

Final

**ENGINEERING EVALUATION/
COST ANALYSIS
M1.01 PARCEL
Fort McClellan, Alabama**

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Engineering and Support Center
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ACRONYMS AND ABBREVIATIONS

ADEM	Alabama Department of Environmental Management
ALDOT	Alabama Department of Transportation
AR	Army Regulation
ARARs	Applicable or Relevant and Appropriate Requirements
ASR	Archives Search Report
BCT	BRAC Cleanup Team
BRAC	Base Realignment and Closure
BW	Biological Warfare
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSM	Conceptual Site Model
CWM	Chemical Warfare Materiel
DID	Data Item Description
DoD	Department of Defense
EA	Environmental Assessment
EE/CA	Engineering Evaluation/Cost Analysis
EM	Electromagnetic
EPA	Environmental Protection Agency
ESS	Explosives Safety Submission
FFE	flame field expedients
FMC	Fort McClellan
HE	High Explosive
JPA	Anniston-Calhoun County FMC Joint Powers Authority
LUCs	Land Use Controls
LUCIP	Land Use Control Implementation Plan
LUCAP	Land Use Control Assurance Plan
mm	millimeter
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
OE	Ordnance and Explosives
ORNL	Oak Ridge National Laboratory
ORS	Ordnance Related Scrap
PM	Project Manager
ROW	Right-of-Way
SOW	Statement of Work
TBC	To be Considered
USACE	U. S. Army Corps of Engineers
USAESCH	U. S. Army Corps of Engineers, Engineering and Support Center, Huntsville
UXO	Unexploded Ordnance
WP	White Phosphorous

EXECUTIVE SUMMARY

1.0 An Engineering Evaluation/Cost Analysis (EE/CA) of the M1.01 Parcel at Fort McClellan, Alabama was performed to:

- Evaluate the presence of ordnance and explosives (OE) that may exist within the M1.01 Parcel;
- Evaluate potential risks to human health and environment due to the presence of OE; and
- To recommend the most technically feasible and cost-effective approach for reducing the risk of exposure to OE items.

2.0 This EE/CA is specific only to the M1.01 Parcel and a small portion of the northwest corner of the M3 Parcel (identified in Figures 2-1 and 2-2 as M3 Miscellaneous Property) and thus addresses only a small area of Fort McClellan. Subsequent EE/CAs are planned to address other specific areas of Fort McClellan. EE/CA investigations to address the entire area of Fort McClellan are not planned. As a result of the Environmental Baseline Survey completed for Fort McClellan (ESE, 1998), portions of Fort McClellan were declared free of OE environmental concerns and were therefore excluded from further investigation.

3.0 The activities were performed in a manner consistent with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Section 104 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

4.0 This work was performed by Foster Wheeler Environmental Corporation and was authorized by the U.S. Army Engineering and Support Center Huntsville (USAESCH), under Contract DACA87-99-D-0010, Ordnance and Explosives Response Services at Fort McClellan, Delivery Order 0001, Modification No. 2, dated January 29, 2001.

5.0 The nature and extent of the presence of OE at the site was estimated using existing site-specific field data that was collected during three previous EE/CA investigations and clearance/removal actions that took place in 1999-2001 in areas inclusive and adjacent to the M1.01 Parcel:

- Eastern Bypass EE/CA,
- Eastern Bypass Construction Support Clearance to One Foot, and
- M2 Parcel Removal Action

6.0 Based on archival records and the results of these previous site investigations, the evidence indicates that the area was primarily used for training activities. But for one exception, there is no evidence that high explosives (HE) were ever used in the area. Small quantities of HE were used in M-15 White Phosphorus (WP) smoke hand grenades to break open the case for the purpose of exposing/releasing the WP. Items found in the previous investigations have been training items at depths of several inches to one foot or less and include such items as 2.36 inch practice rockets, practice hand grenades, practice mortars (60 & 81 mm), expended rifle grenades, flares, and practice land mines. Only

two UXO items were found during the previous investigations – a white phosphorous hand grenade (fuzed) and a practice mine activator.

7.0 Six risk reduction alternatives were identified and evaluated on the basis of overall protectiveness, implementability and costs. These included “no action”, land use controls, construction support, surface clearance, clearance to one foot, and clearance to depth. The alternatives were independently analyzed and then comparatively analyzed using the National Contingency Plan (NCP) nine evaluation criteria.

8.0 Based on the comparative analysis, Alternative 5 – Clearance to One-Foot Depth is the recommended risk reduction alternative for the M1.01 Parcel. Alternative 5 will provide a high level of public safety protection by removing both the surface and subsurface OE. By removing both surface and subsurface OE, it will provide a high reduction in residual OE risk. It will provide a permanent long-term solution since it will result in permanent removal of OE; it is technically and administratively achievable and because it addresses both surface and subsurface OE, it is likely to receive high support from the stakeholders, including the community, EPA and the State.

9.0 The expected land use is residential, mixed business and passive recreation. For the residential and mixed business, intrusive activities below one foot can be expected, suggesting that a “clearance to depth” approach may be more appropriate (In this approach, investigation continues to a depth where the source of the anomaly is found or until it is determined that no OE item is present). However, data collected during the previous investigations/removal actions suggests otherwise:

- During the M2 Parcel clearance to depth removal action, all OE items (two) and OE scrap were found at depths of 6 or less inches;
- During the Eastern Bypass EE/CA sampling, all OE (one) and OE scrap were found at depths of 12 or less inches; and
- Although depth data were not recorded for items found during the Eastern Bypass one-foot clearance, the types of items recovered were consistent with findings in the other two areas. Because the items were similar, it can be reasonably assumed that the depths were similar as well.

10.0 The potential exists that isolated OE items may be present below one foot. However, as indicated above, the likelihood is small and the incremental reduction in risk that may potentially result from a deeper clearance action does not justify the added costs (\$1,200,000) associated with this alternative.

11.0 Any residual risk that may remain at the site after implementation of the alternative will be managed through a deed notice informing future land owners of the history of OE use and provide notification procedures in the event any suspect OE items are found.

1.0 INTRODUCTION

1.1 PROJECT AUTHORIZATION AND PURPOSE

Foster Wheeler Environmental Corporation was tasked by the U.S. Army Engineering and Support Center Huntsville (USAESCH), to prepare an Engineering Evaluation/Cost Analysis (EE/CA) for the M1.01 Parcel and Miscellaneous Property. This work is authorized under Contract No. DACA87-99-D-0010, Ordnance and Explosives Response Services at Fort McClellan, Delivery Order 0001, Modification No. 2, dated January 29, 2001.

1.2 PROJECT OBJECTIVES AND SCOPE

The objectives of this project are to evaluate the presence of ordnance and explosives (OE) that may exist within the M1.01 Parcel and Miscellaneous Property (hereafter referred to as M1.01 Parcel), evaluate the potential risks to human health and environment due to the presence of OE, and to recommend the most technically feasible and cost-effective approach for reducing the risk of exposure to OE items. The activities were performed in a manner consistent with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Section 104 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

1.2.1 The typical EE/CA process includes:

- Conducting visual, geophysical, and intrusive field investigations to characterize the type, distribution, and extent of OE items within the boundaries of the site;
- Analysis of the field investigation data to determine the risks associated with the current and proposed future uses of the property;
- Development and evaluation of risk reduction alternatives; and
- Recommendation of the most effective risk reduction alternative.

1.2.2 This EE/CA used information on the presence of OE developed from previous field investigations conducted within and contiguous to the M1.01 Parcel. The information was considered sufficient to be the basis for estimating the nature and extent of the presence of OE within the M1.01 Parcel and to estimate the risk to human health and environment associated with the presence of OE. Therefore, this EE/CA did not include additional field investigations.

1.2.3 An Action Memorandum will be prepared subsequent to the EE/CA presenting the recommended risk reduction alternative(s). If, during implementation of the alternative(s) in accordance with the Action Memorandum, unanticipated items are discovered that are not adequately addressed by the response action, additional risk-reduction alternatives and/or institutional controls may be required.

1.3 PROJECT TEAM

Project Team Members are identified below.

1.3.1 U.S. Army Engineering and Support Center, Huntsville (USAESCH)

The USAESCH is the implementing agency responsible for the execution of this project. Responsibilities include procurement of services, providing direction to the prime contractor, approving the budget and schedule, and coordination of document reviews.

1.3.2 U.S. Army Engineer District, Mobile

The US Army Corps of Engineers, Mobile District, is the Life Cycle Project Manager for this project. Responsibilities include the review of project workplans and documents.

1.3.3 Foster Wheeler Environmental Corporation

Foster Wheeler Environmental Corporation is the prime contractor to the USAESCH and provides all engineering support and services for the project. Foster Wheeler Environmental Corporation is responsible for performance of the activities detailed in the Statement of Work (SOW) as well as control of the project schedule and budget.

1.3.4 Base Realignment and Closure (BRAC) Cleanup Team (BCT)

The BCT is comprised of representatives of former Fort McClellan, including the Transition Force Environmental Office, Alabama Department of Environmental Management (ADEM), the US Environmental Protection Agency (US EPA) and the United States Army Corps of Engineers (USACE). The BCT reviews, comments on and must approve all deliverables under this contract, including the EE/CA.

2.0 SITE DESCRIPTION AND HISTORY

2.1 SITE LOCATION

The former Fort McClellan (FMC) main post consists of 18,929 acres and is bounded to the south and west by the City of Anniston and to the northwest by the City of Weaver. Adjoining the former main post to the east is the Choccolocco Corridor, which connects the post to the Talladega National Forest.

2.1.1 The M1.01 Parcel is located on the western boundary of FMC in the vicinity of the Summerall Gate Road. The M1.01 Parcel study area consists of approximately 97 acres and is divided into three segments:

- Property north of the proposed Summerall Gate Road Extension (22 acres);
- Property south of Summerall Gate Road Extension (42 acres); and
- Miscellaneous Property south of the Eastern By-Pass Right-of-Way (This property is part of the M3 Parcel) (33 acres).

2.1.2 Figure 2-1 shows the general location of Fort McClellan within the State of Alabama, the location of the M1.01 Parcel within Fort McClellan, and the delineation of the M1.01 Parcel study area.

2.2 PHYSICAL DESCRIPTION

2.2.1 Topography

The surface topography of Fort McClellan varies greatly over its entire area. Within the M1.01 Parcel study area, the surface topography is less variable. Most of the surface terrain is relatively flat to moderately sloping hills. The overall elevation of the parcel and the associated areas ranges from about 750 to 800 feet above mean sea level (msl), with the highest elevation near the eastern end of the study area.

2.2.2 Vegetation

The M1.01 Parcel study area consists of a variably sparse to dense hardwood and pine mix forests with underbrush of shrubs. Some portions of the area contain pine groves with dense underbrush. Other portions of the site contain hardwood stands with little to no underbrush.

2.2.3 Soils

2.2.3.1 General

The soils in the vicinity of the M1.01 Parcel are shallow, steep and stony and usually underlain by sandstone, limestone and shale. Many of the soil series in Calhoun County have developed from transported material, rather than from in-situ (residual) material. Much of the transported product has been washed from parent sedimentary rocks; some of which was brought in by the Coosa River from soils underlain by sandstone and shale. Soils differ within each series depending upon the composition of the upland material, the

amount of mixing of materials, age and drainage conditions. Five soil classifications are represented across the M1.01 Parcel (Zapata, 2000; see Figure 3-5).

2.2.3.2 Anniston and Allen Series

Anniston and Allen gravelly loams dominate the subject area separated by narrow, north-south trending Philo and Stendal Series soil along drainage systems and locally by Jefferson soils. Anniston and Allen soils are often located on slopes at the bases of higher ridges and mountains.

2.2.3.2.1. The Anniston Series and Allen Series consist of acidic, well drained alluvium or colluvium whose development is largely the product of continued weathering and transport of soils from higher elevations. The parent rocks are sandstone, quartzite or shale. At the surface, down to a depth of a few inches, the Allen Series is mainly grayish brown fine sandy loam. Anniston soil, while like in composition, is darker red or reddish brown at the surface. The subsurface soil of each unit is typically dark red sandy clay loam. Deeper soils are gravelly sandy clay and extend to depths greater than 40 inches. Sandstone and quartzite cobbles are found throughout each unit. The Anniston Series and the Allen Series are similar and are combined for mapping purposes in much of Calhoun County.

2.2.3.2.2. Infiltration and runoff are moderate to average. Permeability is considered moderate and the capacity for available moisture is relatively high. Root zones commonly are thick. Fertility and organic matter are moderate to low. The unit is well suited to agricultural or developed use. Erosion varies widely depending upon slope. A brief summary of sub-units of Anniston and Allen gravelly loam follows.

2.2.3.2.3. Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded (AcB2). This is a friable soil that has developed along fans at the base of mountains and in alluvium on foot slopes. The alluvium ranges in thickness from two feet to more than eight feet. The color of the surface ranges from dark brown to reddish-brown. The sub-soil ranges from clay loam to clay or silty-clay loam. Infiltration and runoff are medium. Permeability is moderate and the capacity for available moisture is high. Root material is generally abundant to 12 inches or more. Severely eroded areas are uncommon.

2.2.3.2.4. Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded (AcC2). Severely eroded places are more common on the surface. A few shallow gullies are present. Erosion is a risk because of the slopes. The unit is suitable for cultivation and has been developed for pasture and urban uses.

2.2.3.2.5. Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded (AcD2). These soils have a steeper slope, the upper part at the soil column is thinner and runoff is more rapid than for the above unit (AcC2). Severely eroded benches and shallow gullies are common where not managed. Non-vegetated areas exhibit a reddish brown to dark reddish brown gravelly clay loam surface soil. Infiltration is slow and capacity for available moisture is low.

2.2.3.2.6. Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded (AcE2). As with the above unit (AcD2), these soils have a steep slope, still thinner upper soil column and rapid runoff. In slightly eroded places, the surface soil is a very dark brown to very dark grayish brown gravelly loam, 6 to 9 inches thick. Severely eroded patches and shallow gullies are common. The capacity to hold moisture is low. Infiltration is very low.

2.2.3.3 Philo and Stendal Series

Philo and Stendal Series soils are co-associated and consist of strongly acidic, moderately well drained soils, that have developed in local and general alluvium, the parent material originating from sandstone, shale and sometimes limestone. The unit is commonly mapped around drainage systems and at the heads of small draws.

2.2.3.3.1 Philo and Stendal soils, local alluvium, 0 to 2 percent slopes, eroded (PkA). Areas are elongated and one to ten acres in size. The soils vary in texture, color and consistency. The surface soil is very dark grayish brown to dark brown fine sandy loam and the subsoil is dark brown mottled fine sandy loam. Drainage ranges from poor to moderately good. Water stands on the surface for short periods. As long as the soils are protected from excess runoff from adjacent uplands, they are productive agriculturally, but generally unsuitable for dwellings.

2.2.3.4 Jefferson Series

Jefferson Series soils are associated with and similar to Anniston and Allen soils.

2.2.3.4.1 Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded (JeB2). Surface soils are dark grayish-brown fine sandy loam. Subsurface soils are yellowish brown fine sandy clay. Sandstone fragments occur on the surface and throughout the profile. Runoff and infiltration are medium and permeability is moderate. The soil is suitable for a range of crops and can be developed, but erosion can be a limitation.

2.2.4 Hydrogeology

Few hydrogeological assessments of regional groundwater flow patterns have been conducted in the area surrounding former Fort McClellan. Aquifers in the area are developed in residual soil derived from weathering of bedrock, within fractured bedrock, along fault lines and within karstic units. Groundwater flow is generally toward major surface-water features. However, because of differential weathering, variable fracturing and the potential for conduit flow, topography as an indicator of groundwater flow direction must be used with caution. Groundwater intersecting the ground surface has resulted in numerous springs, which act as important sources of discharge and water supply in the area (SAIC, 1999).

2.2.4.1 Precipitation is the primary source of recharge to groundwater in Calhoun County and thrust fault-zones form conduits for groundwater movement. Points of discharge are springs, effluent streams and lakes. Shallow groundwater on former Fort McClellan

occurs principally in the residuum developed from Cambrian sedimentary bedrock units of the Weisner Formation, part of the Chilhowee Group and locally in Ordovician carbonates. Bedrock permeability may be locally enhanced by fracture zones associated with thrust faults and by solution of limestones. Surface-water movement into sinkholes provides another source of groundwater recharge and locally has facilitated the formation of caves (SAIC, 1999).

2.3 SITE DEMOGRAPHICS

Former Fort McClellan is located in Calhoun County at the foothills of the Appalachian Mountains. The surrounding communities including Weaver, Pelham Range and Anniston (the county seat) offer multiple centers of activity such as Oxford Lake and Civic Center, Cheaha State Park, Jacksonville State University, Anniston Museum of Natural History, Northeast Alabama Regional Medical Center and several theaters, park facilities and golf courses.

2.3.1. According to the 1990 Census of Population and Housing, Calhoun County is home to approximately 116,032 people within a 7,609 square-mile area, averaging 15 people per square mile. The percentage of individuals under age 18 is 24.5 percent; the percentage over age 65 is 13.5 percent. The median age is 35. Approximately 79.29 percent of the population is white, 19.14 percent black, 0.88 percent Asian or Pacific Islander and 0.69 percent other races. At that time, the work force of Calhoun County was broken down into the following: employed armed forces, 5.12 percent; employed civilians, 51.97 percent; unemployed civilians, 4.82 percent; and others not in the labor force, 38.09 percent.

2.3.2. Housing in Calhoun County is composed of 46,753 multiple and single family dwellings. Approximately 47 percent of the households are owner occupied with a median property value of \$51,806. Approximately 24 percent of the households are rental units with a median monthly rent of \$218.

2.3.3. Calhoun County's medical facilities serve as the medical center and the court system serves as the legal and accounting center of northeast Alabama. Retail, entertainment and recreational establishments also thrive in this area.

2.3.4. A variety of industries including federal and civilian government, services, durable goods manufacturing and the area's agricultural industry are strong contributors to the local economy. Mead Ink, Hager (hinges), Parker Hannifin (valves), Bear (knives), Springs Industries (comforters) and Allied Signal (aircraft systems) are just a few of the more than 150 industries located in Calhoun County. Honda has chosen Lincoln, Alabama, just 14 miles southeast of Anniston, as the site for their new automotive facility scheduled to open in 2002.

2.4 SITE HISTORY

Documented military use at former Fort McClellan began in 1912 when the Alabama National Guard used part of the site as a Field Artillery Range. However, there is a

possibility that during the Spanish American War (1898), units stationed at Camp Shipp in the Blue Mountain area used portions of what is now Fort McClellan for artillery training. In 1917, Congress authorized the establishment of Camp McClellan. In 1929, the camp was officially designated as Fort McClellan. Following World War II, in June 1947, the Fort was put into an inactive status. The Fort was reactivated in January 1950 and remained an active army post until September 1999.

2.4.1. The history of Fort McClellan, as described in the Archives Search Report (ASR) Findings (USACE, 1999a) and Archives Search Report Conclusions and Recommendations (USACE, 1999b) includes training activities and demonstrations that used conventional weapons (i.e., mortars, anti-tank guns and artillery pieces). Chemical warfare training occurred during several periods of time that included the use of such items as chemical agent identification sets, smoke pots, flame field expedients (FFE), rifle and smoke grenades. A review of the ASR Conclusions and Recommendations indicates that the majority of the chemical inventory was transferred from Fort McClellan in 1976. In 1987, the Chemical Decontamination Training Facility located in the northeast corner of Fort McClellan became operational.

2.4.2. Under the Base Realignment and Closure (BRAC) Program, Fort McClellan closed in September 1999.

2.5 PREVIOUS SITE INVESTIGATIONS

The US Army Corps of Engineers, St. Louis District, compiled an Archives Search Report (ASR) of Fort McClellan in 1996. The ASR was prepared by reviewing available records and reports documenting the history of the site. Historical information pertaining to site operations, including a listing of site investigations conducted before 1996, is contained within the ASR. In 1998, the St. Louis District revised the ASR to include suspect Chemical Warfare Materiel (CWM) areas. The ASR was finalized in July 1999.

2.5.1. The Final ASR presented the findings of the site inspection and evaluation of potential ordnance and explosives occurrence at Fort McClellan. Numerous areas suspected of being used for CWM training or storage were inspected. One area, the Old Chemical Weapons Demonstration Area, is located within the M1.01 Parcel study area. The site is located in the miscellaneous property segment of the M1.01 Parcel, adjoining the southern edge of the Eastern Bypass right-of-way and the eastern edge of the M2 Parcel (see Figure 2-1). The area included a toxic gas yard (also known as South Gate Toxic Gas Yard), radiological survey area and a biological warfare (BW) survey area. An interview with a retired chemical school instructor also makes reference to this area. The interviewee states that the "Weapons Demonstration Area", could be found by "taking your first right" after entering Summerall Gate and going to the top of the hill (Chemical Corps School 1956, Environmental Science and Engineering 1998). Munitions demonstrated in this area included:

- mechanical flame thrower
- portable flame thrower
- various smoke grenades

- rifle smoke grenades
- thermite grenades
- X-200 land mines (napalm-filled 5 gallon can)
- M5 and M4A2 (Navy floating) smoke pots
- M2 and M3 smoke generators
- Primacord
- M1 land mine filled with MR (innocuous simulant for distilled sulfur mustard)
- white phosphorus
- field flame expedient

2.5.2 During this interviewee's tenure, no toxic chemical agents were used at this location. A second interviewee, who had conducted training at the site, stated that the area was in use when he came to Fort McClellan in 1961 and was used through 1963. He also stated that the area was never used for live agent training during his tenure. Both interviewees stated that the area was used for simulated detection of biological agent, however agent was not employed, the trainees simply went through the motions (Environmental Science and Engineering, 1998). There is no documented evidence of toxic agents being used in this area.

2.5.3 Based on this history, it has been determined that it is very unlikely that actual chemical agents were ever used at the former "Weapons Demonstration Area". However, due to concern that the area may harbor OE such as hand grenades (see list above), the area was selected and sampled as part of the Eastern Bypass EE/CA (Zapata Engineering, 2000). Also, since chemical agents were not suspected to have been used, the former demonstration area (including the South Gate Toxic Gas Yard) was also dropped as a site to be investigated under the upcoming EE/CA scheduled to investigate known or suspected CWM sites at Fort McClellan.

2.5.4 Barge, Waggoner, Sumner and Cannon, Inc. conducted an Environmental Assessment (EA) for the Alabama Department of Transportation (ALDOT) in August 1998. This document identified the economic and environmental impacts of the proposed Eastern Bypass and evaluated right-of-way alternatives for the bypass. A Finding of No Significant Impact was finalized in December 1999.

2.5.5 An Engineering Evaluation/Cost Analysis (EE/CA) for the proposed Eastern Bypass was initiated in 1998. As part of the reconnaissance for the EE/CA, a historical aerial photography investigation was prepared by Oak Ridge National Laboratory (ORNL) for the US Army Engineering and Support Center, Huntsville (*Historical Aerial Photography Investigation of the Fort McClellan East By-Pass Study Area, 1998*). It provided an analysis of land usage over a span of more than 50 years and potential areas of OE occurrence. Selected aerial photographs were scanned at 600 dots per inch and converted to Erdas Imagine format. Second or third order transformations were applied to rectify the photographs. Land use/cover features were digitized and attributed for each successive year of historical aerial photographs. Anomalies were computed from the digital databases by analyzing the changes in land use/cover over time relative to the

expected land use/cover progression. In order to determine specific temporal differences in land use/ cover, changes were computed on a year-by-year basis. Anomalies for which the cause could not be discerned, as well as anomalies that might be related to OE activities, were identified on a map as anomalies of potential concern. Some of these anomalies were recommended for further investigation.

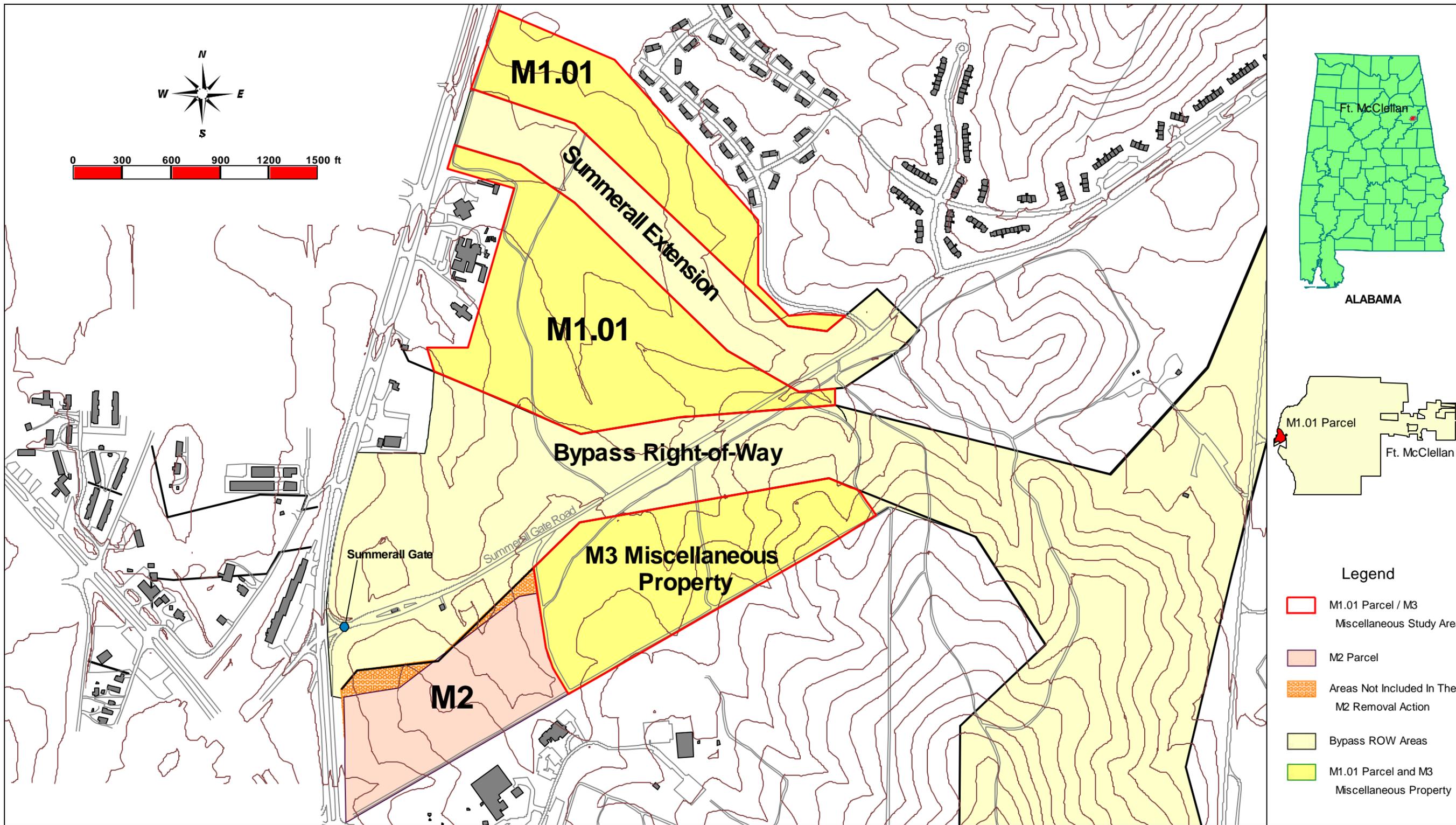
2.5.6 Zapata Engineering conducted a non-intrusive ground reconnaissance for the Eastern Bypass EE/CA in August 1998. The final trip report is located in Appendix B-1 of the Eastern Bypass EE/CA (April 2000). The purpose of the ground reconnaissance was to resolve anomalies identified during the historical aerial photography investigation (ORNL, 1998) and to visually identify areas of possible OE occurrence, which may not have been previously characterized within or adjacent to the proposed Eastern Bypass right-of-way. Several areas revealed evidence of possible training activities to include OE training items and fox holes and were identified as potential sample locations. The most notable locations were in the northern portion of the proposed Eastern Bypass right-of-way, near Summerall Gate. In particular, possible training areas were located north and south of Summerall Gate Road, approximately 200 to 300 yards inside the installation boundary.

2.5.7 In February of 1999, as part of the Eastern Bypass EE/CA, Zapata Engineering conducted a geophysical survey of six areas (encompassing 8.56 acres) selected during the ground reconnaissance. The geophysical data was processed and mapped, using an automatic target detection procedure. This system picked targets using a threshold algorithm that works from the outer part of the amplitude distribution towards the noise level. Peaks were localized at the given threshold and then picked. The geophysicist then did a subjective analysis of the picks, accepting, rejecting or modifying each target. Each target was then assigned a target identification number that associated it with the area and grid in which it was identified. Several subsurface anomalies were identified as targets. The complete geophysical report is located in Appendix B.1 of the Eastern Bypass EE/CA (Zapata Engineering, April 2000).

2.5.8 In May of 1999, Zapata Engineering conducted OE intrusive sampling. However, not all of the 8.56 acres previously surveyed were sampled. Sampling was conducted in grids spanning an area of approximately 2.41 acres, however, several of the grids were not completely sampled. Sampling in a grid was terminated when one or more OE and/or ordnance related scrap (ORS) was found. Therefore, the total area sampled was actually less than 2.41 acres. Intrusive investigations revealed OE training items and ordnance related scrap (ORS). The OE/ORS items discovered during this investigation included 60mm practice mortars, 2.36-inch practice rockets and expended smoke grenades. One pyrotechnic OE item classified as UXO, a mine activator, was recovered and detonated on-site. Evidence of small arms, expended .30 caliber shells, was also discovered (Zapata Engineering, April 2000). These items were found in areas 1, 4, and 5. Figure 2-2 identifies these areas and shows the approximate locations the items were found.

2.5.9. In March 2001, EOD Technologies completed a one-foot clearance of OE over the proposed footprint of the Eastern Bypass to support pre-construction activities. The extent of their activities are identified in the Final Report for the Ordnance and Explosives Surface Removal, Proposed Eastern Bypass, Fort McClellan, Alabama. (EODT, June 2001). Items recovered in the portion of the Eastern Bypass right-of-way that is located within the M1.01 EE/CA study area were primarily training and practice items, including smoke and practice hand grenades, slap flares, training and practice mortars (60mm and 81mm), expended rifle grenades, a practice anti-vehicle mine M-12, and 2.36-inch practice rockets and motors. A 3 inch Stokes mortar and two expended 37mm armor-piercing tracer rounds were also found. No UXO were reported found. Figure 2-2 includes the approximate locations these items were found. Specific sampling grids are presented as small squares with grid numbers that correspond with the grid numbers identified in the accompanying listing for Eastern Bypass One-Foot Clearance.

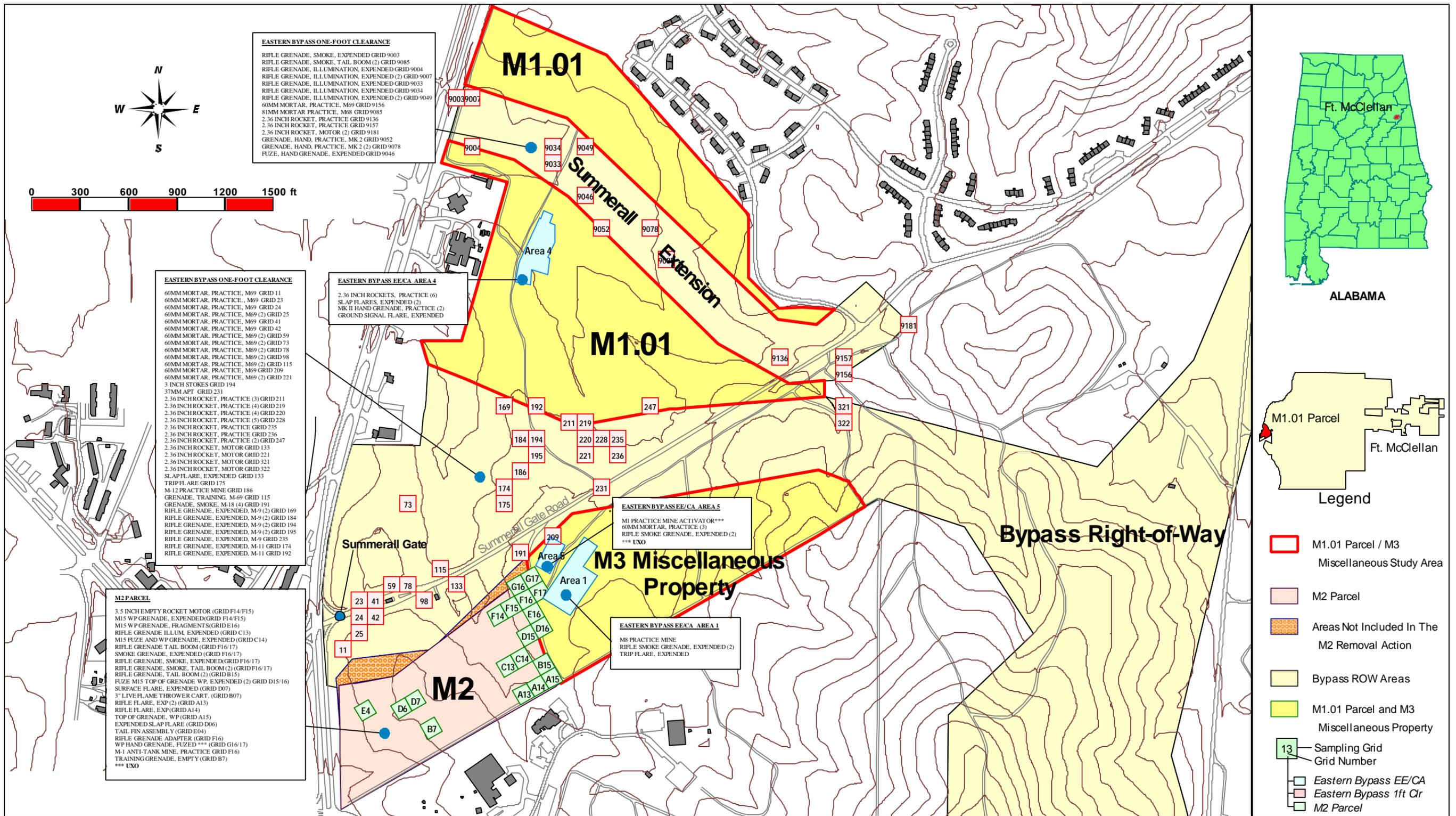
2.5.10 In September, 2000 Foster Wheeler Environmental Corporation completed an OE removal action at the adjacent M2 Parcel. The M2 Parcel is an approximately 22-acre site that adjoins at the southwest corner of the M1.01 Parcel site. Items recovered during the removal action included one UXO (white phosphorous hand grenade), one live flame thrower cartridge, two practice ordnance items (practice anti-tank land mine and practice training grenade), and OE scrap. Small arms (mostly .30 caliber) and Non-OE scrap (cultural metal) were also recovered. The UXO item and the two practice ordnance items were found on or within 6- inches of the ground surface. The flame thrower cartridge was as found at a depth of 2 inches. Consistent with the type of training exercises thought to have occurred at the site, all OE and OE scrap were found within six inches of the ground surface, except for one expended rifle grenade which was found on the surface at the bottom of an open hole, 30 inches deep by 3-foot across. Figure 2-2 shows the approximate locations these items were found. Specific sampling grids are presented as small squares with grid numbers that correspond with the grid numbers identified in the accompanying listing for M2 Parcel. The figure shows the boundaries of the M2 Parcel as was subsequently transferred to the Joint Powers Authority and delineates portions of the M2 Parcel that were not included as part of the M2 Parcel Removal Action.




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FIGURE 2-1
M1.01 Parcel Study Area
 M1.01 Parcel Engineering Evaluation / Cost Analysis



EASTERN BYPASS ONE-FOOT CLEARANCE
 RIFLE GRENADE, SMOKE, EXPENDED GRID 9003
 RIFLE GRENADE, SMOKE, TAIL BOOM (2) GRID 9085
 RIFLE GRENADE, ILLUMINATION, EXPENDED GRID 9004
 RIFLE GRENADE, ILLUMINATION, EXPENDED (2) GRID 9007
 RIFLE GRENADE, ILLUMINATION, EXPENDED GRID 9034
 RIFLE GRENADE, ILLUMINATION, EXPENDED GRID 9034
 RIFLE GRENADE, ILLUMINATION, EXPENDED (2) GRID 9049
 60MM MORTAR, PRACTICE, M69 GRID 9156
 81MM MORTAR, PRACTICE, M68 GRID 9085
 2.36 INCH ROCKET, PRACTICE GRID 9136
 2.36 INCH ROCKET, PRACTICE GRID 9157
 2.36 INCH ROCKET, MOTOR (2) GRID 9181
 GRENADE, HAND, PRACTICE, MK 2 GRID 9052
 GRENADE, HAND, PRACTICE, MK 2 GRID 9078
 FUZE, HAND GRENADE, EXPENDED GRID 9046

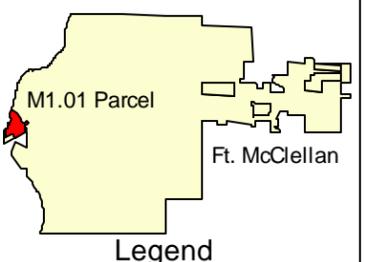
EASTERN BYPASS ONE-FOOT CLEARANCE
 60MM MORTAR, PRACTICE, M69 GRID 11
 60MM MORTAR, PRACTICE, M69 GRID 23
 60MM MORTAR, PRACTICE, M69 GRID 24
 60MM MORTAR, PRACTICE, M69 (2) GRID 25
 60MM MORTAR, PRACTICE, M69 GRID 41
 60MM MORTAR, PRACTICE, M69 GRID 42
 60MM MORTAR, PRACTICE, M69 (2) GRID 59
 60MM MORTAR, PRACTICE, M69 (2) GRID 73
 60MM MORTAR, PRACTICE, M69 (2) GRID 78
 60MM MORTAR, PRACTICE, M69 (2) GRID 98
 60MM MORTAR, PRACTICE, M69 (2) GRID 115
 60MM MORTAR, PRACTICE, M69 GRID 209
 60MM MORTAR, PRACTICE, M69 (2) GRID 221
 3 INCH STOKES GRID 194
 37MM APT GRID 231
 2.36 INCH ROCKET, PRACTICE (3) GRID 211
 2.36 INCH ROCKET, PRACTICE (4) GRID 219
 2.36 INCH ROCKET, PRACTICE (4) GRID 220
 2.36 INCH ROCKET, PRACTICE (5) GRID 228
 2.36 INCH ROCKET, PRACTICE GRID 235
 2.36 INCH ROCKET, PRACTICE GRID 236
 2.36 INCH ROCKET, PRACTICE (2) GRID 247
 2.36 INCH ROCKET, MOTOR GRID 133
 2.36 INCH ROCKET, MOTOR GRID 221
 2.36 INCH ROCKET, MOTOR GRID 321
 2.36 INCH ROCKET, MOTOR GRID 322
 SLAP FLARE, EXPENDED GRID 133
 TRIP FLARE GRID 175
 M-12 PRACTICE MINE GRID 186
 GRENADE, TRAINING, M-69 GRID 115
 GRENADE, SMOKE, M-18 (4) GRID 191
 RIFLE GRENADE, EXPENDED, M-9 (2) GRID 169
 RIFLE GRENADE, EXPENDED, M-9 (2) GRID 184
 RIFLE GRENADE, EXPENDED, M-9 (2) GRID 194
 RIFLE GRENADE, EXPENDED, M-9 (2) GRID 195
 RIFLE GRENADE, EXPENDED, M-9 GRID 235
 RIFLE GRENADE, EXPENDED, M-11 GRID 174
 RIFLE GRENADE, EXPENDED, M-11 GRID 192

EASTERN BYPASS EE/CA AREA 4
 2.36 INCH ROCKETS, PRACTICE (6)
 SLAP FLARES, EXPENDED (2)
 MK II HAND GRENADE, PRACTICE (2)
 GROUND SIGNAL FLARE, EXPENDED

EASTERN BYPASS EE/CA AREA 5
 M1 PRACTICE MINE ACTIVATOR***
 60MM MORTAR, PRACTICE (3)
 RIFLE SMOKE GRENADE, EXPENDED (2)
 *** UXO

EASTERN BYPASS EE/CA AREA 1
 M3 PRACTICE MINE
 RIFLE SMOKE GRENADE, EXPENDED (2)
 TRIP FLARE, EXPENDED

M2 PARCEL
 3.5 INCH EMPTY ROCKET MOTOR (GRID F14/F15)
 M15 WP GRENADE, EXPENDED (GRID F14/F15)
 M15 WP GRENADE, FRAGMENTS (GRID E16)
 RIFLE GRENADE ILLUM, EXPENDED (GRID C13)
 M15 FUZE AND WP GRENADE, EXPENDED (GRID C14)
 RIFLE GRENADE TAIL BOOM (GRID F16/17)
 SMOKE GRENADE, EXPENDED (GRID F16/17)
 RIFLE GRENADE, SMOKE, EXPENDED (GRID F16/17)
 RIFLE GRENADE, SMOKE, TAIL BOOM (2) (GRID F16/17)
 RIFLE GRENADE, TAIL BOOM (2) (GRID B15)
 FUZE M15 TOP OF GRENADE WP, EXPENDED (2) (GRID D15/16)
 SURFACE FLARE, EXPENDED (GRID D07)
 3" LIVE FLAME THROWER CART, (GRID B07)
 RIFLE FLARE, EXP (2) (GRID A13)
 RIFLE FLARE, EXP (GRID A14)
 TOP OF GRENADE, WP (GRID A15)
 EXPENDED SLAP FLARE (GRID D06)
 TAIL FIN ASSEMBLY (GRID E04)
 RIFLE GRENADE ADAPTER (GRID F16)
 WP HAND GRENADE, FUZED*** (GRID G16/17)
 M1 ANTI-TANK MINE, PRACTICE GRID F16
 TRAINING GRENADE, EMPTY (GRID B7)
 *** UXO



- Legend**
- M1.01 Parcel / M3 Miscellaneous Study Area
 - M2 Parcel
 - Areas Not Included In The M2 Removal Action
 - Bypass ROW Areas
 - M1.01 Parcel and M3 Miscellaneous Property
 - Sampling Grid
 - Grid Number
 - Eastern Bypass EE/CA
 - Eastern Bypass 1ft Cr
 - M2 Parcel


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FIGURE 2-2
OE and OE Scrap Found During Previous Investigations and Clearance Actions
 M1.01 Parcel Engineering Evaluation / Cost Analysis

3.0 SITE CHARACTERIZATION

3.1 SITE INVESTIGATIONS

Site investigations were previously conducted in areas geographically inclusive to the M1.01 Parcel and areas contiguous to the parcel. These included investigations performed for the Eastern Bypass EE/CA, the Eastern Bypass Construction Support Clearance to One Foot, and the M2 Parcel Removal Action. Each of these investigations was described earlier in Section 2.5, Previous Site Investigations. The information from the investigations was evaluated for application to the M1.01 Parcel study area and judged to be sufficiently representative of the presence of OE in the study area that no additional sampling was necessary. This determination was based on the fact that the OE data were collected over more than half of the M1.01 study area and that the areas from which the data were collected provided coverage across the M1.01 Parcel study area. Therefore no additional site investigations were performed as part of this EE/CA. Figure 2-2 shows the locations of the previous site investigations.

3.2 SOURCE, NATURE AND EXTENT OF OE

Based on archival records and the results of the previous site investigations, the evidence indicates that the area was primarily used for training activities. But for one exception, there is no evidence that high explosives (HE) were ever used in the area. Small quantities of HE were used in M-15 White Phosphorus (WP) smoke hand grenades to break open the case for the purpose of exposing/releasing the WP. One WP hand grenade was discovered on the surface in the M2 Parcel, an area adjacent to the M1.01 Parcel (see section 2.5.10). Items found in the previous investigations have been training items of minimal penetration, found at or near the ground surface. Table 3-1 summarizes the OE items and OE scrap and the depth at which each item was found, while Figure 2-2 shows the approximate locations the items were found. Based on the findings of the previous investigations, it is anticipated that any OE items in this area will be found on or near the surface.

3.3 SUMMARY OF ORDNANCE AND EXPLOSIVES HAZARDS

3.3.1 Eastern Bypass EE/CA Investigations

Items discovered during the intrusive investigation of approximately 2.4 acres included 60mm practice mortars, 2.36-inch practice rockets and expended smoke grenades. One pyrotechnic OE item classified as UXO, a mine activator, was recovered and detonated on-site. Evidence of small arms (i.e., expended .30 caliber shells) was also discovered (Zapata Engineering, April 2000).

3.3.2 Eastern Bypass Construction Support Clearance to One Foot

Items recovered in the portion of the Eastern Bypass right-of-way that is located within the M1.01 EE/CA study area (approximately 81 acres) were primarily training and practice items, including smoke and practice hand grenades, slap flares, training and practice mortars (60mm and 81mm), expended rifle grenades, a practice anti-vehicle mine M-12, and 2.36-inch practice rockets and motors. A 3 inch Stokes mortar and two

expended 37mm armor-piercing tracer rounds were also found. No UXO were reported found.

3.3.3 M2 Parcel Removal Action

Items recovered during this removal action (approximately 22 acres) included one white phosphorous hand grenade, classified as UXO, one live flame thrower cartridge, two practice ordnance items (practice anti-tank land mine and practice training grenade), and OE scrap. Small arms (mostly .30 caliber) and Non-OE scrap (cultural metal) were also recovered. The UXO item and the two practice ordnance items were found on or within 6- inches of the ground surface. The flame thrower cartridge was found at 2 inches below the surface. Consistent with the type of training exercises thought to have occurred at the site, all OE and OE scrap were found within six inches of the ground surface, except for one expended rifle grenade which was found on the surface at the bottom of an open hole, 30 inches deep by 3-foot across.



Table 3-1 Ordnance and Explosives (OE) and OE Scrap Found In and Adjacent to the M1.01 Parcel		
Item Description (number found)	Depth, inches ¹	Location
M2 Parcel Removal Action		
OE Items:		
3" live flame thrower cartridge	2	Grid B07
WP hand grenade, fuzed (UXO)	0	Grid G16/G17
OE scrap:		
3.5 inch empty rocket motor	3	Grid F14/F15
M15 WP grenade, expended	2	Grid F14/F15
M15 WP grenade, fragments	2	Grid E16
Rifle grenade illum, expended	1	Grid C13
M15 fuze and WP grenade, expended	1	Grid C14
Rifle grenade tail boom	4	Grid F16/F17
Smoke grenade, expended	0	Grid F16/F17
Rifle grenade, smoke, expended	30 ²	Grid F16/F17
Rifle grenade, smoke, tail boom (2)	1	Grid F16/F17
Rifle grenade, tail boom (2)	2	Grid B15
Fuze M15 top of grenade WP, expended (2)	0	Grid D15/D16
Surface flare, expended	1	Grid D07
Rifle flare, expended (2)	6	Grid A13
Rifle flare, expended	0	Grid A14
Top of grenade, WP	3	Grid A15
Expended slap flare	1	Grid D06
Tail fin assembly	1	Grid E04
Rifle grenade adapter	0	Grid F16
M-1 anti-tank mine, practice	0	Grid F16
Training grenade, empty	0	Grid B07
Eastern Bypass EE/CA		
OE Items:		
M1 Practice Mine Activator (UXO)	2	Area 5
OE Scrap:		
2.36 inch rockets, practice (6)	12, 4	Area 4
Slap flares, expended (2)	12, 4	Area 4
MK II hand grenade, practice (2)	2, 0	Area 4
Ground signal flare, expended	1	Area 4



**Table 3-1
Ordnance and Explosives (OE) and OE Scrap Found In and
Adjacent to the M1.01 Parcel**

Item Description (number found)	Depth, inches¹	Location
60mm Mortar, practice (3), M69	4, 3	Area 5
Rifle smoke grenade, expended (2)	2	Area 5
M8 Practice Mine	3	Area 1
Rifle smoke grenade, expended (2)	2	Area 1
Trip flare, expended	6	Area 1
Eastern Bypass Construction Support Clearance to One Foot		
OE Items:		
None reported.		
OE Scrap:		
60mm mortar, practice, M69	0 – 12	Grid 11
60mm mortar, practice., M69	0 – 12	Grid 23
60mm mortar, practice, M69	0 – 12	Grid 24
60mm mortar, practice, M69 (2)	0 – 12	Grid 25
60mm mortar, practice, M69	0 – 12	Grid 41
60mm mortar, practice, M69	0 – 12	Grid 42
60mm mortar, practice, M69 (2)	0 – 12	Grid 59
60mm mortar, practice, M69 (2)	0 – 12	Grid 73
60mm mortar, practice, M69 (2)	0 – 12	Grid 78
60mm mortar, practice, M69 (2)	0 – 12	Grid 98
60mm mortar, practice, M69 (2)	0 – 12	Grid 115
60mm mortar, practice, M69	0 – 12	Grid 209
60mm mortar, practice, M69 (2)	0 – 12	Grid 221
60mm mortar, practice, M69	0 – 12	Grid 9156
81mm mortar practice, M68	0 – 12	Grid 9085
3 inch Stokes mortar	0 – 12	Grid 194
37mm APT	6	Grid 231
2.36 inch rocket, practice (3)	0 – 12	Grid 211
2.36 inch rocket, practice (4)	0 – 12	Grid 219
2.36 inch rocket, practice (4)	0 – 12	Grid 220
2.36 inch rocket, practice (5)	0 – 12	Grid 228
2.36 inch rocket, practice	0 – 12	Grid 235
2.36 inch rocket, practice	0 – 12	Grid 236
2.36 inch rocket, practice (2)	0 – 12	Grid 247
2.36 inch rocket, practice	0 – 12	Grid 9136
2.36 inch rocket, practice	0 – 12	Grid 9157
2.36 inch rocket, motor	0 – 12	Grid 133



**Table 3-1
Ordnance and Explosives (OE) and OE Scrap Found In and
Adjacent to the M1.01 Parcel**

Item Description (number found)	Depth, inches¹	Location
2.36 inch rocket, motor	0 – 12	Grid 221
2.36 inch rocket, motor	0 – 12	Grid 321
2.36 inch rocket, motor	0 – 12	Grid 322
2.36 inch rocket, motor (2)	0 – 12	Grid 9181
Slap flare, expended	0 – 12	Grid 133
Trip flare	0 – 12	Grid 175
M-12 practice mine	0 – 12	Grid 186
Grenade, hand, practice, MK 2	0 – 12	Grid 9052
Grenade, hand, practice, MK 2 (2)	0 – 12	Grid 9078
Grenade, training, M-69	0 – 12	Grid 115
Grenade, smoke, M-18 (4)	0 – 12	Grid 191
Fuze, hand grenade, expended	0 – 12	Grid 9046
Rifle grenade, expended, M-9 (2)	0 – 12	Grid 169
Rifle grenade, expended, M-9 (2)	0 – 12	Grid 184
Rifle grenade, expended, M-9 (2)	0 – 12	Grid 194
Rifle grenade, expended, M-9 (2)	0 – 12	Grid 195
Rifle grenade, expended, M-9	0 – 12	Grid 235
Rifle grenade, expended, M-11	0 – 12	Grid 174
Rifle grenade, expended, M-11	0 – 12	Grid 192
Rifle grenade, smoke, expended	0 – 12	Grid 9003
Rifle grenade, smoke, tail boom (2)	0 – 12	Grid 9085
Rifle grenade, illumination, expended	0 – 12	Grid 9004
Rifle grenade, illumination, expended (2)	0 – 12	Grid 9007
Rifle grenade, illumination, expended	0 – 12	Grid 9033
Rifle grenade, illumination, expended	0 – 12	Grid 9034
Rifle grenade, illumination, expended (2)	0 – 12	Grid 9049

Footnotes:

¹ "0" inches means item located on surface.

² item was located on the surface at the bottom of an open 30-inch deep hole.

4.0 RISK EVALUATION

4.1 CONCEPTUAL SITE MODEL

The conceptual site model (CSM) provides the basis for identifying and evaluating potential risks to the public and site workers from potential OE within the M1.01 Parcel study area. The CSM includes receptors and potential exposure pathways appropriate to all plausible scenarios. The elements of the CSM are shown in Figure 4-1 and are listed below:

- Sources,
- Release mechanisms,
- Transport and migration mechanisms,
- Potential receptors, and
- Exposure routes

4.1.1 Sources

The sources consist of OE training items that may still contain explosive spotting charges, incendiary material, or propellants.

4.1.2 Release Mechanism

The main release mechanism was troop training in firing, throwing, and placement of these items. A secondary release mechanism may have been disposal of items through burial after training was completed. OE items also may have been released as the result of poor housekeeping, mishandling, and loss.

4.1.3 Transport and Migration Mechanisms

Transport and migration mechanisms for OE for the M1.01 Parcel include frost heave and erosion, which may bring subsurface items to the surface. Precipitation runoff and the mechanical redistribution of soil by people could also lead to a redistribution of OE within the study area.

4.1.4 Potential Receptors/Exposure Routes

Currently the site is not used. Access to the area is limited but only to the extent that road barricades and policing by the City of Anniston Police Department and Department of Defense security personnel are effective in preventing and/or discouraging trespassers. Although barricaded, vehicular access is still possible via the paved Summerall Gate Road, which extends across the lower third of the site (from northeast to southwest). The area is not completely fenced and therefore lacks effective control of access by foot traffic. The most plausible receptor under the current land use would be the recreational site user (hunters and hikers) who bypass the existing limited controls. His exposure would be limited to direct contact with OE on the ground surface.

4.1.4.1 The M1.01 Parcel is an area with a high likelihood of redevelopment. Future uses of the area may include the Eastern Bypass transportation corridor, residential, commercial/industrial, and recreational/hunting activities. Construction activities that

would disturb the soil for some depth would be associated with any significant reuse scenario. Terrestrial wildlife also is exposed to the site's surface and subsurface soils.

4.2 RISK ASSESSMENT

The safety risks associated with encountering OE, specifically UXO, within the M1.01 Parcel were evaluated based upon information developed during the previous investigations/removals completed in the immediate vicinity of the M1.01 Parcel (see Sections 2 and 3). Basing the risk evaluation on existing site-specific information provides a "baseline" qualitative estimate of the potential OE hazards due to present conditions if no action is taken to reduce the risk. This risk evaluation is completed for both current and anticipated future land uses.

4.2.1 Approach

The safety risks are qualitatively determined by the hazards associated with the specific OE items that may be present at the site and the likelihood of the public coming into contact with these items. The hazards associated with the OE will vary depending on the type and condition of ordnance item, whether or not it is fused, and the amount of energetic material that may be present. These factors give an indication of the potential for an unexpected detonation and possible personal injury or death upon encountering dangerous OE items. The potential that the public will come into contact with one of these dangerous items will vary depending on the quantity and distribution of the items present across the site; how accessible the items are; and the projected frequency and intensity of human interaction with the land associated with the future activities. This later condition will vary depending on the types of land use activities (e.g., construction excavation versus hiking) and the number of persons using or passing through the area.

4.2.2 Potential OE Hazard

OE and OE scrap found during the previous investigations and clearance actions provide a clear indication of the types of OE that may still be present within the M1.01 Parcel. The OE hazard that may remain at the site can be evaluated based on those findings. Items found consisted almost entirely of practice items. For training purposes, these items were designed to be less dangerous than their High Explosive (HE) equivalent and typically contain a small explosive spotting charge and/or pyrotechnic material that could still function. These items however, may still cause personal injury or death due to unexpected explosion or fire. The recovered items that were not practice or training items were expended items presenting no OE risk.

4.2.2.1 Three OE items, two of which were classified as UXO, were found:

- UXO: One (1) white phosphorous (WP) smoke hand grenade M15 found in the northeast corner of the M2 Parcel in Grid F16,
- UXO: One M1 practice mine activator found east of the M2 Parcel and south of Summerall Gate Road during the Eastern Bypass EE/CA sampling event, and
- OE (non UXO): One live flame thrower cartridge found in the M2 Parcel in Grid B07.

4.2.2.2 The WP smoke hand grenade was lying on the surface and was determined to be fuzed. The grenade is a bursting type grenade that contains 15 oz. of WP; it is used for signaling, screening and incendiary purposes and burns for about 60 seconds. Upon release, WP burns, producing a white smoke, and presenting a fire hazard as well as a burn hazard to anyone that may come into direct contact with it. Vapors from the burning WP can be an irritant to the eyes, nose, throat and lungs.

4.2.2.3 An M20 practice mine with an expended M604 training fuze and a M1 practice activator in the secondary fuze well were found in the Eastern Bypass EE/CA sampling Area 5 (see Figure 2-2). These practice mines were used to train personnel in how to position and remove mines. The training fuze (approximately 314 milligrams) was designed to provide a noise and smoke return when contacted by a vehicle or tank passing over it. The M1 practice activator performs the same function (noise and smoke return) for booby-trapping a mine. A live practice mine presents a low risk unless it is disassembled and then purposely tampered with by trying to activate the fuze or M1 activator. Encounters with these practice mines should be extremely rare as they were training items to be reused and, therefore, were accountable in the military supply system.

4.2.2.4 The live flame thrower cartridge was an ignition cylinder for a flame thrower and was suspected to contain black powder. It was found in the M2 Parcel at a depth of 2 inches.

4.2.3 OE Density

The presence of OE presents a potential for personal injury. However, this potential is highly dependent upon the quantity of OE items present. The less OE present, the lower the density of OE, and the lower the risk of becoming exposed and possibly harmed.

4.2.3.1 OE density was estimated for the M1.01 Parcel study area. The density was calculated from the number of OE items found and the area over which these items were found. The number of OE and OE scrap items recovered during these operations and the representative areas over which these items were found and the OE density estimates are summarized in the table below. Note that the density estimate for the M1.01 Parcel study

Sampled Area	Approximate Area (Acres)	Items ¹		OE Density (Items/acre)
		OE/UXO	OE Scrap	
Eastern Bypass EE/CA	—	1	20	—
Eastern Bypass Construction Support Clearance to One Foot	81	0	85	0
M2 Parcel Removal Action	22	2	24	0.09
Totals	103	3	129	0.03

¹ See Table 3-1.

area (0.03 items per acre, or one item per 34 acres) includes all three OE items listed in the table, however, the total area upon which the calculation is based includes only the Eastern Bypass one foot clearance area (81 acres) and the M2 Parcel removal action area (22 acres). The Eastern Bypass EE/CA investigation area (less than 2.41 acres) was not included since the entire area was not sampled (see section 2.5.8 for clarification).

4.2.3.2. Of the three OE items, two were classified as UXO (see Section 3.3). Almost all OE are expected to be within approximately one foot of the ground surface based on the reported findings during these previous investigations and removal actions. The types of OE scrap items found during the Eastern Bypass Construction Support Clearance to One Foot would also suggest any OE would be within approximately one foot of the ground surface. However, since the removal was limited to a depth of one foot, the results cannot be completely relied upon to support that conclusion. However, the data may be used to further validate the types of ordnance found in the M1.01 area. One OE scrap item (an expended rifle grenade) was found in the M2 Parcel on the surface at the bottom of an open hole, 30 inches deep by 3-foot across. However, all remaining OE and OE scrap items within the M2 Parcel and the Eastern Bypass EE/CA sampling areas were at 12 or less inches below the surface.

4.2.4 Exposure

As indicated above (Section 4.1.4), limited control of site access exists at the present time and current OE risk is thought to be limited to the occasional trespasser. However, proposed future land uses involve more frequent and intense activities and may include residential, mixed business, and passive recreation. With each of these land uses comes different types of activities and variations in the number of persons frequenting the area.

4.2.4.1 Of these land uses, residential poses the highest level of concern primarily due to potential worker-exposure during construction activities, and the subsequent unrestricted access/uncontrolled intrusive activities (e.g., digging) of the residents. Potentially exposed residents include both children and adults. The risks may be greater for the children, especially the younger ones who may not be as educable or reliably cognizant of the risks as are the adults. Due to the probability that intrusive activities will be uncontrolled, significant potential risks are presented by both surface and subsurface OE. Surface and subsurface removal of OE would be required to provide the greatest risk reduction for residential land use.

4.2.4.2 Mixed business use may pose the second highest potential risk. Construction site workers, especially those involved in any form of intrusive activity (e.g., driving stakes, drilling, and excavation) are potentially at risk of encountering and contacting OE. To reduce the risk of worker-exposure, UXO support during construction activities would be required. This approach should be effective at reducing the risk in the footprint areas where construction is planned.

4.2.4.3 Passive recreation (e.g., hiking, bike riding, bird watching) should pose the least potential risk as it generally does not involve ground intrusive activities (e.g., digging, driving tent stakes, and building camp fires). Potential worker-exposure may exist in

passive recreation areas if any structures (e.g., shelters) are built at which time UXO support would be warranted to protect the workers.

4.2.5 Summary

The safety risks can be expected to be highest for the areas in which ground intrusive activities are anticipated. Ground intrusive activities are anticipated for both residential and mixed-business land uses. The risk associated with residential is likely to be greater for the reasons cited earlier (less positive control of future intrusive activities). The safety risks associated with passive recreation should be much lower since no intrusive activities are anticipated.

The relative risks resulting from OE hazard is considered to be low. The possibility exists that some of the OE items that may still be present within the M1.01 Parcel could contain small explosive spotting charges and incendiary material that could still function if the item was not previously expended. However, this risk is considered to be low and not life-threatening. The estimated density of OE is also important in assessing the relative risks. The density reported above (i.e., 0.03 OE items/acre) is considered to be low and should contribute significantly to minimizing the risk to the public and to reducing the added concern from any OE items that may remain following implementation of the selected risk reduction alternative.

Figure 4-1
M1.01 Parcel Conceptual Site Model

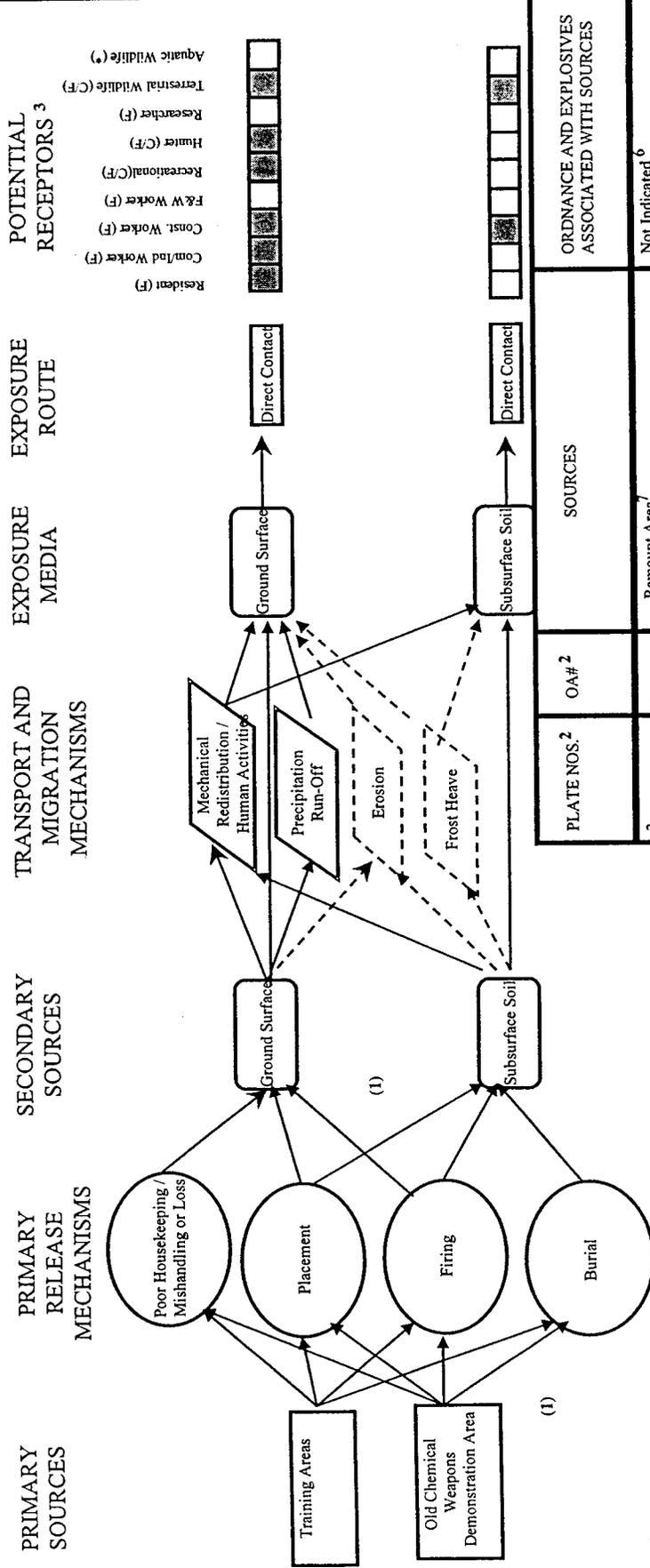


PLATE NOS. ²	OA# ²	SOURCES	ORDNANCE AND EXPLOSIVES ASSOCIATED WITH SOURCES
3	-	Remount Area/ Training Area 10 (TA-10) ⁷	Not Indicated ⁶ Not Indicated ⁶ (compass and navigation training)
5, 6, 7 & 10	OA-76	Old Chemical Weapons Demonstration Area ⁴	Flame throwers; Smoke Grenades; Rifle Smoke Grenades; Thermite Grenades; Land Mines; Smoke Pots; Primacord; White Phosphorous; field flame expedient
8	AOC 5	South Gate Toxic Gas Yard ⁴ (located within AOC5) Eastern Bypass EE/CA Investigation Areas ⁵	Not Indicated
8	AOC 20		60mm Practice Mortars; 2.36" Practice Rockets; Expanded Smoke Grenades; Mine Activator; Small Arms
none	none	Eastern Bypass Construction Support Clearance to One Foot ⁵	60mm Practice Mortars; Smoke and Practice Hand Grenades; Practice Anti-Vehicle Mine; 2.36" Practice Rockets
none	none	M2 Parcel Removal Action ⁵	White Phosphorous Hand Grenade; Practice Anti-Tank Land Mine; Practice Training Grenade; Small Arms; Expanded Rifle Grenades

NOTES:

- 1 Dashed lines indicate a linkage that is indicated to be present in only a small number of specific locations.
- 2 Plate and OA numbers obtained from the Fort McClellan Archives Search Report (USACE, St Louis District, 1999a, 1999b)
- 3 (C) = Current Receptor; (F) = Potential Future Receptor; (*) = Not plausible for this sector
- 4 see discussion in Section 2.5.1 through 2.5.3 of text
- 5 see discussion in Section 2.5 & 3.3 of text
- 6 area was not suspected of training activities involving ordnance
- 7 Because there was no indication of ordnance use, these source areas were not discussed in text section 2.5.

5.0 IDENTIFICATION OF RESPONSE ACTION OBJECTIVES

5.1 INTRODUCTION

A number of factors must be considered when establishing specific objectives for a response action. The objectives must be able to meet the requirements set forth in the applicable or relevant and appropriate requirements (ARARs), while still being realistic and achievable in terms of cost. The alternatives considered for achieving the goal of reducing the explosive threat posed by potential OE remaining at the M1.01 Parcel, must be effective, implementable, and economical. These criteria were used to evaluate the potential response actions considered for the M1.01 Parcel (see Section 6).

5.2 RESPONSE ACTION OBJECTIVES

The EE/CA is intended to determine the most effective risk reduction alternative that will meet the response action objectives. The objectives are listed below:

- Ensure protectiveness of site workers and public during all response action operations;
- Ensure overall protectiveness of the public after completion of the response action;
- Comply with ARARs to the extent practicable; and
- Facilitate the intended future uses of the property.

5.2.1 The Army intends to comply with ARARs to the extent practicable. Ordnance poses a unique safety risk that must be considered in determining if it is “practicable” to comply with an ARAR. If an ordnance item is discovered, and it is too unstable to move, it must be blown in place. For example, if an ordnance item is found next to a protected plant, the risk of harming the plant will be weighed against the risk of injuring the worker and potential members of the public that might come into contact with the ordnance item. In such a situation, human safety outweighs protection of the plant. Therefore a waiver of the ARAR that ordinarily would require protection of the plant would be appropriate.

5.3 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

5.3.1 *Applicable* requirements are those cleanup standards, control standards, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant or contaminant, remedial action, location, or other circumstance at a CERCLA site.

Relevant and appropriate requirements are cleanup standards and control standards, and the substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not “applicable” to ordnance, or maybe to hazardous substances, pollutants, or contaminants, a remedial action, the location, or other circumstance at CERCLA site, address problems or situations sufficiently similar to those encountered at a site to where their use is well-suited.

5.3.2 Although the requirements of CERCLA Section 121 generally apply as a matter of law only to remedial actions, the U. S. Army Corps of Engineers’ policy for OE removal actions is that ARARs will be identified and attained to the extent practicable. Two factors are applied to determine whether identifying and attaining ARARs is practical in a

particular response situation. These factors include the urgency of the situation and the scope of the response action to be taken.

5.3.3 ARARs are identified on a site-specific basis and involve a two-part analysis. First, a determination is made whether a given requirement is *applicable*. Second, if it is not applicable, a determination is made whether it is both *relevant and appropriate*. When this analysis results in a determination that a requirement is both *relevant and appropriate*, such a requirement must be complied with to the same degree as if it were *applicable*. There are three categories of ARARs:

- chemical-specific
- location-specific
- action-specific

5.3.4 According to the National Contingency Plan (NCP), chemical-specific ARARs are usually health or risk-based standards that establish the acceptable amount of concentration of a chemical that may remain in, or be discharged to, the ambient environment. Location-specific ARARs generally are restrictions placed upon the concentration of hazardous substance or the conduct of activities solely because they are in special locations. Some examples of special locations include flood plains, wetlands, historic places, and sensitive ecosystems or habitats. Action-specific ARARs are usually technology or activity-based requirements or limitations placed on actions taken with respect to hazardous wastes, or requirements to conduct certain actions to address particular circumstances at a site.

5.3.5 Non-promulgated advisories or guidance documents issued by federal or state governments do not have the status of potential ARARs. However, these “to be considered” (TBC) criteria may be used in determining the necessary level of cleanup for human safety and protection of the environment. In addition there are specific requirements that must be followed when conducting OE Response Actions. Potential ARARs and TBCs for the EE/CA of the M1.01 Parcel are discussed in the following paragraphs.

5.3.6 Specific Requirements and TBCs. OE response actions will be executed in compliance with the *Military Munitions Rule* (40 CFR Part 260 et al); the OE requirements of *Ammunition and Explosives Safety Standards* (DoD 6055.9-STD); the *Army Toxic Chemical Agent Safety Program* (Army Regulation [AR] 385-61); *Ammunition and Explosives Safety Standards* (AR 385-64); *Toxic Chemical Agent Safety Standards* (Department of the Army Pamphlet [DA Pam] 385-61); and HQDA LTR 385-00-02 *Explosives Safety Policy for Real Property Containing Conventional Ordnance and Explosives*, and other applicable OE publications.

5.3.7 Chemical-Specific ARARs. Portions of the following are potential State ARARs:

- Alabama Hazardous Waste Management & Minimization Act, ALA. CODE 22-30-1
- Alabama Safe Drinking Water Act, ALA CODE 22-31-1
- Alabama Water Pollution Control Act, 22-23-1

- Alabama Solid Waste Disposal Act, 22-27-1

5.3.8 The specific portions of these ARARs which are applicable to the selected alternative will be identified in the site-specific removal action work plan.

5.3.9 Location-Specific ARARs. There are numerous potential location-specific ARARs that include the protection of historical and archeological resources, the protection of wetlands, protection of wildlife and habitat resources, and management considerations for forested areas identified for Fort McClellan in the Environmental Impact Statement for Fort McClellan (USACE, Mobile District, 1998). The Final Environmental Impact Statement also identified an “unnamed cemetery” located near the western edge of the M1.01 Parcel. Measures will be included in the site-specific removal action work plan to address the protection of the cemetery.

5.3.10 Action-Specific ARARs. The National Environmental Policy Act (NEPA), as implemented by Army Regulation (AR) 200-2, Environmental Effects of Army Actions, is applicable to future land use alternatives that involve developing the site for commercial or residential purposes which could result in environmental impacts.

5.4 INTENDED LAND USE

If the M1.01 Parcel is found suitable for transfer after the recommended risk reduction alternative has been implemented, it is intended that the property will be transferred to the Anniston-Calhoun County Fort McClellan Development Joint Powers Authority. The proposed future use of the property is residential, mixed business, and passive recreation.