomaly reacquisition data was found to be of acceptable quality for spatial offset and correspondence of anomaly amplitude. Anomalies were reacquired with the EM61-MK2 operated in analog mode. More than 99.5% of all targeted anomalies reacquired to 2.5 feet or less from the targeted location. The few exceptions were primarily on larger compound anomalies where reacquisition teams found stronger peaks within the anomaly. The QC mV comparison data was reviewed and it was confirmed that dig results with a disparate size difference to their targeted mV levels were identified and referred to the MES UXOQCS for intrusive QC investigation.

5.1.2 REMAPPING

In addition to the QC post-dig confirmation remapping discussed in Section 4.6, independent (third party) QA verification (pre-dig) and (post-dig) confirmation DGM remapping was performed by ERT on a limited number of grids to demonstrate consistency of NAEVA's DGM results and the overall quality of the removal process. QA remapping data are included in Appendix J. Remapping was performed in accordance with the ADEM approved remapping plan in Appendix E.

Verification (pre-dig) remapping was performed by ERT on the following 8 grids to assess the adequacy and repeatability of NAEVA's DGM results.

QAN129E027	QAN135E068	QAN146E039
QAN130E027	QAN144E063	QAN146E040
QAN135E067	QAN144E064	

Verification remapping results were compared to the original NAEVA DGM data and target lists. The DGM survey data, anomaly detection/delineation, target selection, location of non-DGM areas, and data quality were acceptably similar in all data sets.

Independent third party QA confirmation (post dig) remapping was performed on the following 12 grids in MRS-3 by ERT after completion of Contractor clearance and QC release, to demonstrate that the objectives of the grid clearance were achieved and that no MEC or MEC-like items remain.

QAN159E100	QAN166E091	QAN171E082
QAN159E101	QAN167E091	QAN171E083
QAN162E101	QAN162E085	QAN162E067
QAN162E102	QAN163E085	QAN162E068

TABLE 5-3: QA (Post-Dig) Remapping and Dig Results

Tract	Grid	QA Targets	MEC	Quantity	Weight (lbs)	Comments
3E	QAN159E100	6	0	4	2	Hinges, nails, metal debris
3E	QAN159E101	1	0	1	0.5	Metal debris
3E	QAN162E101	0	0	0	0	--
3E	QAN162E102	1	0	1	0.5	MD fuze
3E	QAN166E091	21	0	42	13.5	Nails, metal debris
3E	QAN167E091	25	0	51	15.5	Nails, metal debris
3F	QAN162E085	4	0	1	1	Nails, metal debris
3F	QAN163E085	0	0	0	0	--
3F	QAN171E082	13	0	14	7.5	Nails, metal debris
3F	QAN171E083	4	0	3	1.5	Nails
3G	QAN162E067	1	0	1	0.5	MD rifle grenade HE
3G	QAN162E068	1	0	7	2	Nails, metal debris

Confirmation sampling of the confirmation mapping targets was performed by the MES UXO QA. Confirmation mapping and sampling results indicated that the residual anomalies in the grids were primarily due to small nails and metallic scrap and (Table 5-3). No MEC or MEC-like items were found during QA confirmation sampling, and GeoQA and UXOQA signed off on all grid clearances.

The 44 QC remapping grids plus the 20 QA remapping grids total 14.7 acres of remapping which is 6% of the total DGM area. This did not affect the QA as the 66 remapped grids were deemed by QA to be sufficient to assess DGM quality for MRS-3 give that no quality issues were identified coupled with the QA/QC seeding results. Total remapping areas for all MRSs exceeds 10% of the total DGM area. QA remapping data are included in Appendix J.

In summary, the DGM QA program results for MRS-3 indicate that the Contractor data quality and QC performance goals for the removal action were met. No critical or systematic DGM performance discrepancies were found.

5.1.3 DEFICIENCY NOTICE REPORTS

Six QA DNR's were issued for missed items as shown in Table 5-4. DGM grid data for the MRS was reviewed and all anomalies were targeted per the targeting criteria prior to intrusive activities.

5.2 UXO QA

The goal of the UXO QA program is to ensure that the procedures and field operations were sufficient to support the clearance and removal of all detectable MEC in accordance with the removal depths specified in the project DQOs.

The UXO QA personnel conducted routine and random visits to each grid to ensure that procedures and processes were being performed in accordance with the SSWP and approved FCRs.

The UXO QA activities measures included the following tasks:

- Review of work plans and GPO Report
- QA blind seeding program
- Review of processes and procedures used by field crews
- Review of the QC process and reports
- Intrusive investigation of QA remapping targets, and
- Post-dig QA sweeps of grids.

Table 5-4: QA Deficiency Notice Reports

DNR	Description	Root Cause Analysis	Corrective Action Taken
QA-DN-001	During QA Inspection, USAE grid N103E040 failed to meet quality standards – missed intact item	There was no evidence of excavation near the missed item indicating that the area was missed during the initial sweep.	Rework of grids pending QA within the affected UoP: N102E038, N102E139, N103E138, N103E139 and N103E040.
QA-DN-002	During QA Inspection, the following USAE grids failed to meet quality standards: N138E056, N142E056, N143E056, and N139E057.	Inadequate supervision, lack of skill or training in proper magnetometer techniques, insufficient attention to quality standards.	Rework of the affected grids emphasizing lane spacing and proper instrument usage.
QA-DN-003	During QA Inspection, USAE grid N134E057 failed to meet quality standards.	Inadequate supervision, lack of skill or training in proper magnetometer techniques, insufficient attention to quality standards.	Rework of the affected grid paying close attention to lane spacing and proper instrument usage.
QA-DN-004	During QA inspection, the following USAE grids failed to meet quality standards: N144E057, N148E058, and N145E058.	Inadequate supervision, lack of skill or training in proper magnetometer techniques, insufficient attention to quality standards.	Rework of the affected grids emphasizing lane spacing and proper instrument usage.
QA-DN-005	During QA Inspection, PIKA grid N161E107 failed to meet quality standards.	Improper investigation of spoils during and after excavator digs.	Training the teams in thorough investigation of the spoils.
QA-DN-006	During QA Inspection, PIKA grid N166E065 failed to meet quality standards.	Inadequate supervision, lack of skill or training in proper magnetometer techniques, insufficient attention to quality standards.	Training the teams in level of quality required. Team reviewed anomaly investigation techniques and failure criteria.

5.2.1 UXO QA BLIND SEEDING PROGRAM

A total of 56 QA seed items were placed in MRS-3 by the UXOQA to test final product MEC clearance results (Table 5-5). 56 QA seeds were recovered resulting in a 100% recovery rate.

5.2.1 UXOQA ASSESSMENT

The UXOQA physically inspected a minimum of 25% of all DGM targets and 25% of all non-DGM areas in each grid using handheld sensors. QA inspection reports and grid sign-offs are included in Appendix J.

Table 5-5: QA Seeding Results

Tract	Tract Type	No. of QA Seeds	QA Seeds Recovered	Notes
3-A: PIKA	Analog Clearance to 1 ft.	7	7	All recovered
3-B: USAE	Analog Clearance to 1 ft.	6	6	All recovered
3-C: USAE	Analog Clearance to 1 ft.	7	7	All recovered
3-D: USAE	Analog Clearance to 1 ft.	9	9	All recovered
3-E: PIKA	Clearance to Depth of Detection	7	7	All recovered
3-F: PIKA	Clearance to Depth of Detection	5	5	All recovered
3-G: PIKA	Clearance to Depth of Detection	7	7	All recovered
3-H: PIKA	Clearance to Depth of Detection	8	8	All recovered
Totals		**56**	**56 (100%)**	

5.3 QA CONCLUSIONS

The results and conclusions of the UXOQA and geophysical QA programs can be summarized as follows: with minor exceptions, which were documented and corrected during the QC/QA process:

- GeoQA did not identify any critical or systematic deficiencies and concluded that the geophysical data collected for the remediation was useable and sufficient to support the clearance of MEC.
- Geophysical remapping results for over 6% of the area confirmed and verified DGM mapping and clearance results.
- 100% of 56 QA blind seeds were recovered.
- UXOQA did not identify any critical or systematic deficiencies and signed off on the clearance of all grids and UoPs.
- UXOQA and GeoQA concurred that the remediation met the quality objectives set forth in the QAP and the SSWP.

6.0 CONCLUSIONS

The MEC clearance to the depth of detection for MRS-3 has been successfully accomplished in accordance with the PWP, SSWP and associated FCRs. In total, 432.37 acres were cleared either to the depth of detection (238.26 acres) or to a depth of 1 ft. (171.88 acres) during MRS-3 remediation, plus including 22.23 acres of step-outs outside of the baseline area. The following totals of MEC and materials were removed during the clearance:

- A total of 3,401 MPPEH items were found and destroyed. Of these, 2,553 were determined to be MEC.
- 153,062 pounds of MDAS ("MEC scrap")
- 120,688 pounds of other metallic debris ("non-MEC scrap")

The 432.37 acre area was seeded in excess of SSWP requirements to test the clearance process. The contractors recovered 1,147 of 1,155 QC blind seeds and 100% of 56 QA blind seeds. All missed blind seeds were subsequently recovered during rework. The Contractor blind seed recovery was 99.3% which is an outstanding performance. QC remapping did not indicate DGM quality issues.

QC was implemented as required by the SSWP to ensure that a quality MEC clearance work product was performed. MES QC signed off on all work products and clearance grids as being of acceptable quality.

A total of 56 Quality Assurance (QA) seeds were placed to test final product clearance work. Of these, 56 (100%) were recovered. QA remapping did not indicate DGM quality issues.

MES QA inspected the work products and concurred that the MEC clearance product met the required performance standards specified in the SSWP and QAP.

The MEC clearance for MRS-3 has been successfully accomplished IAW with the PWP and associated FCRs. MRS-3 was cleared of MEC to either a depth of one foot (McClellan Park System) or to the depth of detection (all other areas). Step-outs were performed to establish a 200-foot MEC-free buffer zone of appropriate depth around MRS-3 (excepting that step-outs were not extended into MRSs which have been previously cleared or which were slated for future MEC clearance).

This removal action for MRS-3 completes the required response for portions of eight Army-designated subsectors (M3-2H Mortar Area-PR sector, M3-2H Mortar Area-D sector, M3-1L Rocket Area-D sector, M3-1H Rocket Area-PR sector, M3-1H Mixed Use Area-D sector, M3-1H Grenade Area-PR sector, M3-1L 37mm Projectile Area-D sector, and the M3-3H Rocket/Hand Grenade Area –D sector) under the Environmental Services Cooperative Agreement (ESCA) No. W9128F-07-2-0163 and ADEM Clean-up Agreement No. AL4 210 020 562.

To increase operational efficiencies, the boundary of MRS-3 was adjusted to conform to the bordering MRS boundaries and the McClellan 100-foot state plane coordinate line grid, resulting in a baseline clearance area not including step-outs of approximately 410.14 acres (432.37 acres including step-outs).

There are no exception areas requiring future construction support.

All of MRS-3 will have a LUC consisting of a deed notification of the property's former use as a military base. In addition, unrestricted future use is recommended for the non-McClellan Park System areas that underwent a clearance to the depth of detection. It is recommended that future LUCs include a prohibition on intrusive activities without UXO construction support for Tracts 3A, 3B, 3C, and 3D that were cleared to a depth of one foot. There are no exception areas requiring other future land use controls.

An Environmental Covenant pursuant to the Alabama Uniform Environmental Covenants Act (UECA), Code of Alabama 1975, §§ 35-19-1 to 35-19-14 for MRS-3 is included in Appendix K.

7.0 REFERENCES

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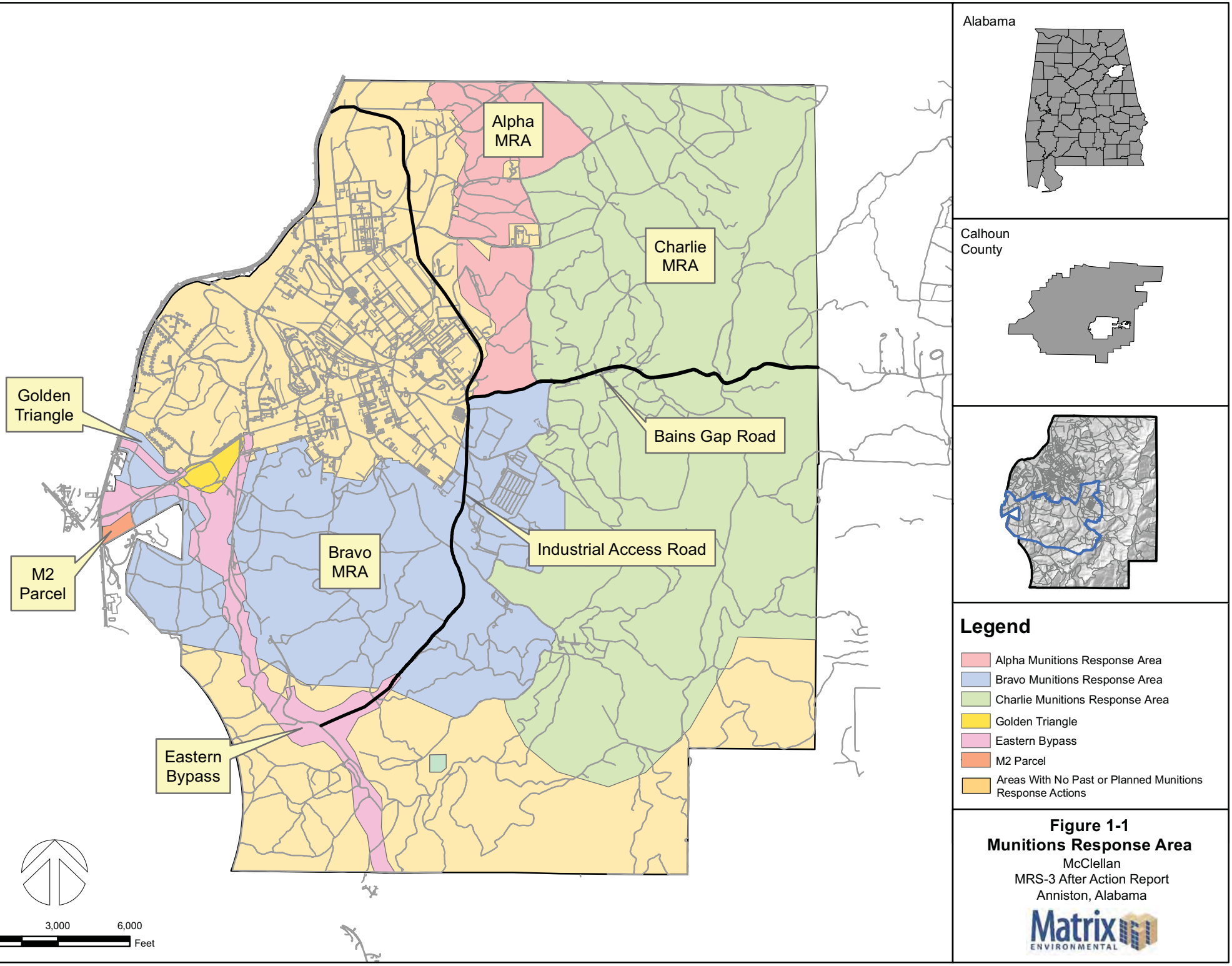
Figures


Alpha MRA
Charlie MRA
Bains Gap Road
Industrial Access Road
Bravo MRA
Golden Triangle
M2 Parcel
Eastern Bypass
0
3,000
6,000
Feet
Alabama
Calhoun County
Legend
Alpha Munitions Response Area
Bravo Munitions Response Area
Charlie Munitions Response Area
Golden Triangle
Eastern Bypass
M2 Parcel
Areas With No Past or Planned Munitions Response Actions
Figure 1-1
Munitions Response Area
McClellan
MRS-3 After Action Report
Anniston, Alabama
Matrix ENVIRONMENTAL
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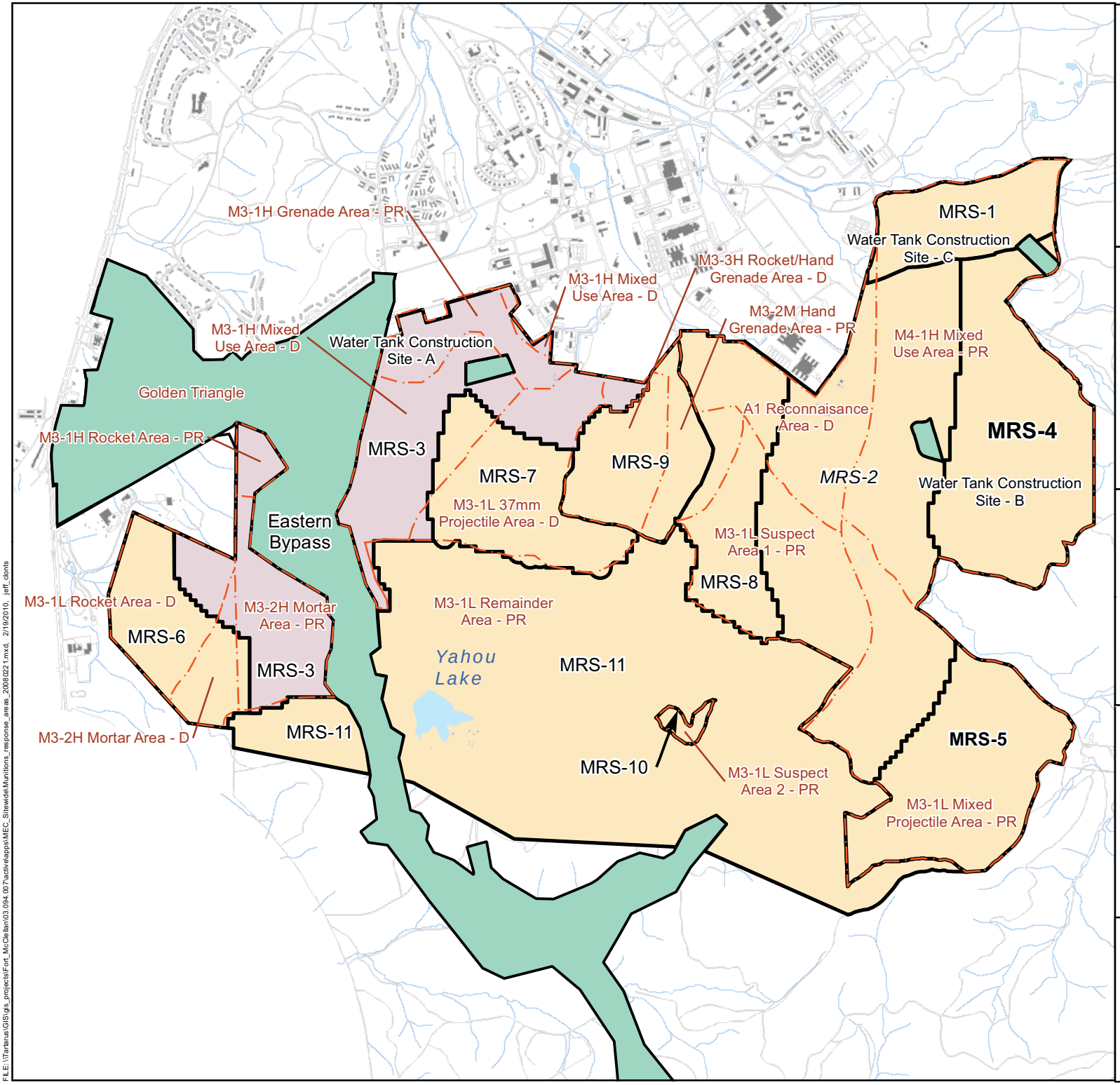

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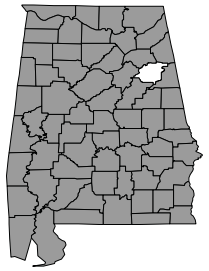
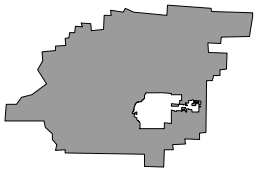
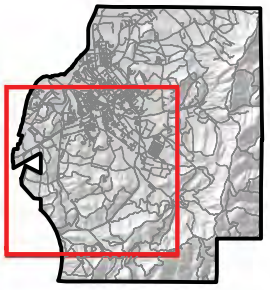


Calhoun County





Legend

- MRS-3 Boundary
- Previously Cleared Parcels by U.S. Army
- Bravo Munitions Response Area
- Army EE/CA Sector Boundary
- Buildings
- Lakes
- Roads
- Streams

0 1,250 2,500 Feet

FIGURE 1-2
Bravo Munitions Response Area

McClellan
MRS-3 After Action Report
Anniston, Alabama

Matrix ENVIRONMENTAL

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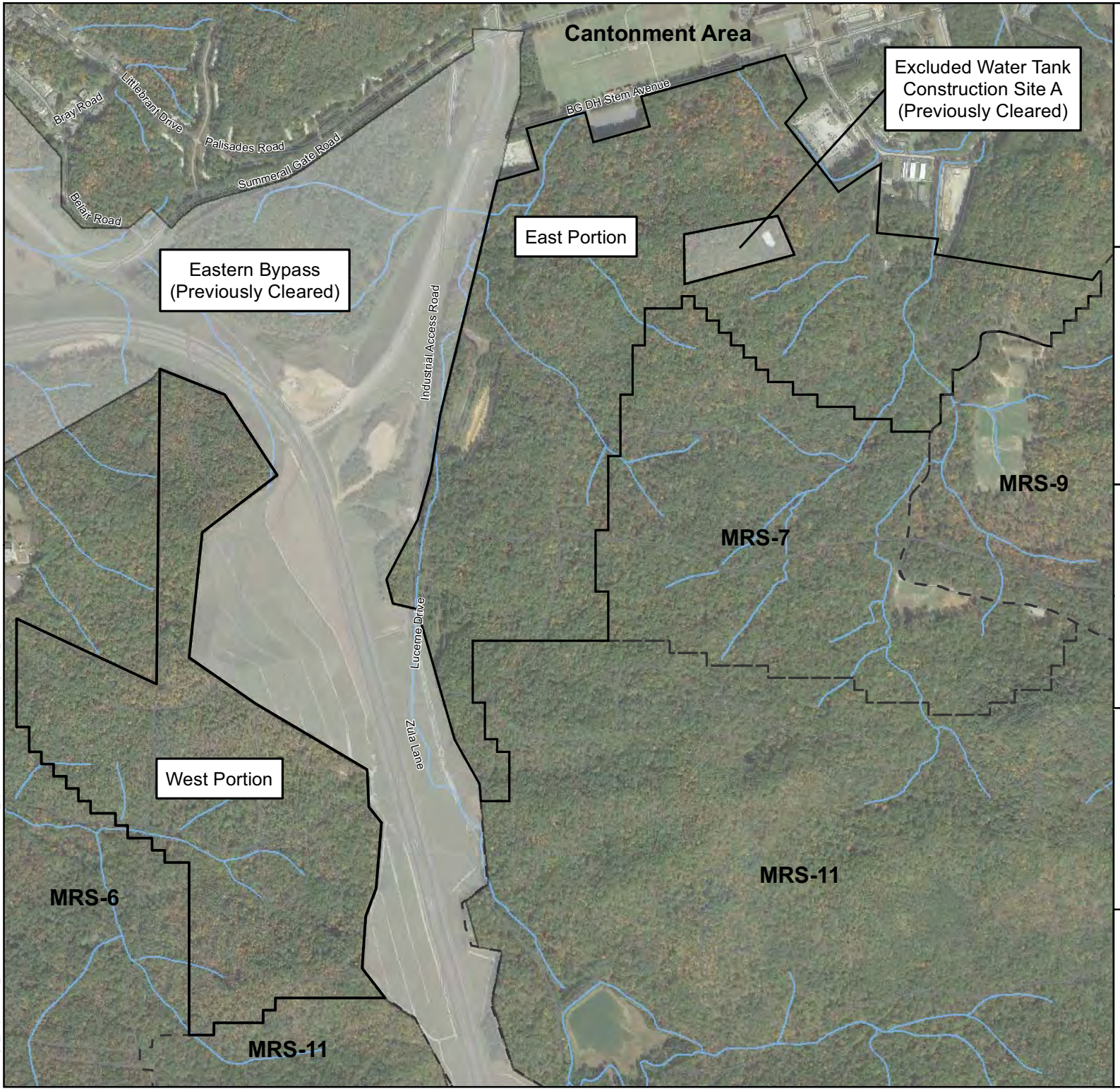

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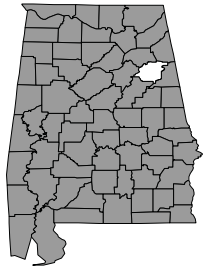

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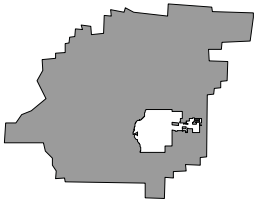

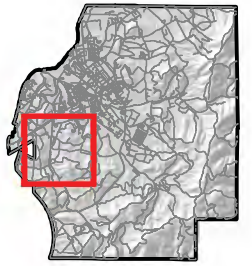

Legend

- MRS-3 Boundary
- Previously Cleared Parcels by U.S. Army
- Streams
- Roads

Imagery Date: 2015

0 550 1,100 Feet

FIGURE 1-3
Site Features

McClellan
MRS-3 After Action Report
Anniston, Alabama

Matrix ENVIRONMENTAL

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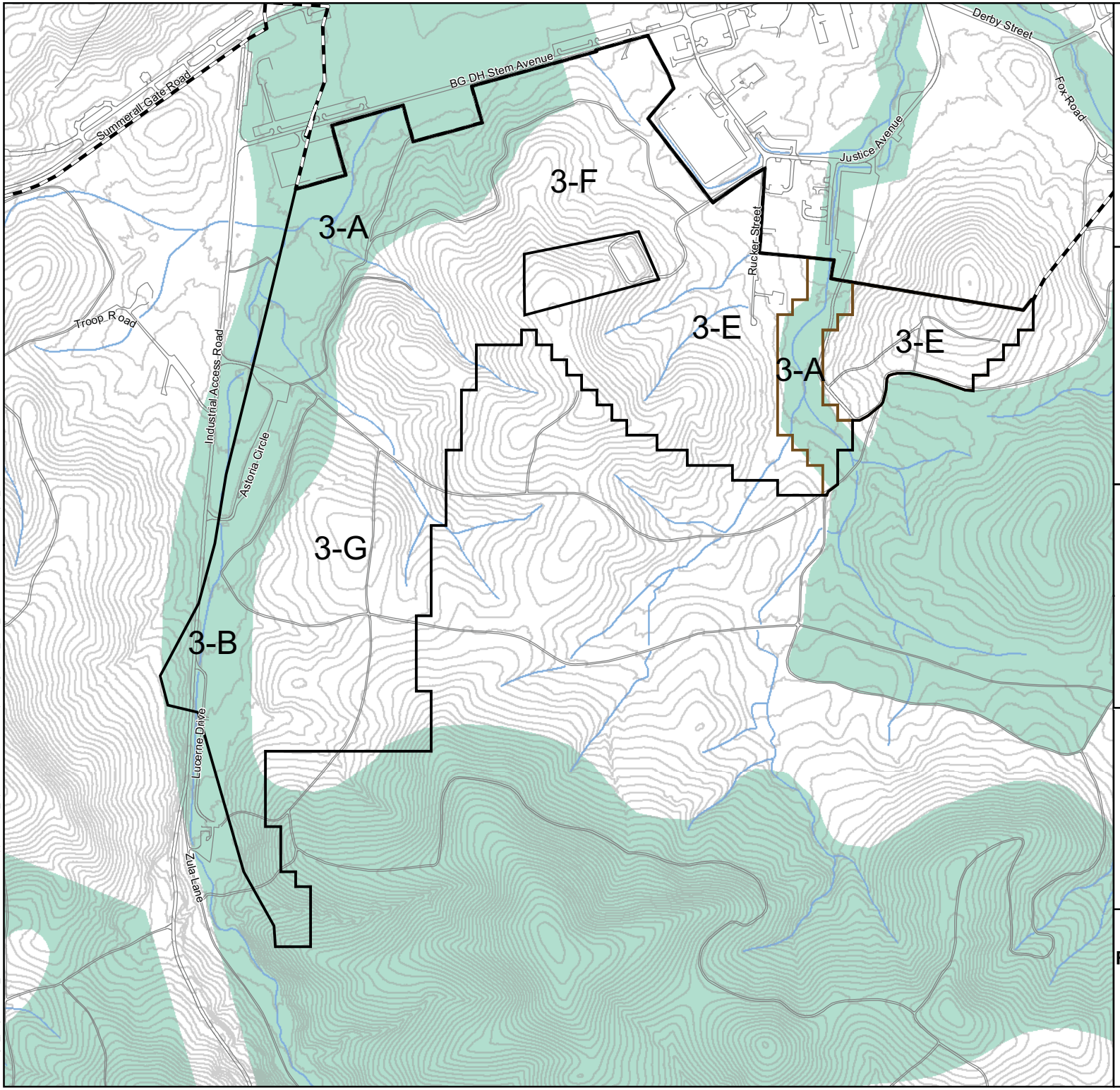

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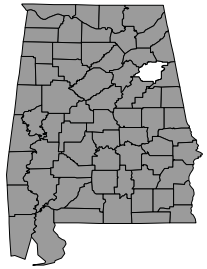

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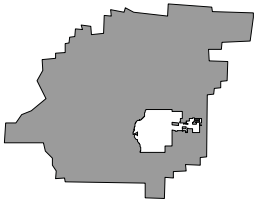

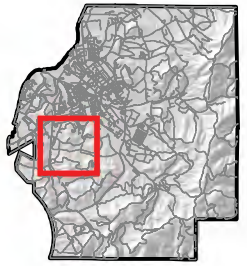

Legend

- MRS-3 East Boundary
- Bravo Munitions Response Area
- McClellan Park Boundary
- Streams
- Roads
- Index Contour (10 ft)

0 300 600 Feet

FIGURE 1-4
Future Land Use and Tracts - East

McClellan
MRS-3 After Action Report
Anniston, Alabama

Matrix ENVIRONMENTAL

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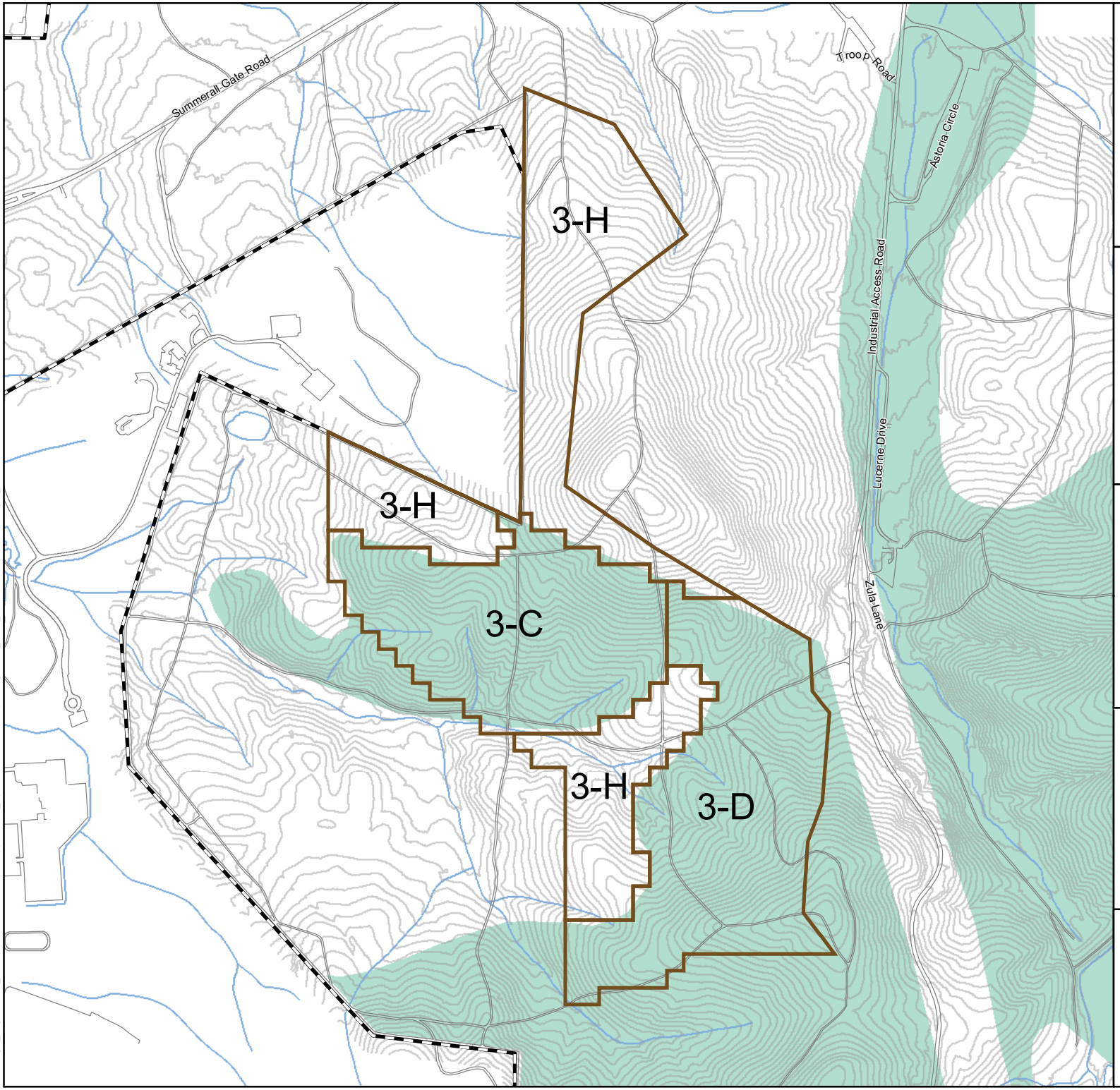

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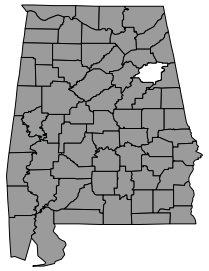
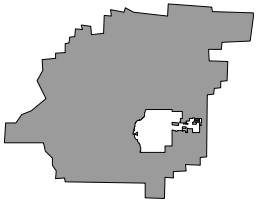
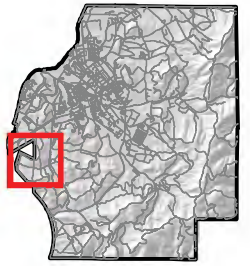


Calhoun County





Legend

- MRS-3 West Boundary
- Bravo Munitions Response Area
- McClellan Park Boundary
- Streams
- Roads
- Index Contour (10 ft)

0 300 600 Feet

FIGURE 1-5
Future Land Use and Tracts - West

McClellan
MRS-3 After Action Report
Anniston, Alabama

Matrix ENVIRONMENTAL

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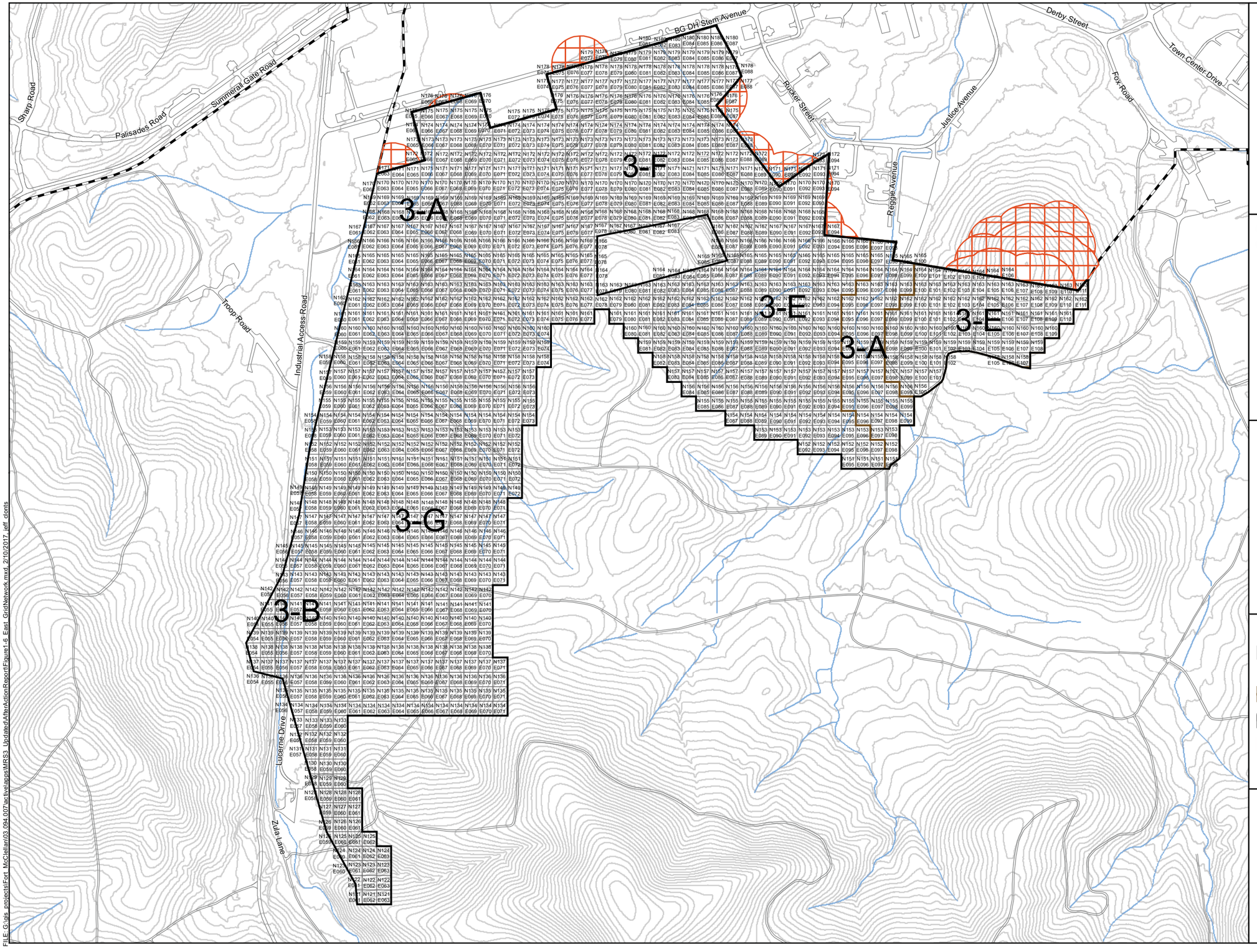
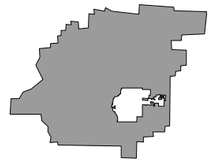


Alabama

Calhoun County



Legend

- MRS-3 East Boundary
- Grid Network
- Tract Boundary
- Bravo Munitions Response Area
- Step Out
- Streams
- Roads
- Index Contour (10 ft)

0 325 650 Feet

FIGURE 1-6
Grid Network - East

McClellan
MRS-3 After Action Report
Anniston, Alabama

Matrix ENVIRONMENTAL

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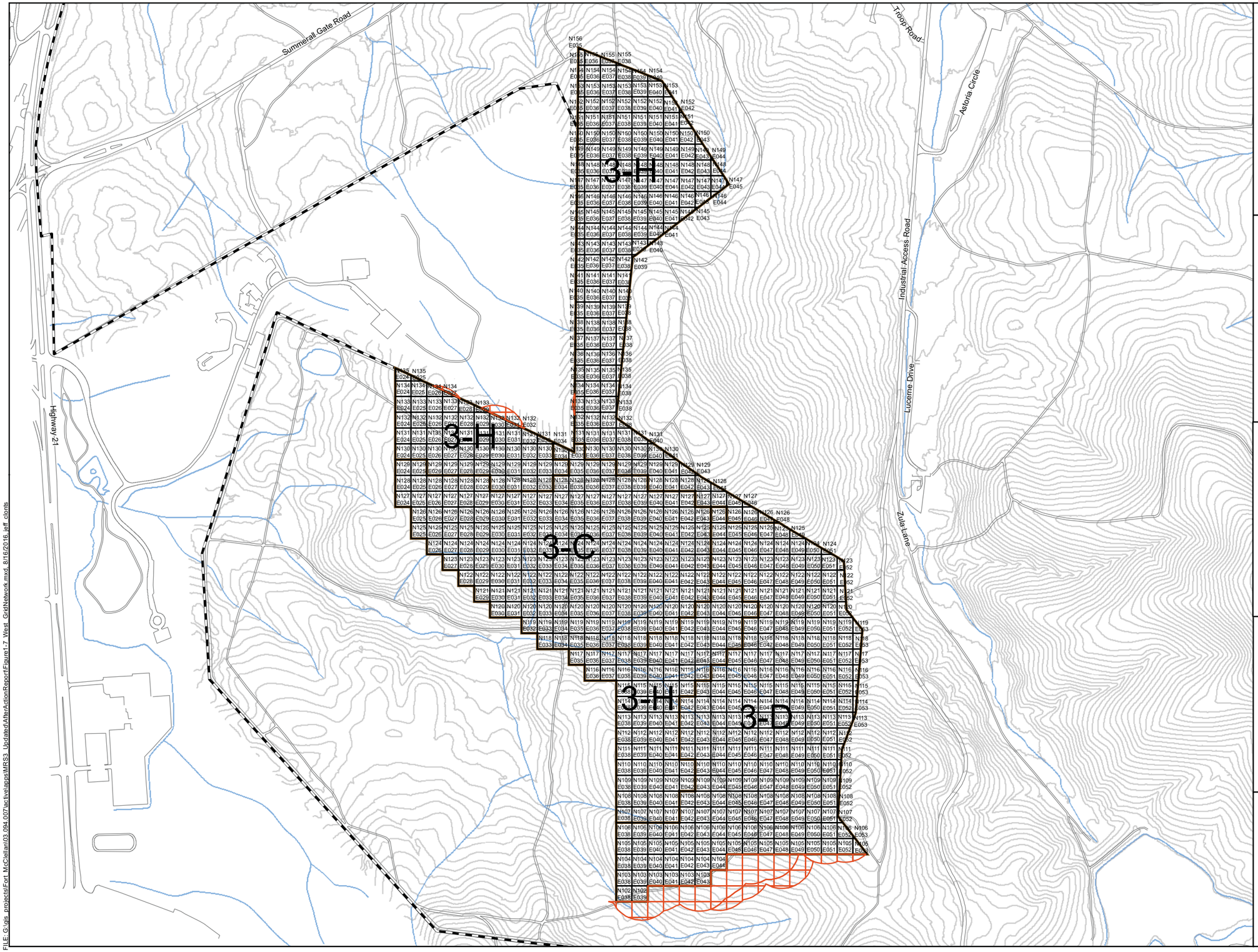

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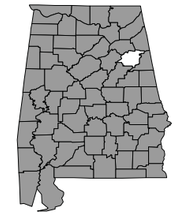
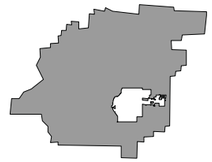


Calhoun County



Legend

- MRS-3 West Boundary
- Grid Network
- Tract Boundary
- Bravo Munitions Response Area
- Step Out
- Streams
- Roads
- Index Contour (10 ft)

0 300 600 Feet

FIGURE 1-7
Grid Network - West

McClellan
MRS-3 After Action Report
Anniston, Alabama

Matrix ENVIRONMENTAL

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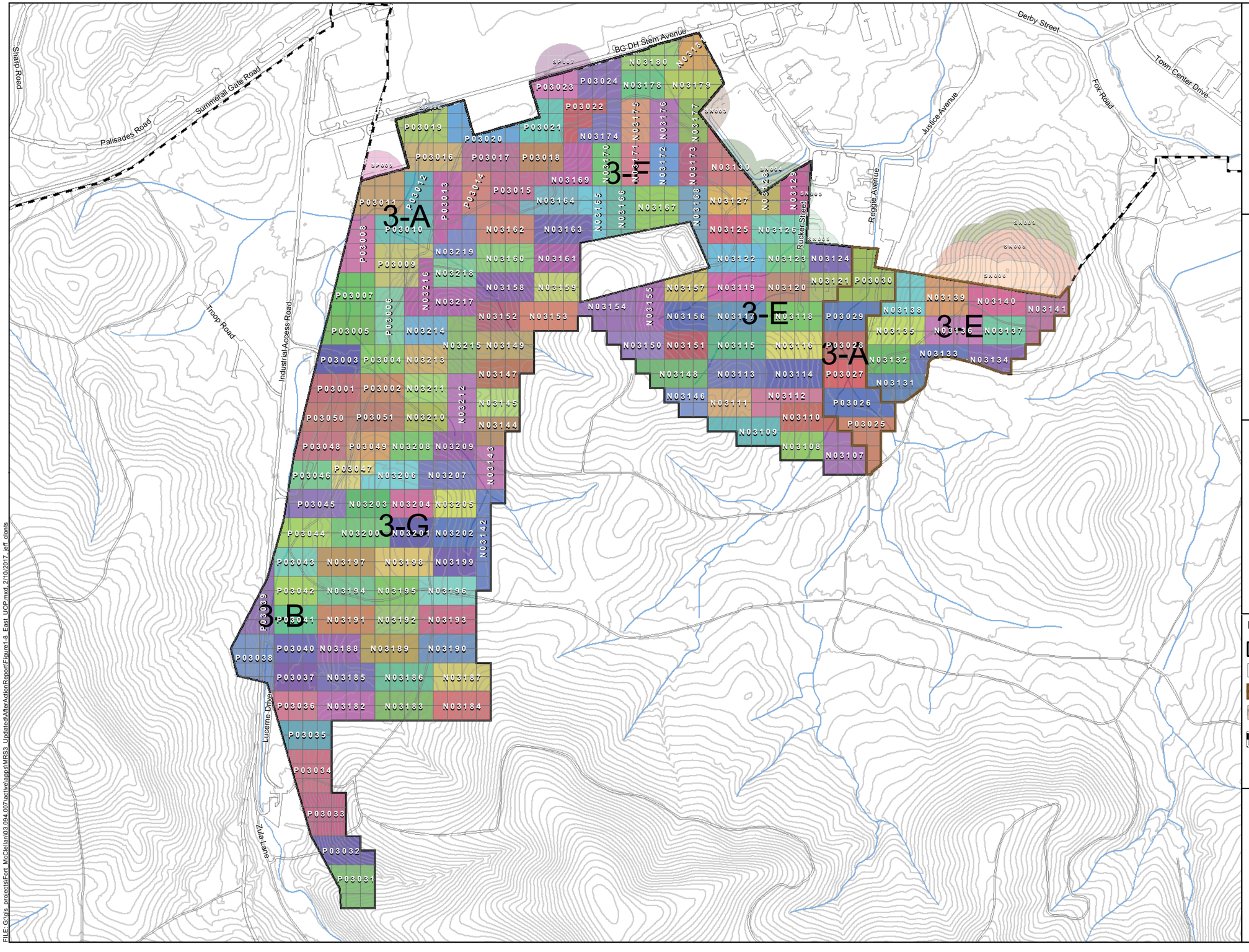
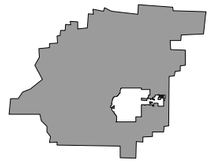


Alabama

Calhoun County



Legend

- MRS-3 East Boundary
- Grid Network
- Tract Boundary
- N0001 UOP
- Bravo Munitions Response Area
- Streams
- Roads
- Index Contour (10 ft)

0 325 650 Feet

FIGURE 1-8
Units of Production (UOP) Layout - East

McClellan
MRS-3 After Action Report
Anniston, Alabama

Matrix ENVIRONMENTAL

FILE: G:\gis_projects\Fort_McClellan\03.094.007\active\apps\MRS3_Updated\AfterActionReport\Figure1-8_East_UOP.mxd 2/10/2017 jeff_clonts

Summerall Gate Road

Highway 21

Industrial Access Road

Astoria Circle

Lucerne Drive

Zulia Lane

3-H

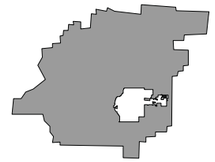
3-C

3-I

3-D

Alabama

Calhoun County



Legend

- MRS-3 West Boundary
- Grid Network
- Tract Boundary
- UOP
- Bravo Munitions Response Area
- Streams
- Roads
- Index Contour (10 ft)

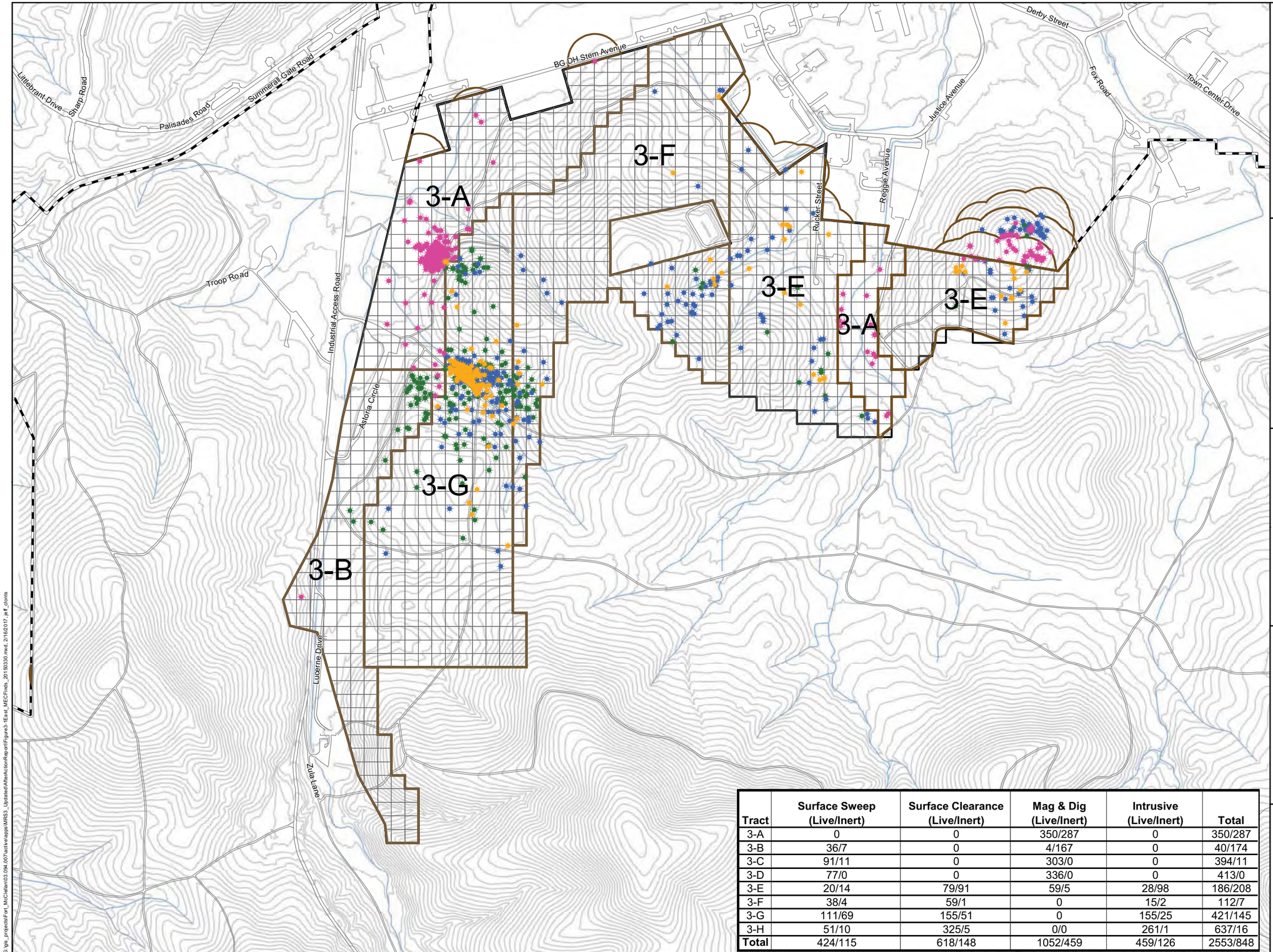
0 300 600 Feet

FIGURE 1-9
Units of Production (UOP) Layout - West

McClellan
MRS-3 After Action Report
Anniston, Alabama

Matrix ENVIRONMENTAL

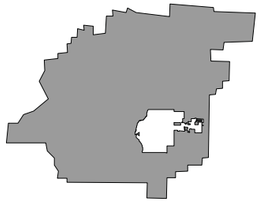
FILE: G:\gis_projects\Fort_McClellan\03_094.007\active\apps\MRS3_Updated\AfterActionReport\Figure1-9_West_UOP.mxd 8/16/2016 jeff_donts



Tract	Surface Sweep (Live/Inert)	Surface Clearance (Live/Inert)	Mag & Dig (Live/Inert)	Intrusive (Live/Inert)	Total
3-A	0	0	350/287	0	350/287
3-B	36/7	0	4/167	0	40/174
3-C	91/11	0	303/0	0	394/11
3-D	77/0	0	336/0	0	413/0
3-E	20/14	79/91	59/5	28/98	186/208
3-F	38/4	59/1	0	15/2	112/7
3-G	111/69	155/51	0	155/25	421/145
3-H	51/10	325/5	0/0	261/1	637/16
Total	424/115	618/148	1052/459	459/126	2553/848

Alabama

Calhoun County



Legend

- Aggressive Surface/Near Surface Clearance (Live)
- Clearance to Depth (Live)
- 1 ft. Clearance (Live)
- Surface Sweep (Live)
- MRS-3 East Boundary
- Grid Network
- Step Out
- Tract Boundary
- Bravo Munitions Response Area
- Streams
- Roads
- Index Contour (10 ft)

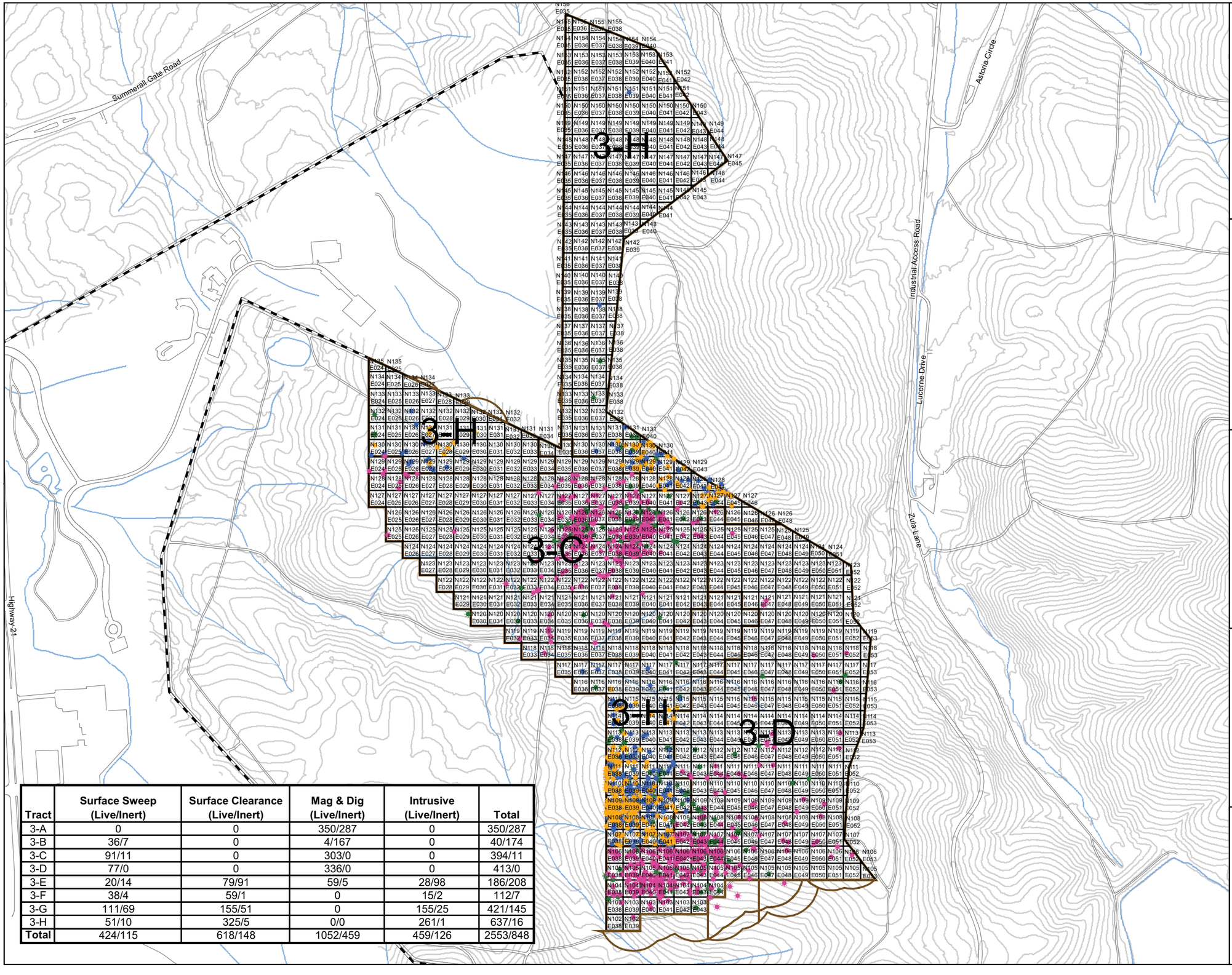
0 300 600 Feet

FIGURE 3-1
MEC Finds - East

McClellan
MRS-3 After Action Report
Anniston, Alabama

Matrix ENVIRONMENTAL

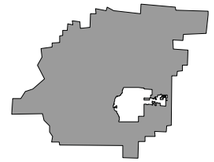
FILE: G:\gis_projects\Fort_McClellan\03.094.007\actv\apps\MRS3_Updated\AfterActionReport\Figure3-1East_MECFinds_20150330.mxd, 2/16/2017, jeff_clonts



Tract	Surface Sweep (Live/Inert)	Surface Clearance (Live/Inert)	Mag & Dig (Live/Inert)	Intrusive (Live/Inert)	Total
3-A	0	0	350/287	0	350/287
3-B	36/7	0	4/167	0	40/174
3-C	91/11	0	303/0	0	394/11
3-D	77/0	0	336/0	0	413/0
3-E	20/14	79/91	59/5	28/98	186/208
3-F	38/4	59/1	0	15/2	112/7
3-G	111/69	155/51	0	155/25	421/145
3-H	51/10	325/5	0/0	261/1	637/16
Total	424/115	618/148	1052/459	459/126	2553/848

Alabama

Calhoun County



Legend

- Aggressive Surface/Near Surface Clearance (Live)
- Clearance to Depth (Live)
- 1 ft. Clearance (Live)
- Surface Sweep (Live)
- MRS-3 West Boundary
- Grid Network
- Step Out
- Tract Boundary
- Bravo Munitions Response Area
- Streams
- Roads
- Index Contour (10 ft)

0 300 600 Feet

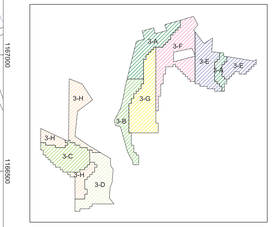
FIGURE 3-2
MEC Finds - West

McClellan
MRS-3 After Action Report
Anniston, Alabama

Matrix ENVIRONMENTAL

FILE: G:\gis_projects\Fort_McClellan\03.094.007\active\apos\MRS3_Update\5-AfterActionReport\Figure3-2West_MECFinds_20150330.mxd, 7/27/2016, jeff_clonts

NAEVA GEOPHYSICS INC.
Near-Surface Geophysical Solutions
Subsurface Geophysical Surveys



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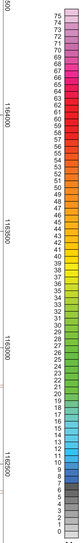
1167000 1166500 1166000 1165500 1165000 1164500 1164000 1163500 1163000 1162500 1162000 1161500 1161000 1160500 1160000 1159500



Legend
- Grid Boundary
- Paved Road
- Unpaved Road
- Streams
- Building
- Historic Subsurface Utility Location (Red=Electric, Yellow=Gas, Green=Sanitary, Blue=Water)

Scale 1:3000

200 0 200 400 600

US survey foot
NAD83 / Alabama CS83 East Zone

Matrix Environmental Services, LLC

EM61 MK2 Bottom Coil Contoured Data
Site Mosaic
MRS-3 - McClellan
Anniston, Alabama

Map Last Updated: 09/25/2009
Data Collection and Map Creation by NAEVA Geophysics Inc.