

**Final
Site-Specific Field Sampling Plan,
Site-Specific Safety and Health Plan, and Site-Specific
Unexploded Ordnance Safety Plan Attachments,
Area North of Military Operations in Urban Terrain
(MOUT) Site**

**Fort McClellan
Calhoun County, Alabama**

**Task Order CK10
Contract No. DACA21-96-D-0018
IT Project No. 796887**

December 2001

**Final
Site-Specific Field Sampling Plan Attachment
Area North of Military Operations in Urban Terrain (MOUT)
Site**

**Fort McClellan
Calhoun County, Alabama**

Prepared for:

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**Task Order CK10
Contract No. DACA21-96-D-0018
IT Project No. 796887**

December 2001

Revision 0

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List of Acronyms

See Attachment 1, List of Abbreviations and Acronyms

Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK10, IT Corporation (IT) will conduct site investigation activities at the Area North of Military Operations in Urban Terrain (MOUT) Site, at Fort McClellan, Calhoun County, Alabama, to determine the presence or absence of potential site-specific chemicals at this site. The purpose of this site-specific field sampling plan (SFSP) is to provide technical guidance for sampling activities at the Area North of MOUT Site.

The Area North of MOUT Site is located in the northern area of the Main Post, just north of the MOUT Site. The Area North of MOUT is located just south of the former Prisoner of War Training Facility off of Falcon Road and covers approximately 50 acres. This area is partially overlapped by the range fans of Parcels 88Q, 100Q, 101Q, 102Q, and 107Q, but does not appear to contain any of the firing lines or impact areas for those ranges. These overlapping ranges are described as rifle/machine gun ranges, except for Parcel 107Q, which is a former grenade range.

A site visit, by IT in October 2001, revealed that this area appears to have been used for training maneuvers with live fire. Two ground scars and a borrow area are present at this site. The borrow area is in the northeast corner of the site and the two ground scars, aligned roughly parallel to one another, are in the southern portion of the site. A large mound was observed along the northern edge of the borrow area in the northern portion of the site. North of the borrow area are some small piles of wood and scrap metal. Several bullet fragments were noted on the surface soil within both ground scars. The southwestern ground scar contained a minimal amount of miscellaneous construction debris consisting of broken concrete, polyvinyl chloride pipe, scrap metal, and unlabeled 5-gallon cans. There were several fox holes in the southwestern portion of the site including a line of fox holes along the southwestern boundary of this area. The bullet fragments observed on the surface of the ground scars may have been fired from the fox holes using the ground scars as impact areas.

Also, there are several shot up 55-gallon drums scattered over the site in addition to small-arms ammunition casings (7.62 millimeter) and M-16 (5.56 millimeter) blanks.

Specifically, IT will collect 22 surface soil samples, 22 subsurface soil samples, 3 groundwater samples, 2 surface water samples and 2 sediment samples at this site. Potential contaminant sources at Area North of MOUT Site are primarily lead and explosives. Samples collected

during the SI will be analyzed for metals and nitroaromatic explosives. Approximately ten percent of the samples will also be analyzed for volatile organic compounds, semivolatile organic compounds, pesticides, and herbicides. In addition, sediment samples will be analyzed for total organic carbon and grain size. Results from these analyses will be compared with site-specific screening levels, ecological screening values, and background values to determine if potential site-specific chemicals are present at the site at concentrations that pose an unacceptable risk to human health or the environment.

The presence of unexploded ordnance (UXO) is possible at Area North of MOUT Site because it is within the area of former active range fans. Therefore, IT will conduct UXO avoidance activities as outlined in Appendix E of the installation-wide sampling and analysis plan (SAP) and the attached site-specific UXO safety plan prior to initiating field activities at Area North of MOUT Site. The surface sweeps and downhole surveys will be conducted to identify anomalies for the purpose of UXO avoidance.

This SFSP attachment to the SAP for Area North of MOUT Site, will be used in conjunction with the site-specific safety and health plan, the site-specific UXO safety plan, the installation-wide work plan, and the SAP. The SAP includes the installation-wide safety and health plan, waste management plan, ordnance and explosives management plan, and quality assurance plan. Site-specific hazard analyses are included in the site-specific safety and health plan.

1.0 Project Description

1.1 Introduction

The U.S. Army is conducting studies of the environmental impact of suspected contaminants at Fort McClellan (FTMC) in Calhoun County, Alabama, under the management of the U.S. Army Corps of Engineers (USACE)-Mobile District. The USACE has contracted IT Corporation (IT) to provide environmental services for the site investigation (SI) at the Area North of Military Operations in Urban Terrain (MOUT) Site, under Task Order CK10, Contract Number DACA21-96-D-0018.

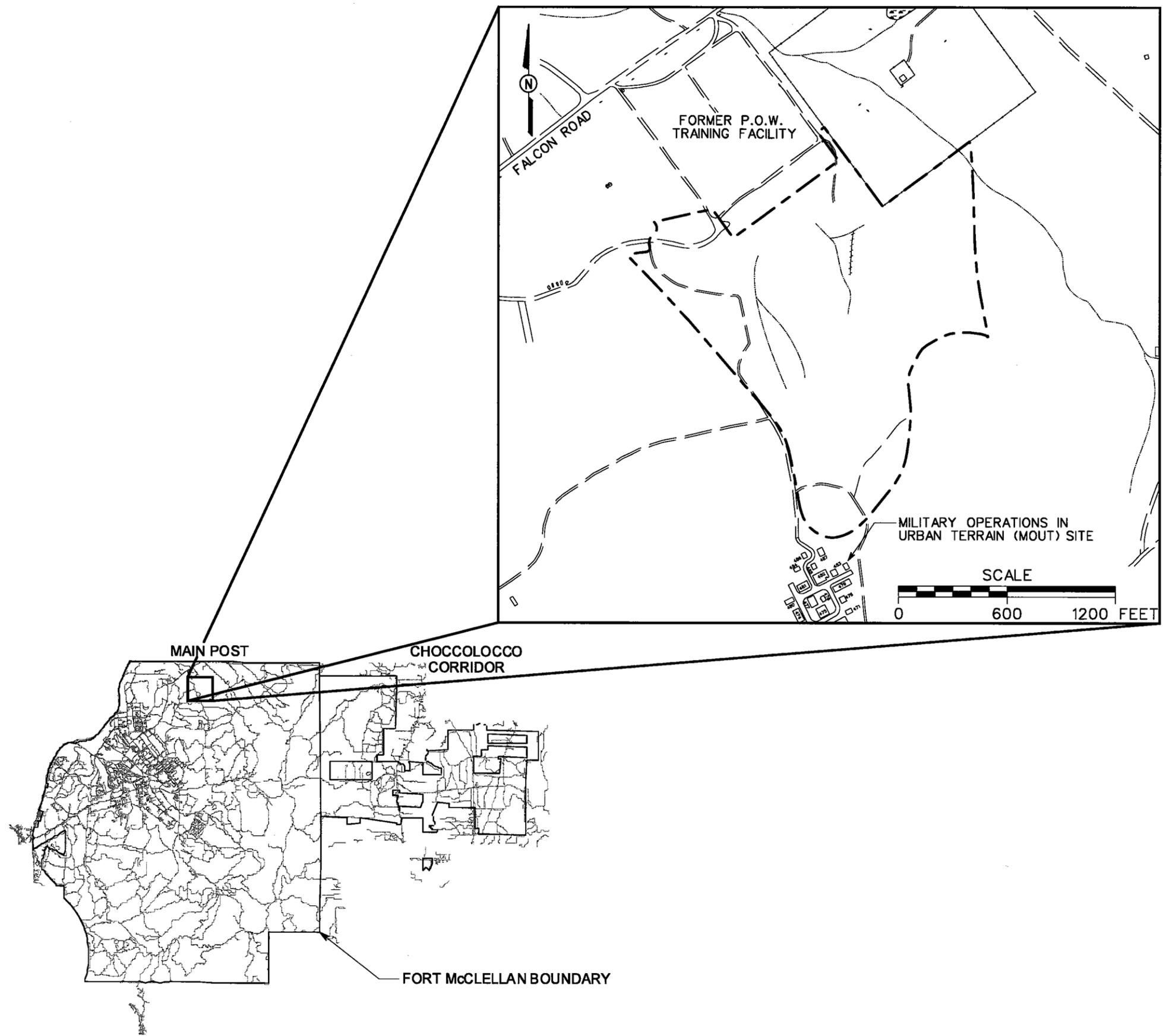
This site-specific field sampling plan (SFSP) is an attachment to the installation-wide sampling and analysis plan (SAP) for FTMC (IT, 2000a) and has been prepared to provide technical guidance for sample collection and analysis at the Area North of MOUT Site. This SFSP will be used in conjunction with the site-specific safety and health plan (SSHP) and site-specific unexploded ordnance (UXO) safety plan developed for the Area North of MOUT Site, and the installation-wide work plan (WP) (IT, 1998) and SAP. The SAP includes the installation-wide safety and health plan, waste management plan, ordnance and explosives management plan, and quality assurance plan (QAP). Site-specific hazard analyses are included in the SSHP.

1.2 Site Description

The Area North of MOUT Site is located in the northern area of the Main Post, just north of the MOUT Site and just south of the former Prisoner of War Training Facility off of Falcon Road (Figures 1-1 and 1-2). The Area North of MOUT Site covers approximately 50 acres. This area is partially overlapped by the range fans of Parcels 88Q, 100Q, 101Q, 102Q, and 107Q, but does not appear to contain any of the firing lines or impact areas for those ranges. These overlapping ranges are described as rifle/machine gun ranges, except Parcel 107Q, which is a former grenade range.

A site visit, by IT in October 2001, revealed that this area appears to have been used for training maneuvers with live fire. Two ground scars and a borrow area are present at this site. The borrow area is in the northeast corner of the site and the two ground scars, aligned roughly parallel to one another, are in the southern end of the site (Figure 1-2). A large mound was observed along the northern edge of the borrow area in the northern part of the site. North of the borrow area are some small piles of wood and scrap metal. Several bullet fragments were noted on the surface soil within both ground scars. The southwestern ground scar contained a minimal

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 PROJ. MGR.: J. YACOUB
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 ENGR. CHCK. BY: S. MORAN
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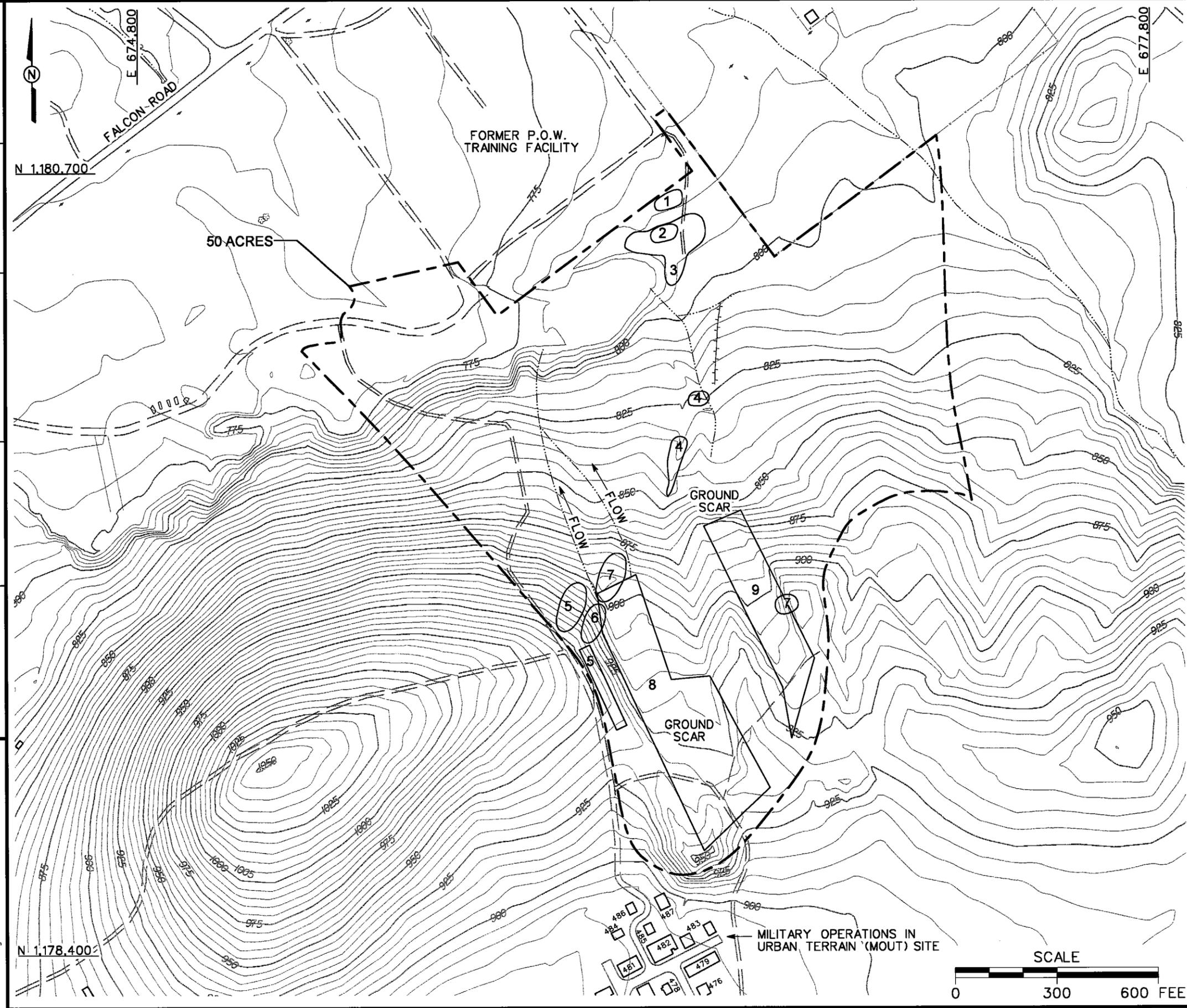
- LEGEND**
- UNIMPROVED ROADS AND PARKING
 - PAVED ROADS AND PARKING
 - BUILDING
 - AREA OF INVESTIGATION
 - SURFACE DRAINAGE / CREEK
 - FENCE
 - UTILITY POLE

FIGURE 1-1
SITE LOCATION MAP
AREA NORTH OF MOUT SITE

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 Contract No. DACA21-96-D-0018



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 PROJ. MGR.: J. YACOUB
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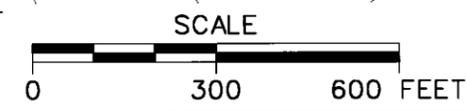
- LEGEND**
- UNIMPROVED ROADS AND PARKING
 - PAVED ROADS AND PARKING
 - BUILDING
 - TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
 - TREES / TREELINE
 - AREA OF INVESTIGATION
 - SURFACE DRAINAGE / CREEK
 - FENCE
 - UTILITY POLE

TRAINING AIDS/PHYSICAL FEATURES OBSERVED

- ① WOOD AND METAL DEBRIS
- ② LARGE MOUND
- ③ BORROW AREA
- ④ APPROXIMATE LOCATION OF RUSTED 55-GALLON DRUMS WITH BULLET HOLES
- ⑤ SEVERAL FOX HOLES
- ⑥ SLAP FLARE, SMALL ARMS 7.62mm CASINGS, AND MANY M-16 (5.56mm) BLANKS
- ⑦ APPROXIMATELY 6 SHOT UP 55-GALLON DRUMS
- ⑧ GROUND SCAR WITH BULLET FRAGMENTS AND A SMALL AMOUNT OF MISCELLANEOUS DEBRIS (e.g., CONCRETE, PVC PIPE, METALS AND 5-GALLON CANS)
- ⑨ GROUND SCAR WITH BULLET FRAGMENTS

FIGURE 1-2
SITE MAP
AREA NORTH OF MOUT SITE

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 MOBILE DISTRICT
 FORT McCLELLAN
 CALHOUN COUNTY, ALABAMA
 Contract No. DACA21-96-D-0018



amount of miscellaneous construction debris consisting of broken concrete, polyvinyl chloride pipe, scrap metal, and unlabeled 5-gallon cans. There were several fox holes in the southwestern portion of the site including a line of fox holes along the southwestern boundary of this area. The bullet fragments found on the surface of the ground scars may have been fired from the fox holes using the ground scars as impact areas.

Also, there are several shot up 55-gallon drums scattered over the site in addition to small-arms ammunition casings (7.62 millimeter) and M-16 (5.56 millimeter) blanks.

1.2.1 Archive Search Report Ranges

The *Archives Search Report, Maps, Fort McClellan, Anniston, Alabama* (ASR) (USACE, 1999a) shows five other ranges (areas) on Plates 3, 4, 5, and 6 that extend through the area of investigation. These ranges were not described in the FTMC environmental baseline survey (EBS) for Parcels 88Q, 100Q, 101Q, 102Q and 107Q. Figures 1-3, 1-4, 1-5, and 1-6, taken from the ASR map plates, show the additional ranges present in the study area from the time period of World War I (ASR Plate 3) through 1973 (ASR Plate 6). Most of the ranges shown in the ASR are not named or described. Each of the ASR plates represents a different time period of range use at Fort McClellan. The ASR plates that show additional ranges in this area of investigation are as follows:

- Plate 3 - World War I Use
- Plate 4 - Inter-War Range Use (World War I to World War II)
- Plate 5 - World War II to 1950 Range Use
- Plate 6 - 1950 to 1973 Range Use.

Plate 3 of the ASR. Plate 3 of the ASR shows two ranges in the area of investigation for this SI. These two ranges are not named or described in the ASR. The ranges are identified on Figure 1-3 as Unnamed Range A and Unnamed Range B. Unnamed Range A overlaps three EBS Parcels (100Q, 101Q, and 102Q). Unnamed Range B falls within EBS Parcel 100Q and may be inferred to represent Parcel 101Q because of their similar location and orientation. The orientation of Unnamed Range A and Unnamed Range B and the location of firing lines presented in the EBS for Parcels 100Q, 101Q, and 102Q suggest the direction of fire to have been toward the southeast. The likely impact area for Unnamed Range A and Unnamed Range B is the hillside located southeast of the area of investigation (Figure 1-3).

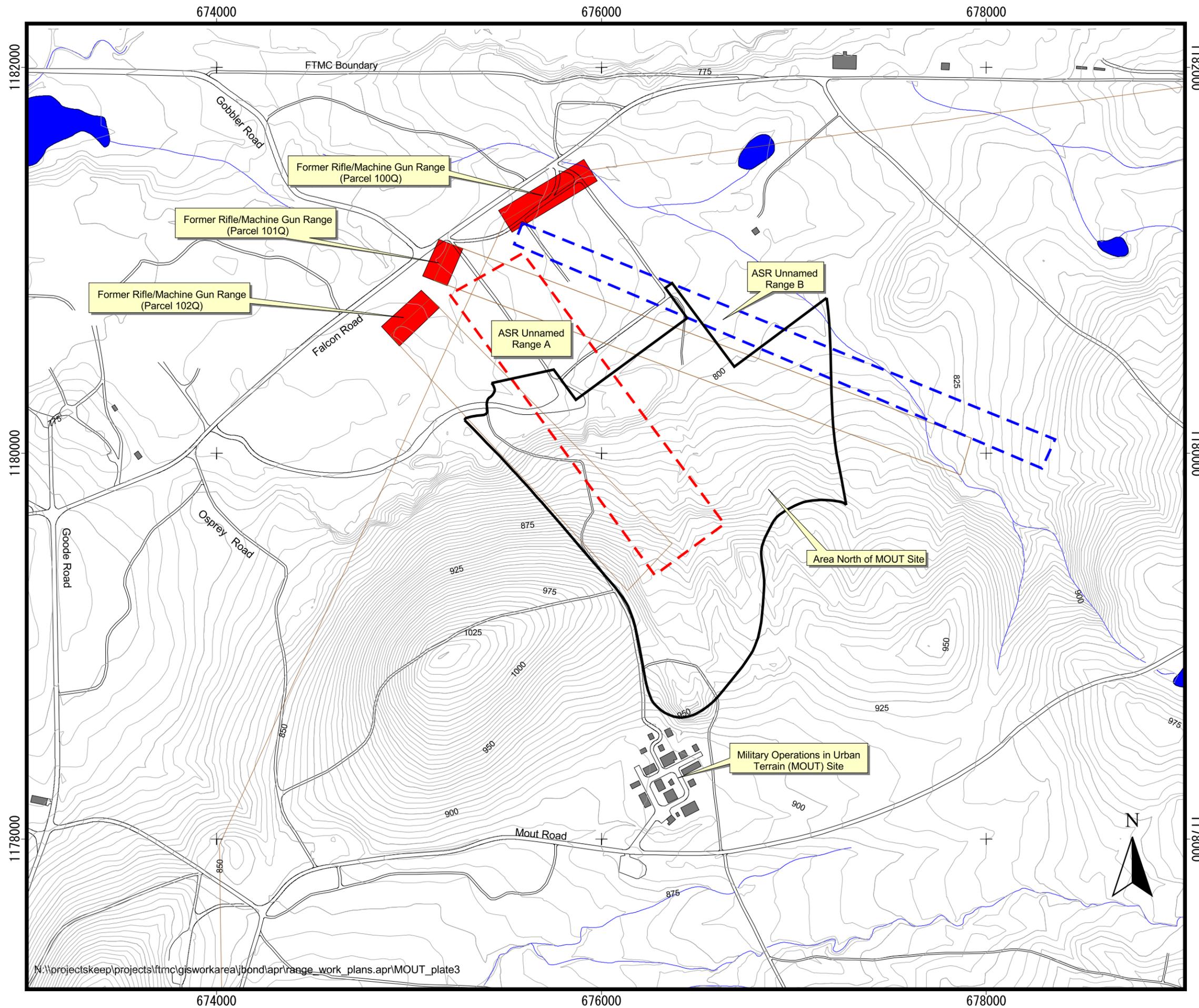
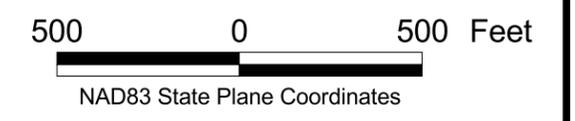
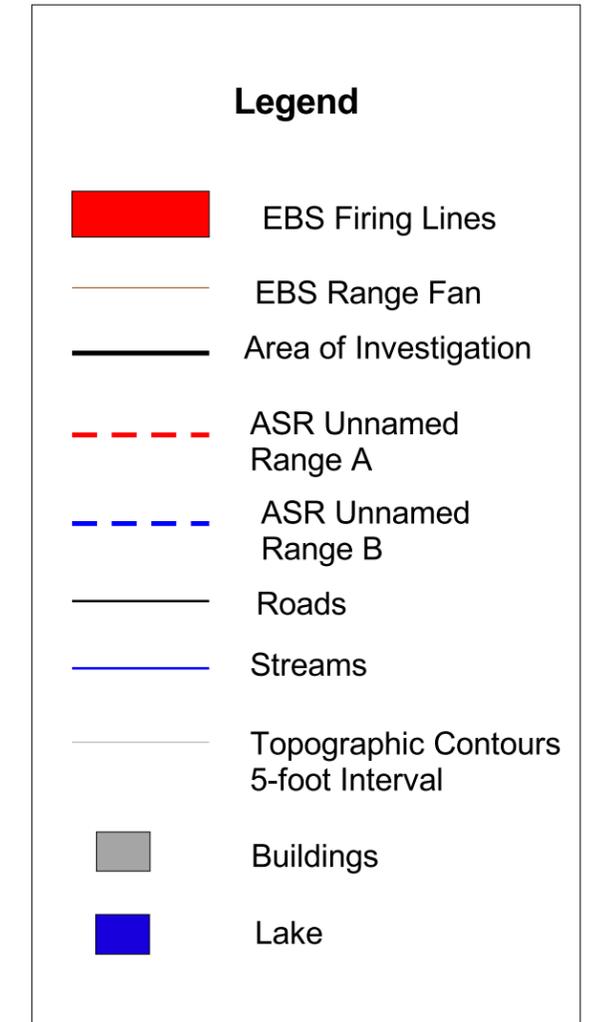


Figure 1-3
ASR Plate 3 Range Location Map
Area North of MOUT Site



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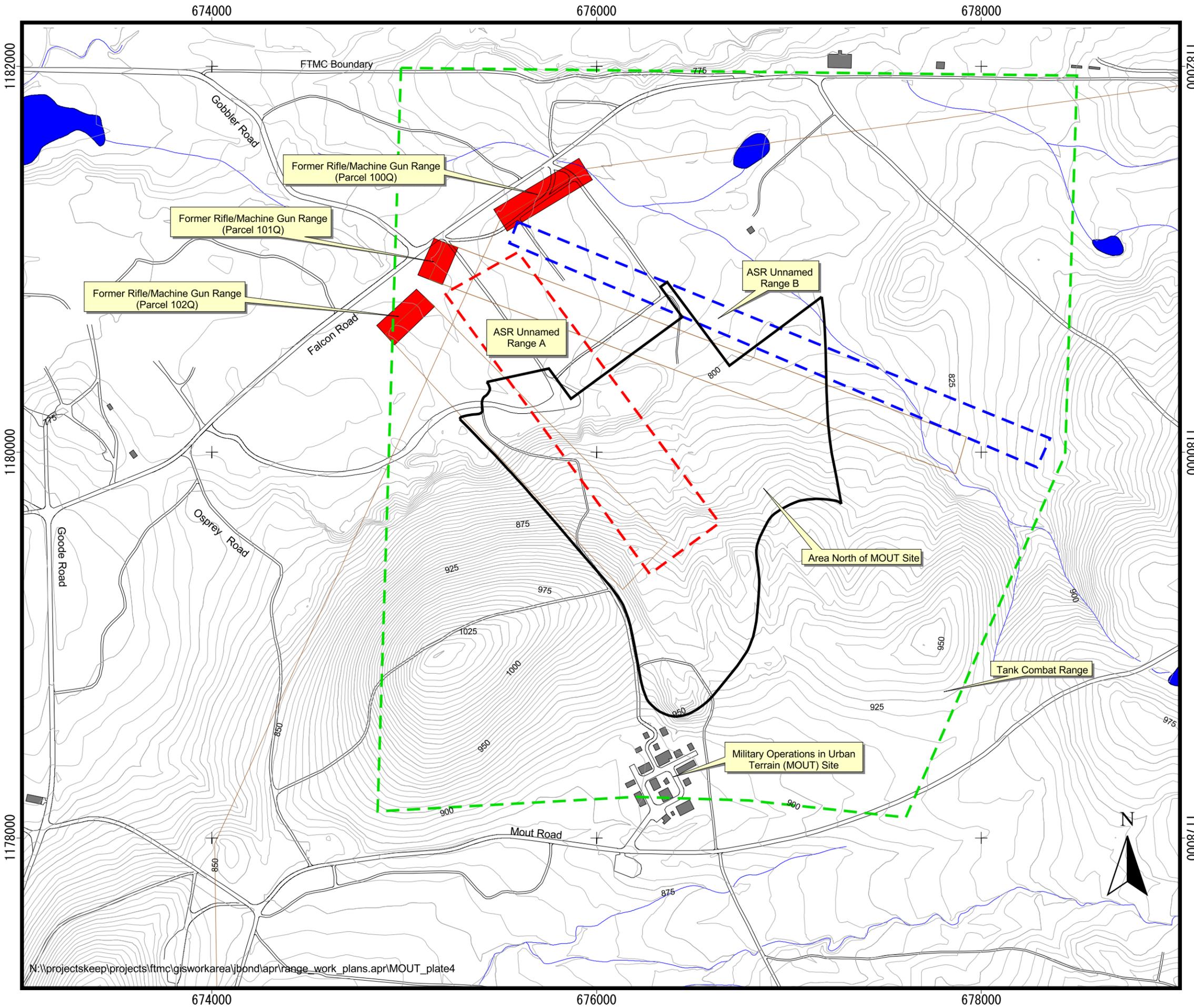
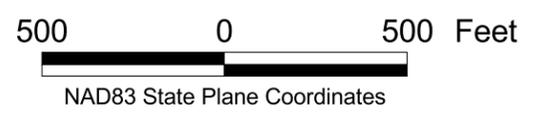


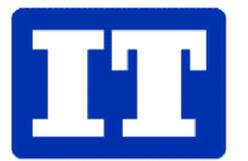
Figure 1-4
ASR Plate 4 Range Location Map
Area North of MOUT Site

Legend

-  EBS Firing Lines
-  EBS Range Fan
-  Area of Investigation
-  Tank Combat Range
-  ASR Unnamed Range A
-  ASR Unnamed Range B
-  Roads
-  Streams
-  Topographic Contours 5-foot Interval
-  Buildings
-  Lake



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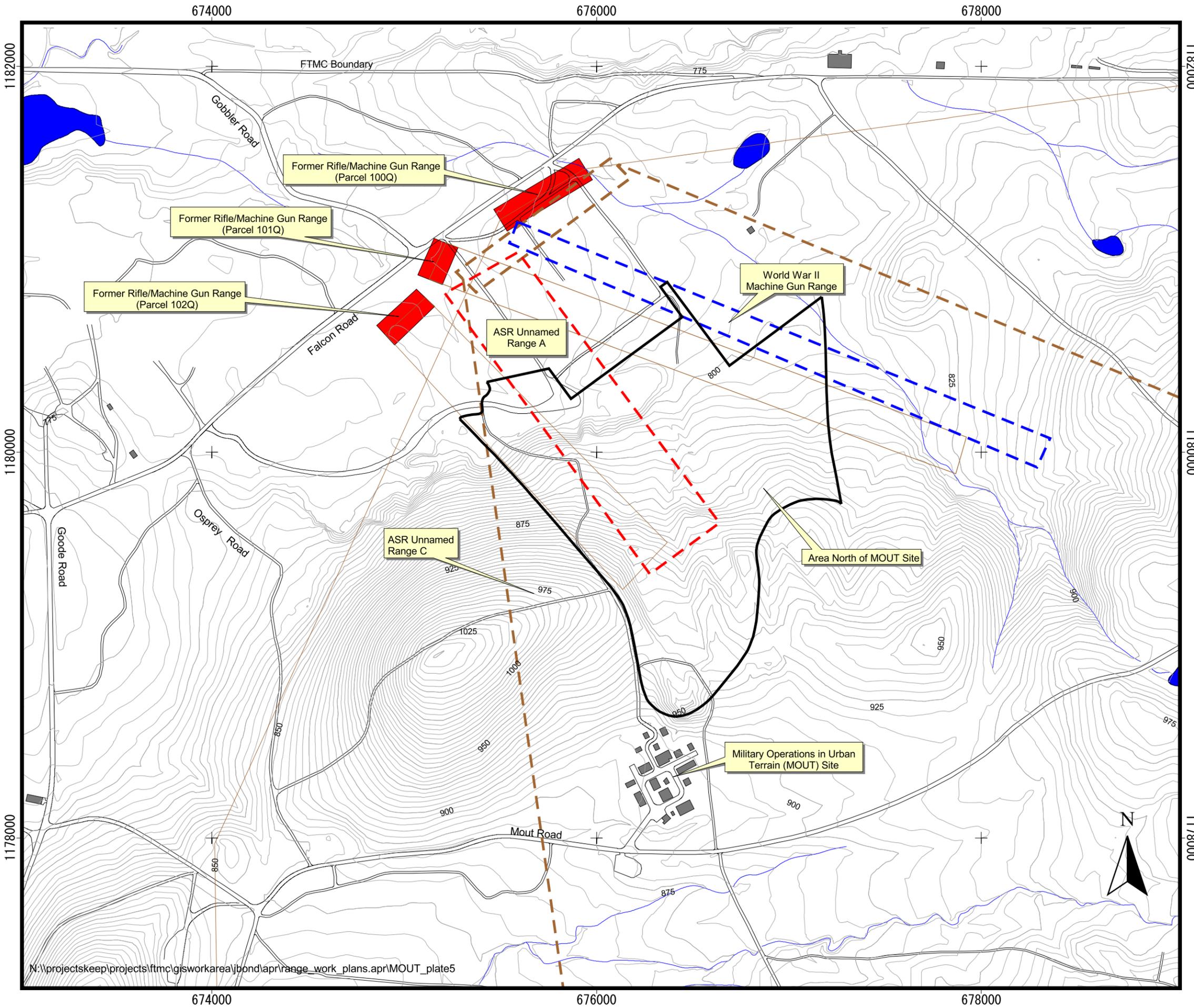
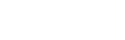
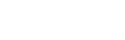
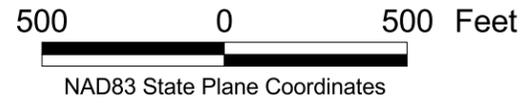


Figure 1-5
ASR Plate 5 Range Location Map
Area North of MOUT Site

Legend

-  EBS Firing Lines
-  EBS Range Fan
-  Area of Investigation
-  World War II Machine Gun Range
-  ASR Unnamed Range A
-  ASR Unnamed Range C
-  Roads
-  Streams
-  Topographic Contours 5-foot Interval
-  Buildings
-  Lake



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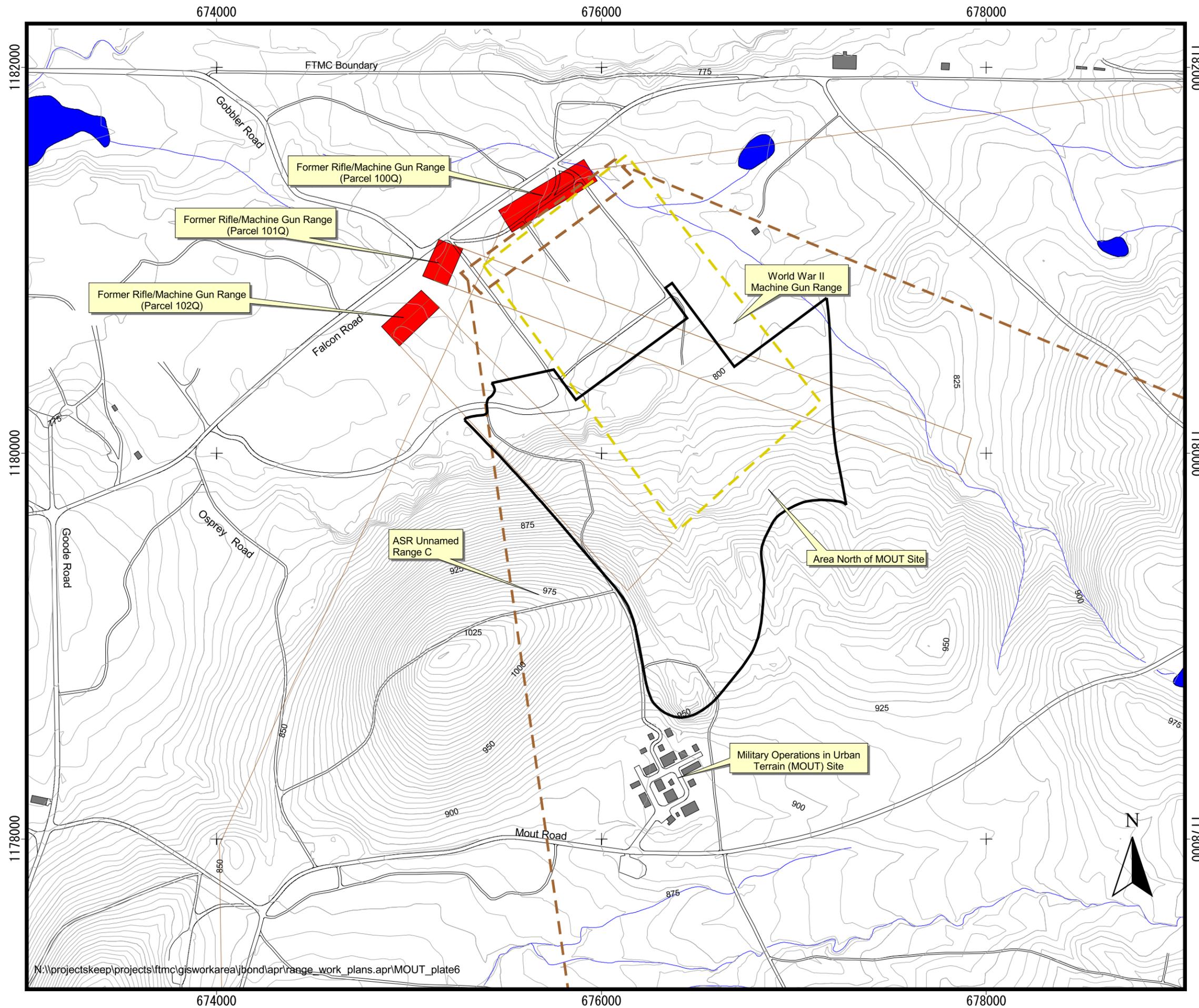
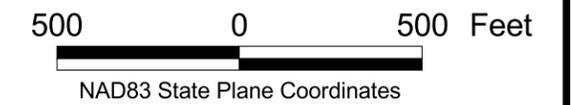
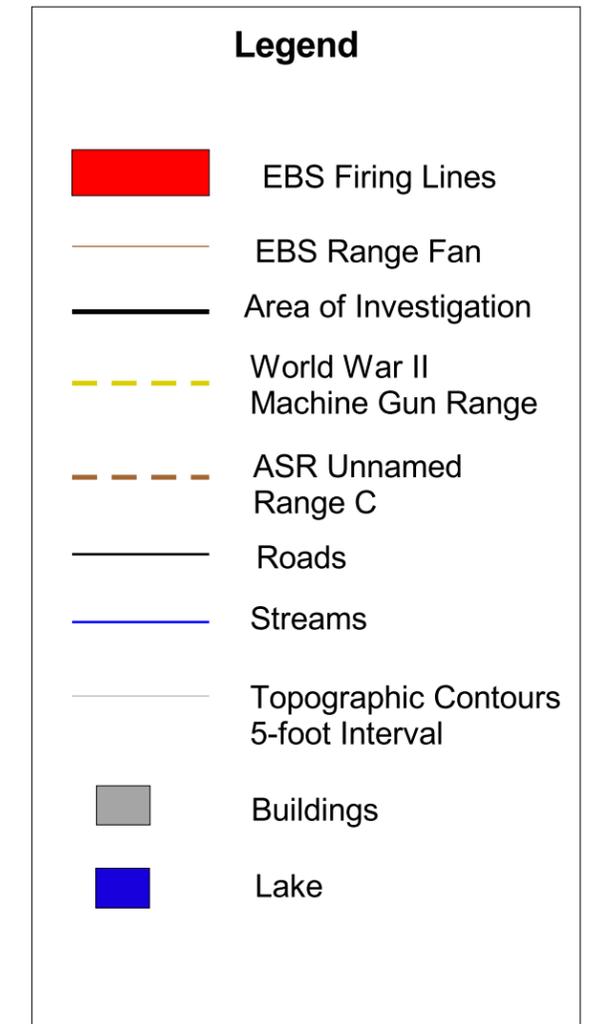
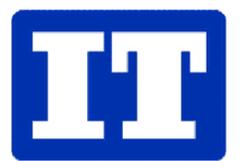


Figure 1-6
ASR Plate 6 Range Location Map
Area North of MOUT Site



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Plate 4 of the ASR. Plate 4 of the ASR (Figure 1-4) shows three ranges: Unnamed Range A, Unnamed Range B, and Tank Combat Range. Unnamed Ranges A and B are located in the same location and with the same orientation as in ASR Plate 3. The Tank Combat Range encompasses a significant portion of the north-central portion of the Main Post including almost the entire area of investigation for this SI. According to the ASR, the Tank Combat Range appears on several maps during the Inter-War period. The exact nature of training activities at the Tank Combat Range, as well as range boundaries, are unknown. Possible uses for this range include driver training, tactical maneuvers, or main gun firing (USACE, 1999a). The ASR did not identify firing points or impact areas. Firing points, direction of fire, or impact areas could not be determined from the shape or orientation of this range.

Plate 5 of the ASR. Plate 5 of the ASR (Figure 1-5) shows three ranges: Unnamed Range A, Unnamed Range C, and World War II Machine Gun Range. The range identified as Unnamed Range B in ASR Plates 3 and 4, is identified as World War II Machine Gun Range on ASR Plate 5. According to the ASR, this machine gun range was built during World War II and includes part of the World War I 1,000-yard rifle range. In 1967 it was still being used as a Squad/Platoon Attack Course and was later abandoned (USACE, 1999a). The likely impact area for the World War II Machine Gun Range is the hillside located southeast of the area of investigation (Figure 1-5). Unnamed Range A is shown in the same location and with the same orientation in ASR Plate 5 as in ASR Plates 3 and 4. Unnamed Range C has a somewhat similar shape, orientation, and location as EBS Parcel 100Q and may be intended to represent Parcel 100Q.

Plate 6 of the ASR. Plate 6 of the ASR (Figure 1-6) shows two ranges, the World War II Machine Gun Range and Unnamed Range C. The World War II Machine Gun Range on ASR Plate 6 is in a different location and has a different shape than that shown on ASR Plate 5. The World War II Machine Gun Range shown on ASR Plate 6 is located within Parcel 100Q and overlaps Parcel 101Q. The new location and range shape for the World War II Machine Gun Range probably reflects the change of this range from a machine gun range to a Squad/Platoon Attack Course. Unnamed Range C is in the same location with the same orientation as in ASR Plate 5.

1.2.2 Aerial Photographs

Available aerial photographs were reviewed to reveal any land-use activity in the Area North of MOUT Site. Only the aerial photographs that showed distinct surface activity changes are

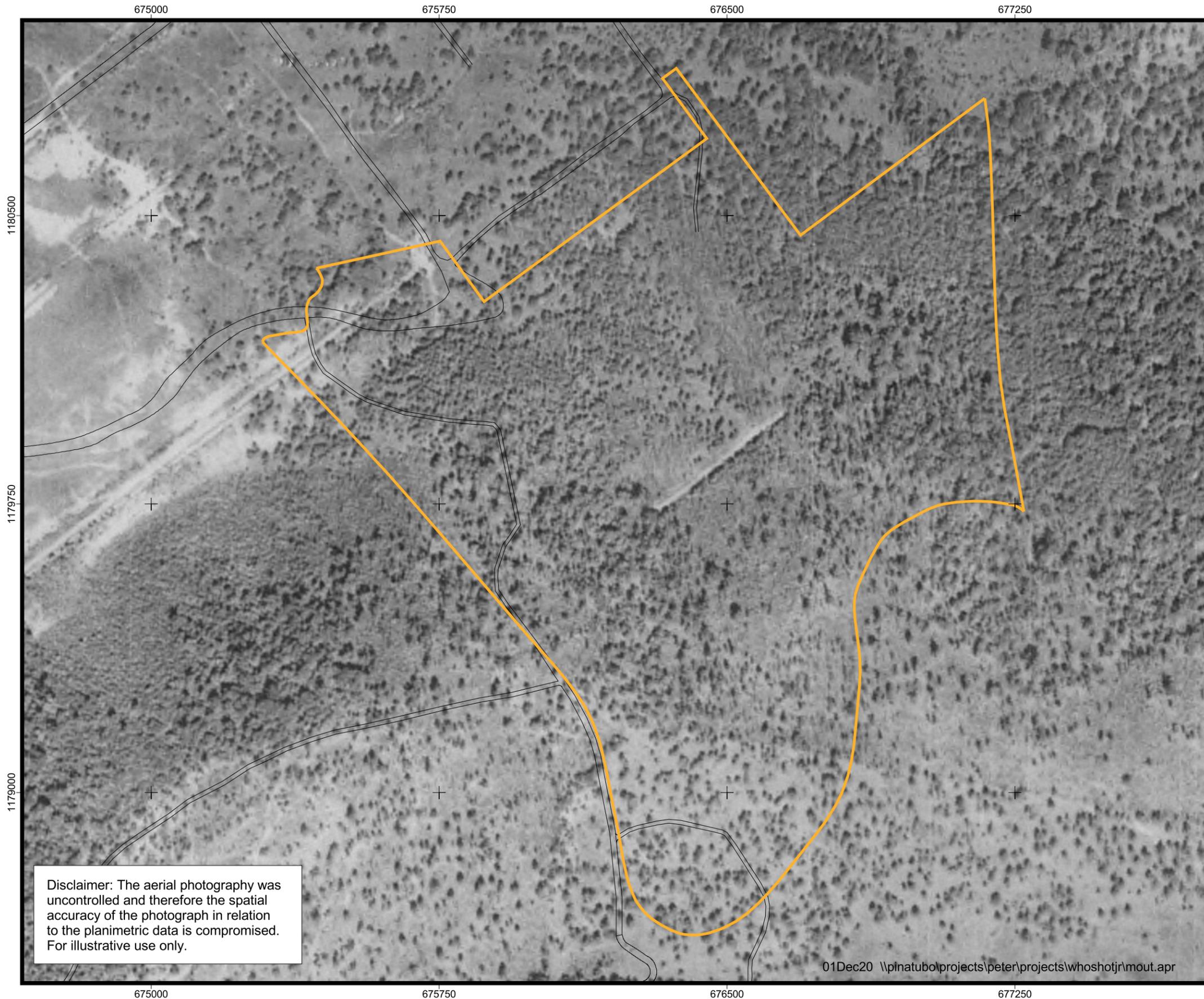


Figure 1-7
1940 Aerial Photograph
Area North of MOUT Site

Legend

-  Roads
-  Area of Investigation

N



0 200 400



State Plane feet, NAD83

Disclaimer: The aerial photography was uncontrolled and therefore the spatial accuracy of the photograph in relation to the planimetric data is compromised. For illustrative use only.

U.S. Army Corps of Engineers
 Mobile District
 Fort McClellan
 Calhoun County, Alabama
 Contract No. DACA21-96-D-0018



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presented in this SFSP. The following paragraphs summarize the review of aerial photographs for the years 1940, 1954, 1969, 1994, and 1998.

1940. This aerial photograph (Figure 1-7) is clearer than the 1937 photograph but is very similar in the appearance of the site. There is not any obvious surface activity, except a ground scar oriented northeast to southwest in the center portion of the area of investigation. This ground scar was not observed during the October 2001 IT site walk.

1954. In this aerial photograph (Figure 1-8), the area of investigation appears to have been cleared of tree cover, and dirt roads can be seen at the site. The ground scar in the center portion of the site is still visible.

1969. This aerial photograph is the first to show several long ground scars in the southern portion of the area (Figure 1-9). These ground scars appear to be graded areas and may have been used as borrow areas. The borrow area in the northern portion of the site that was observed during the IT October 2001 site walk is not apparent in this photograph. The ground scar in the center portion of the site is still somewhat visible. The dirt roads shown in the 1954 aerial photograph are not as noticeable.

1994. This aerial photograph, the only color photograph in the series, shows considerable tree cover within the area of investigation (Figure 1-10). The long ground scars are still visible in the southern portion of the site. A large ground scar is evident in the northern portion of the site and may have been a possible borrow area. The ground scar appears to have been extended from the area of Range 30 to the northwest of the site. The ground scar in the center portion of the site is barely discernible. The dirt roads shown in earlier photographs are hardly visible due to the tree cover at the site.

1998. This aerial photograph appears to show more tree cover over the site (Figure 1-11). Also, there appear to be more small trees in the ground scars in the southern portion of the site. The northern portion of the site shows more activity than previously observed in the aerial photographs. It appears the northern ground scar shown in this photograph has been used extensively as a borrow area. There are a few dirt roads that appear through the trees in the central part of the site.

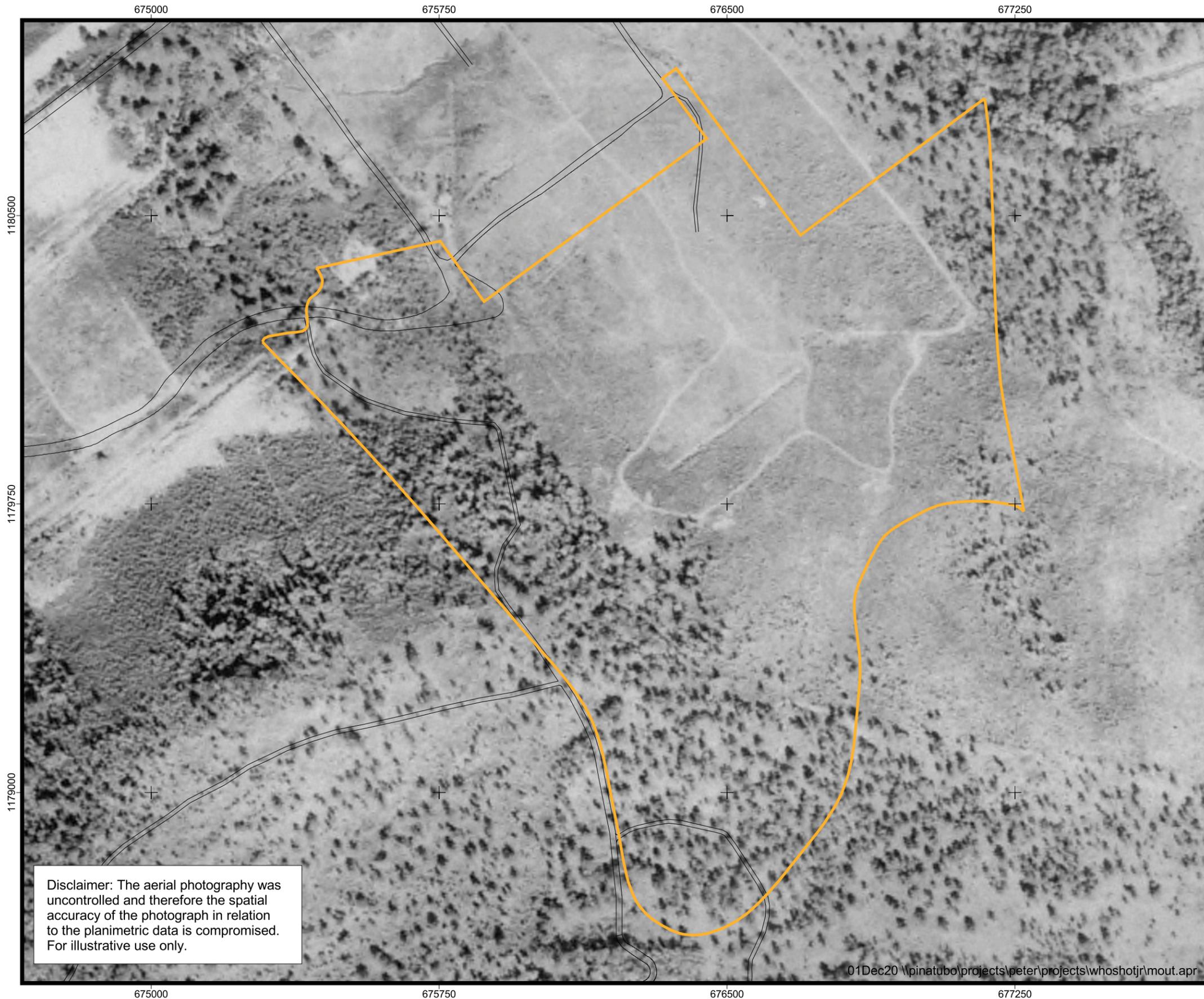


Figure 1-8

1954 Aerial Photograph Area North of MOUT Site

Legend

-  Roads
-  Area of Investigation

N



0 200 400



State Plane feet, NAD83

Disclaimer: The aerial photography was uncontrolled and therefore the spatial accuracy of the photograph in relation to the planimetric data is compromised. For illustrative use only.

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Disclaimer: The aerial photography was uncontrolled and therefore the spatial accuracy of the photograph in relation to the planimetric data is compromised. For illustrative use only.

Figure 1-9

1969 Aerial Photograph Area North of MOUT Site

Legend

-  Roads
-  Area of Investigation

N



0 200 400



State Plane feet, NAD83

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Disclaimer: The aerial photography was uncontrolled and therefore the spatial accuracy of the photograph in relation to the planimetric data is compromised. For illustrative use only.

Figure 1-10

1994 Aerial Photograph Area North of MOUT Site

Legend

-  Roads
-  Area of Investigation

N



0 200 400



State Plane feet, NAD83

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Contract No. DACA21-96-D-0018



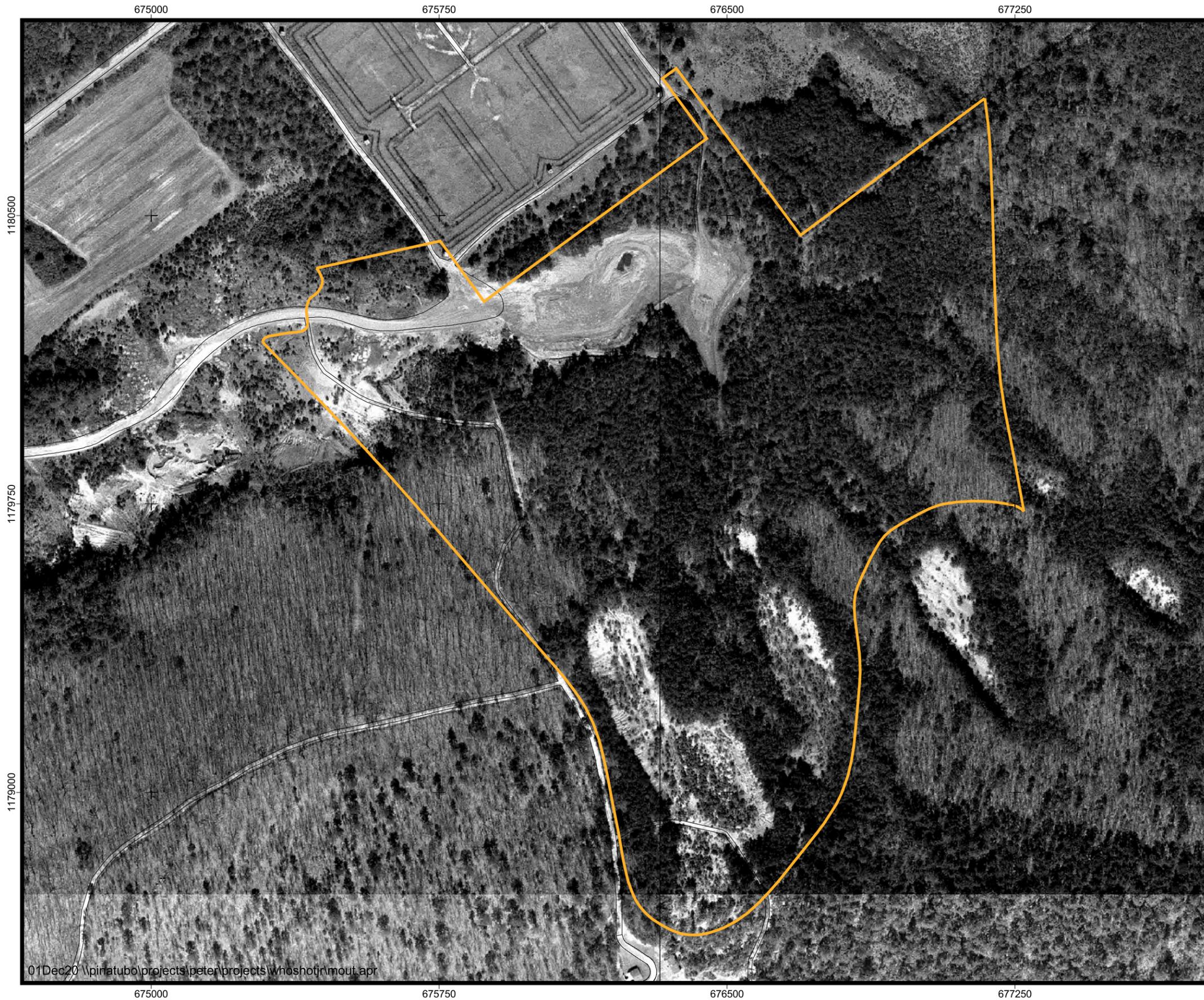


Figure 1-11

**1998 Aerial Photograph
Area North of MOUT Site**

Legend

-  Roads
-  Area of Investigation

N



0 200 400



State Plane feet, NAD83

U.S. Army Corps of Engineers
Mobile District
Fort McClellan
Calhoun County, Alabama
Contract No. DACA21-96-D-0018



The elevation of the site ranges from approximately 760 feet above mean sea level (amsl) in the northwest corner of the site to approximately 950 feet amsl in the southern portion of the site. Surface water at the site appears to drain north across the site. Local shallow groundwater direction at the site is probably controlled by topography; therefore, groundwater flow in the residuum is likely to the north or northwest.

Soils at Area North of MOUT Site fall into mainly four mapping units in three soil series. The northern portion of the range and firing line consists of the Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded (AcC2) (U.S. Department of Agriculture [USDA], 1961). The Anniston and Allen Series of soils consists of strongly acid, deep, well-drained soils that have developed in old local alluvium. The parent material washed from the adjacent higher-lying Linker, Muskingum, Enders, and Montevallo soils, which developed from weathered sandstone, shale, and quartzite. These sites contain sandstone and quartzite gravel and cobbles, which measure as much as 8 inches in diameter on the surface and throughout the soil. For this soil series, the depth to bedrock is typically from 2 feet to greater than 10 feet, with depth to water greater than 20 feet (U.S. Department of Agriculture [USDA], 1961).

Some severely eroded areas may be common on the surface for this soil type as well as a few shallow gullies. Generally, the depth to bedrock ranges from 2 feet to greater than 10 feet. The typical soil description is 2 to 10 feet of well-drained stony loam to clay loam over stratified local alluvium; limestone or shale bedrock. The depth to the water table is likely greater than 20 feet.

This mapping unit (AcC2) consists of friable soils that have developed in old alluvium on foot slopes and along the base of mountains. The color of the surface soil ranges from very dark brown and dark brown to reddish brown and dark reddish brown. The texture of subsoil ranges from light clay loam to clay or silty clay loam. The alluvium ranges in thickness from 2 to more than 8 feet. Infiltration and runoff are medium, permeability is moderate, and the capacity for available moisture is high. Some severely eroded areas may be common on the surface for this soil type as well as a few shallow gullies (USDA, 1961).

The soils in the southern part of the main target area of the range fall into the Anniston and Allen stony loams, 10 to 25 percent slopes (AdE). Soils for this mapping unit have a surface layer that is a very dark brown to dark grayish-brown stony loam, 4 to 8 inches thick. At a depth of about

10 inches, these soils are a dark-red or dark reddish-brown stony fine sandy clay loam (USDA, 1961).

The third series of soils found is the Philo and Stendal Series of soils (USDA, 1961). The Philo series consists of strongly acid, moderately well-drained soils that are developing in local and general alluvium. The parent material washed mainly from sandstone and shale, but some of it originated from limestone. Philo soils occur on first bottoms along most streams in the northern part of Calhoun County. The surface soil is very dark grayish-brown to dark-brown fine sandy loam, and the subsoil is dark-brown, slightly mottled fine sandy loam.

The Stendal series consists of strongly acid, somewhat poorly drained soils that are developing in general alluvium that washed chiefly from sandstone and shale (USDA, 1961). Some of the material originated from limestone. These soils occur on first bottoms along most streams in the northern part of Calhoun County. The surface soil is a dark grayish-brown fine sandy loam and the subsurface soil is a dark-brown, mottled fine sandy loam. For the Philo and Stendal series, the depth to bedrock is typically greater than 6 feet, with depth to water greater than 1 to 2 feet (USDA, 1961).

Soils that fall into the Philo and Stendal soils local alluvium, 0 to 2 percent slopes (PkA) are found only in the northern portion of the Area North of MOUT Site along the intermittent stream that flows northeast off site (USDA, 1961). This mapping unit is on foot slopes along and at the heads of small drainages or draws.

Soils in the southeastern area of the range fan of Area North of MOUT Site, consist mainly of one soil series. This soil series is the soils of the higher elevations of the Choccolocco Mountains and consist of the stony rough land, sandstone series (Ss) (USDA, 1961). This miscellaneous land type consists of rough mountainous area with many outcrops of sandstone and quartzite bedrock, loose rock fragments, and scattered patches of sandy soil material. It also includes rock escarpments on higher parts of the mountains where quartzite of the Weisner formation is common. Slopes are generally more than 25 percent. The soil material is generally shallow over bedrock. For this soil series, depth to bedrock is typically less than 3 feet, with depth to groundwater usually more than 20 feet.

1.3 Scope of Work

The scope of work for SI field activities at the Area North of MOUT Site, as specified by the statement of work (USACE, 1999b), includes the following tasks:

- Develop the SFSP attachment.
- Develop the SSHP attachment.
- Develop the UXO safety plan attachment
- Conduct a surface and near-surface UXO survey over all areas to be included in the sampling effort.
- Provide downhole UXO support for all intrusive drilling to determine buried downhole hazards.
- Collect 22 surface soil samples, 22 subsurface soil samples, 3 groundwater samples, 2 surface water samples, and 2 sediment samples to determine whether potential site-specific chemicals (PSSC) are present at the site and to provide data useful for supporting any future corrective measures and closure activities.
- Analyze samples for the parameters listed in Section 4.5.

The possibility for UXO exists at this site because the area is within former active range fans, therefore, UXO surface sweeps and downhole surveys of soil borings will be required to support field activities at this site. The surface sweeps and downhole surveys will be conducted to identify anomalies for the purposes of UXO avoidance. The site-specific UXO safety plan attachment addresses the manner in which the avoidance will be conducted.

Following the field activities and sample analyses, an SI summary report will be prepared to evaluate the absence or presence of PSSCs at this site and to recommend further actions, if appropriate. The SI summary report will be prepared in accordance with current U.S. Environmental Protection Agency (EPA), Region IV, and Alabama Department of Environmental Management (ADEM) guidelines.

2.0 Summary of Existing Environmental Studies

An EBS was conducted by Environmental Science and Engineering, Inc. (ESE) to document current environmental conditions of all FTMC property (ESE, 1998). The study was to identify sites that, based on available information, have no history of contamination and comply with U.S. Department of Defense guidance for fast-track cleanup at closing installations. The EBS also provides a baseline picture of FTMC properties by identifying and categorizing the properties by the following seven criteria:

1. Areas where no storage, release, or disposal of hazardous substance or petroleum products has occurred (including no migration of these substances from adjacent areas)
2. Areas where only release or disposal of petroleum products has occurred
3. Areas where release, disposal, and/or migration of hazardous substance has occurred, but at concentrations that do not require a removal or remedial response
4. Areas where release, disposal, and/or migration of hazardous substance has occurred, and all removal or remedial actions to protect human health and the environment have been taken
5. Areas where release, disposal, and/or migration of hazardous substance has occurred, and removal or remedial actions are underway, but all required remedial actions have not yet been taken
6. Areas where release, disposal, and/or migration of hazardous substance has occurred, but required actions have not yet been implemented
7. Areas that are not evaluated or require further evaluation.

The EBS was conducted in accordance with the Community Environmental Response Facilitation Act (CERFA) protocols (CERFA-Public Law 102-426) and U.S. Department of Defense policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, ADEM, EPA Region IV, and Calhoun County, as well as a database search of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-regulated substances, petroleum products, and Resource Conservation and Recovery Act-regulated facilities. Available historical maps and aerial photographs were reviewed to document historical land uses. Personal and telephone

interviews of past and present FTMC employees and military personnel were conducted. In addition, visual site inspections were conducted to verify conditions of specific property parcels.

The Area North of MOUT Site requires evaluation to determine its environmental condition.

3.0 Site-Specific Data Quality Objectives

3.1 Overview

The data quality objective (DQO) process is followed to establish data requirements. This process ensures that the proper quantity and quality of data are generated to support the decision-making process associated with the action selection for Area North of MOUT Site. This section incorporates the components of the DQO process described in the publication EPA 540-R-93-071 *Data Quality Objectives Process for Superfund* (EPA, 1993). The DQO process as applied to Area North of MOUT Site is described in more detail in Section 3.4 of this SFSP. Table 3-1 provides a summary of the factors used to determine the appropriate quantity of samples and the procedures necessary to meet the objectives of the SI and establish a basis for future action at this site.

The samples will be analyzed using EPA SW-846 methods, including Update III Methods where applicable, as presented in Chapter 4.0 in this SFSP and Table 6-1 in the QAP. Data will be reported in accordance with definitive data requirements of Chapter 2, *Chemistry Data Reporting Requirements and Data Package Deliverables*, USACE Engineering Manual 200-1-6, *Chemical Quality Assurance For Hazardous, Toxic And Radioactive Waste (HTRW) Projects* (USACE, 1997) and evaluated by the stipulated requirements for the generation of definitive data (Section 3.1.2 of the QAP). Chemical data will be reported by the laboratory via hard-copy data packages using Contract Laboratory Program-like forms, along with electronic copies. These packages will be validated in accordance with EPA National Functional Guidelines by Level III criteria.

3.2 Data Users and Available Data

The available data related to the SI at Area North of MOUT Site, presented in Table 3-1, have been used to formulate a site-specific conceptual model. This conceptual model was developed to support the development of this SFSP, which is necessary to meet the objectives of these activities and to establish a basis for future action at the site. The data users for the data and information generated during field activities are primarily EPA, USACE, ADEM, FTMC, and other USACE supporting contractors. This SFSP, along with the necessary companion documents, has been designed to provide the regulatory agencies with sufficient detail to reach a determination as to the adequacy of the scope of work. The program has also been designed to provide the level of defensible data and information required to confirm or rule out the existence of residual chemical contamination in site media.

Table 3-1

**Summary of Data Quality Objectives
Area North of MOUT Site
Site Investigation
Fort McClellan, Calhoun County, Alabama**

Users	Available Data	Conceptual Site Model	Media of Concern	Data Uses and Objectives	Data Types	Analytical Level	Data Quantity	
EPA, ADEM USACE, DOD FTMC, IT Corporation Other contractors, and possible future land users	None	<p><u>Contaminant Source</u> Area North of MOUT (explosives and lead)</p> <p><u>Migration Pathways</u> Rain runoff and erosion to surface soil, infiltration and leaching to subsurface soil and groundwater, biotransfer to venison, dust emissions and volatilization to ambient air, groundwater discharge to surface water, and runoff and erosion to surface water and sediment</p> <p><u>Potential Receptors</u> Residents (future), Recreational site user (current and future)</p> <p><u>PSSC</u> metals, nitroexplosives, VOCs, SVOCs, herbicides, and pesticides</p>	<u>Surface soil</u>	SI to confirm the presence or absence of contamination in the site media	<u>Surface soil</u> TAL Metals, Nitroaromatic and Nitramine Explosives; Plus 10% of Samples for TCL VOCs TCL SVOCs, CL Pesticides, OP Pesticides, and CL Herbicides	Definitive data in CESAS Level B data packages	22 surface soil samples + QC	
			<u>Subsurface Soil</u>					
			<u>Groundwater</u>	Definitive quality data for future decision-making	<u>Surface Water</u>	<u>Subsurface Soil</u> TAL Metals, Nitroaromatic and Nitramine Explosives; Plus 10% of Samples for TCL VOCs TCL SVOCs, CL Pesticides, OP Pesticides, and CL Herbicides	Definitive data in CESAS Level B data packages	22 subsurface soil samples + QC
			<u>Sediment</u>		<u>Groundwater</u> TAL Metals, Nitroaromatic and Nitramine Explosives; Plus 10% of Samples for TCL VOCs TCL SVOCs, CL Pesticides, OP Pesticides, and CL Herbicides	Definitive data in CESAS Level B data packages	3 groundwater samples + QC	
					<u>Surface Water</u> TAL Metals, Nitroaromatic and Nitramine Explosives; Plus 10% of Samples for TCL VOCs TCL SVOCs, CL Pesticides, OP Pesticides, and CL Herbicides	Definitive data in CESAS Level B data packages	2 surface water samples + QC	
					<u>Sediment</u> TAL Metals, Nitroaromatic and Nitramine Explosives; Plus 10% of Samples for TCL VOCs TCL SVOCs, CL Pesticides, OP Pesticides, and CL Herbicides	Definitive data in CESAS Level B data packages	2 sediment samples + QC	

ADEM - Alabama Department of Environmental Management.
CESAS - Corps of Engineers South Atlantic Savannah.
DOD - U.S. Department of Defense.
EPA - U.S. Environmental Protection Agency.
FTMC - Fort McClellan.
USACE - U.S. Army Corps of Engineers.

SI - Site investigation.
QC - Quality control.
TAL - Target analyte list.
TOC - Total organic carbon.
PSSC - Potential site-specific chemical.
VOC - Volatile Organic Compounds.
SVOC - Semi-volatile Organic Compounds.

3.3 Conceptual Site Exposure Model

The conceptual site exposure model (CSEM) provides the basis for identifying and evaluating potential risks and hazards to human health in the risk assessment. The CSEM includes receptors and potential exposure pathways appropriate to all plausible scenarios. The CSEM facilitates a consistent and comprehensive evaluation of human health through graphically presenting all possible exposure pathways, including sources, release and transport pathways, and exposure routes. In addition, the CSEM helps to ensure that potential pathways are not overlooked. The elements of a complete exposure pathway and CSEM are:

- Source (i.e., contaminated environmental) media
- Contaminant release mechanisms
- Contaminant transport pathways
- Receptors
- Exposure pathways.

Contaminant release mechanisms and transport pathways are not relevant for direct receptor contact with a contaminated source medium.

Primary contaminant release mechanisms were associated with training exercises (e.g., discharging lead and ordnance to the ground), and possibly through leaks and spills. Potential contaminant transport pathways include rain runoff and erosion to surface soil, infiltration and leaching to subsurface soil and groundwater, biotransfer to deer through browsing, dust emissions and volatilization to ambient air, groundwater discharge to surface water, surface water runoff and erosion to surface water and sediment.

Currently, the site is not used. Most of the site is tree covered; however, exceptions include the ground scars in southern portion and around the borrow area in the northern portion. However, because the site is not fenced and is wooded, it is accessible to potential trespassers who may hunt. Therefore, the most likely current receptor scenario for the site is a recreational site user who hunts. Because the site does not have surface water year round, there is not sufficient surface water to contain fish for consumption. Potential receptor scenarios considered, but not included under current land-use scenarios, are the:

- **Groundskeeper.** The site is not currently maintained by a groundskeeper.
- **Construction Worker.** The site is unused, and no development or construction is occurring.

- **Resident.** The site is not currently used for residential purposes.

Future land use at Area North of MOUT Site is shown as part of the remediation reserve to be used for passive recreation. The sites may not be deemed safe for public access until remediation has been completed because of the potential for UXO (FTMC, 1997). Potential receptor scenarios evaluated for the future include the following:

- **Resident.** Although the site is not expected to be utilized for residential purposes, the resident is considered in order to provide information for the project manager and regulators.
- **Recreational Site User.** Because the future site is planned for passive recreational use, and hunting is a viable option, the recreational site user is included. Fish ingestion will not be evaluated because the streams are too small to support fish for consumption.

A summary of relevant contaminant release and transport mechanisms, source and exposure media, and receptor scenarios and exposure pathways for this site is provided in Table 3-1 and Figure 3-1.

3.4 Decision-Making Process, Data Uses, and Needs

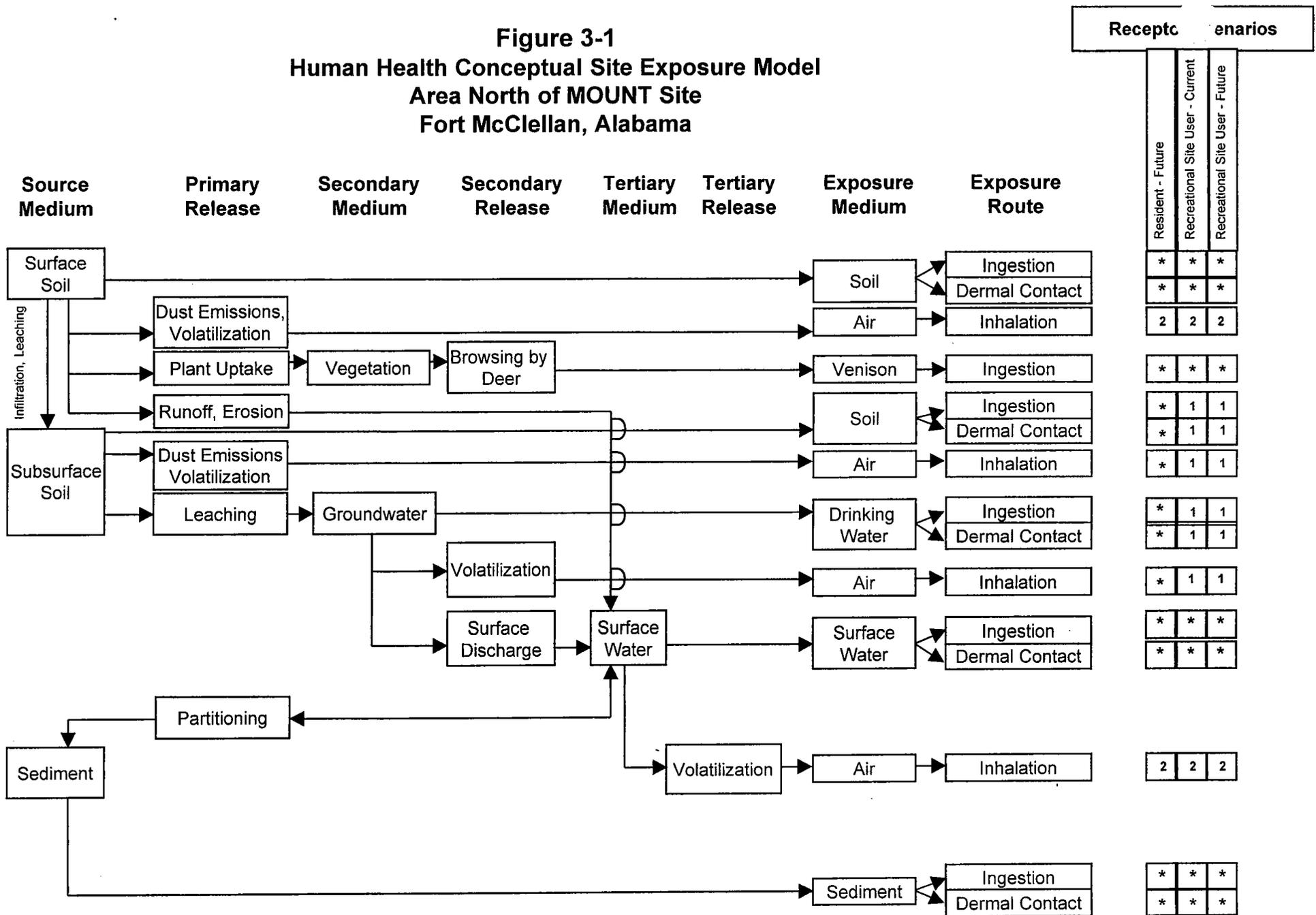
The seven-step decision-making is presented in detail in Section 4.3 of the WP and will be followed during the SI at Area North of MOUT Site. Data uses and needs are summarized in Table 3-1.

3.4.1 Risk Evaluation

Confirmation of contamination at Area North of MOUT Site will be based on using EPA definitive data to determine whether or not PSSCs are detected in site media. Detected site chemical concentrations will be compared to site-specific screening levels, ecological screening values, and background values to determine if PSSCs are present at the site at concentrations that pose an unacceptable risk to human health or the environment. Definitive data will be adequate for confirming the presence of site contamination and for supporting a feasibility study and risk assessment.

Assessment of potential ecological risk associated with sites or parcels (e.g., surface water and sediment sampling, specific ecological assessment methods, etc.) will be addressed in accordance with the procedures in the WP.

Figure 3-1
Human Health Conceptual Site Exposure Model
Area North of MOUNT Site
Fort McClellan, Alabama



* = Complete exposure pathway evaluated in the streamlined risk assessment.
 1 = Incomplete exposure pathway.
 2 = Although theoretically complete, this pathway is judged to be insignificant and is not evaluated in the streamlined risk assessment.

3.4.2 Data Types and Quality

Surface soil, subsurface soil, groundwater, surface water and sediment will be sampled and analyzed to meet the objectives of the SI at Area North of MOUT Site. Quality assurance/quality control (QA/QC) samples will be collected for all sample types as described in Chapter 4.0 of this SFSP. Samples will be analyzed by EPA-approved SW-846 Methods Update III, where available; comply with EPA definitive data requirements; and be reported using hard-copy data packages. In addition to meeting the quality needs of this SI, data analyzed at this level of quality are appropriate for all phases of site characterization, remedial investigation, and risk assessment.

3.4.3 Precision, Accuracy, and Completeness

Laboratory requirements of precision, accuracy, and completeness for this SI are provided in Section 9.0 of the QAP (IT, 2000a).

4.0 Field Activities

4.1 UXO Survey Requirements and Utility Clearances

The Area North of MOUT Site falls within the area of former active range fans. Therefore, IT will conduct UXO avoidance activities, including surface sweeps and downhole surveys of soil borings. The site-specific UXO safety work plan provides technical guidance for ordnance and explosives avoidance and construction activities for sample collection activities at Area North of MOUT Site. The site-specific UXO safety work plan attachment has been written in conjunction with Appendix E of the SAP (IT, 2000a).

4.1.1 Surface UXO Survey

A UXO sweep will be conducted over areas that will be included in the sampling and surveying activities to identify UXO on or near the surface that may present a hazard to on-site workers during field activities. Low-sensitivity magnetometers will be used to locate surface and shallow-buried metal objects. UXO located on the surface will be identified and conspicuously marked for easy avoidance. Subsurface metallic anomalies will not be disturbed and will also be marked for easy avoidance. UXO personnel requirements, procedures, and detailed descriptions of the geophysical equipment to be used are provided in Chapter 4.0 and Appendices D and E of the approved SAP (IT, 2000a).

4.1.2 Downhole UXO Survey

During the soil boring and downhole sampling, downhole UXO surveys will be performed to determine if buried metallic objects are present. UXO monitoring, as described in Chapter 4.0 of the SAP (IT, 2000a), will continue until undisturbed soil is encountered or the borehole has been advanced to 12 feet below ground surface, whichever is reached first.

4.1.3 Utility Clearances

After the UXO surface survey has cleared the area to be sampled and prior to performing any intrusive sampling, a utility clearance will be performed at locations where soil and groundwater samples will be collected, using the procedure outlined in Section 4.2.6 of the SAP (IT, 2000a). The site manager will mark the proposed locations with stakes, coordinate with the local utility companies to clear the proposed locations for utilities, and obtain digging permits. Once the locations are approved (for both UXO and utility avoidance) for intrusive sampling, the stakes will be labeled as cleared.

4.2 Environmental Sampling

The environmental sampling program at the Area North of MOUT Site, includes the collection of surface soil, subsurface soil, groundwater, surface water, and sediment samples for chemical analysis. These samples will be collected and analyzed to provide data for characterizing the site to determine the environmental condition of the site and any further action to be conducted at the site. Additionally, samples will be collected from environmental media in locations that will assist in the assessment of potential ecological impacts resulting from activities at the site.

4.2.1 Surface Soil Sampling

Surface soil samples will be collected from 22 locations at the Area North of MOUT Site.

4.2.1.1 Sample Locations and Rationale

The sampling rationale for each surface soil sample location is listed in Table 4-1. Proposed sampling locations are shown in Figure 4-1. Surface soil sample designations and required QA/QC sample requirements are summarized in Table 4-2. The final soil boring sampling locations will be determined in the field by the on-site geologist, based on actual field conditions.

4.2.1.2 Sample Collection

Surface soil samples will be collected from the upper 1 foot of soil by direct-push methodology as specified in Section 4.7.1.1 of the SAP (IT, 2000a). Collected soil samples will be screened using a photoionization detector (PID) in accordance with Section 4.15 of the SAP. Surface soil samples will be screened for information purposes only and not to select samples for analysis. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are listed in Section 5.0, Table 5-1, of the QAP. Sample documentation and chain-of-custody (COC) will be recorded as specified in Section 4.13 of the SAP. The samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

4.2.2 Subsurface Soil Sampling

Subsurface soil samples will be collected from 22 borings installed at the Area North of MOUT Site.

4.2.2.1 Sample Locations and Rationale

Subsurface soil samples will be collected from the soil borings proposed on Figure 4-1. The sampling rationale for each subsurface soil sample location is listed in Table 4-1. Subsurface soil samples to be collected are listed in Table 4-2. The final soil boring sampling locations will be

Table 4-1

**Sampling Locations and Rationale
Area North of MOUT Site
Fort McClellan, Alabama**

(Page 1 of 3)

Sample Location	Sample Media	Sample Location Rationale
HR-NOM-GP01	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed near southeast boundary of the area of investigation. This sample location is in the southern end of a ground scar with lead bullets on the surface. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.
HR-NOM-GP02	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed near southeast boundary of the area of investigation. This sample location is in the southern portion of a ground scar with lead bullets on the surface. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.
HR-NOM-GP03	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed near southeast boundary of the area of investigation. This sample location is in the middle portion of a ground scar with lead bullets on the surface and down slope of some shot up 55-gallon drums. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.
HR-NOM-GP04	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed near southeast boundary of the area of investigation. This sample location is in the northern portion of a ground scar with lead bullets on the surface. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.
HR-NOM-GP05	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed near the southern boundary of the area of investigation. This sample location is in the southern end of a ground scar with lead bullets and other debris on the surface. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.
HR-NOM-GP06	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed near the southern boundary of the area of investigation. This sample location is in the southern portion of a ground scar with lead bullets and other debris on the surface. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.
HR-NOM-GP07	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed near the southwestern boundary of the area of investigation. This sample location is at the south end and down slope of a line of fox holes. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.
HR-NOM-GP08	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed in the southern portion of the area of investigation. This sample location is in the middle portion of a ground scar with lead bullets and other debris on the surface. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.
HR-NOM-GP09	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed in the southern portion of the area of investigation. This sample location is in the northern portion of a ground scar with lead bullets and other debris on the surface. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.
HR-NOM-GP10	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed near the southwestern boundary of the area of investigation. This sample location is inside one of the fox holes at the north end of the line of fox holes at this location. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.

Table 4-1

Sampling Locations and Rationale
 Area North of MOUT Site
 Fort McClellan, Alabama

(Page 2 of 3)

Sample Location	Sample Media	Sample Location Rationale
HR-NOM-GP11	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed near the southwestern boundary of the area of investigation. This sample location is between and down slope of an area of several fox holes and spent small arms casings. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.
HR-NOM-GP12	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed in the southern area of investigation. This sample location is down slope of some shot up 55-gallon drums and the ground scar with lead bullets and other debris on the surface. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.
HR-NOM-GP13	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed in the middle area of investigation. This sample location is down slope of some shot up 55-gallon drums. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.
HR-NOM-GP14	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed in the middle area of investigation. This sample location is down slope of some shot up 55-gallon drums. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.
HR-NOM-GP15	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed in the northeastern portion of the area of investigation. This sample location is near the center of a borrow area. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.
HR-NOM-GP16	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed in the northeastern portion of the area of investigation. This sample location is adjacent and down slope of a large mound in a borrow area. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.
HR-NOM-GP17	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed in the northeastern portion of the area of investigation. This sample location is adjacent and down slope of wood and debris piles. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.
HR-NOM-GP18	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed in the northern portion of the area of investigation. This sample location is in a level area and down slope of most of the site. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.
HR-NOM-GP19	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed in the northern portion of the area of investigation. This sample location is in a level area and down slope of the western portion of the site. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.
HR-NOM-MW01	Surface soil, subsurface soil, and groundwater	Soil boring surface soil, subsurface soil, and groundwater samples to be placed in the southern portion of the area of investigation. This sample location is in the northern end of a ground scar with lead bullets on the surface. This sample location is down slope of most of the ground scar. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and location-specific geology, and provide information on groundwater quality in the residuum aquifer.

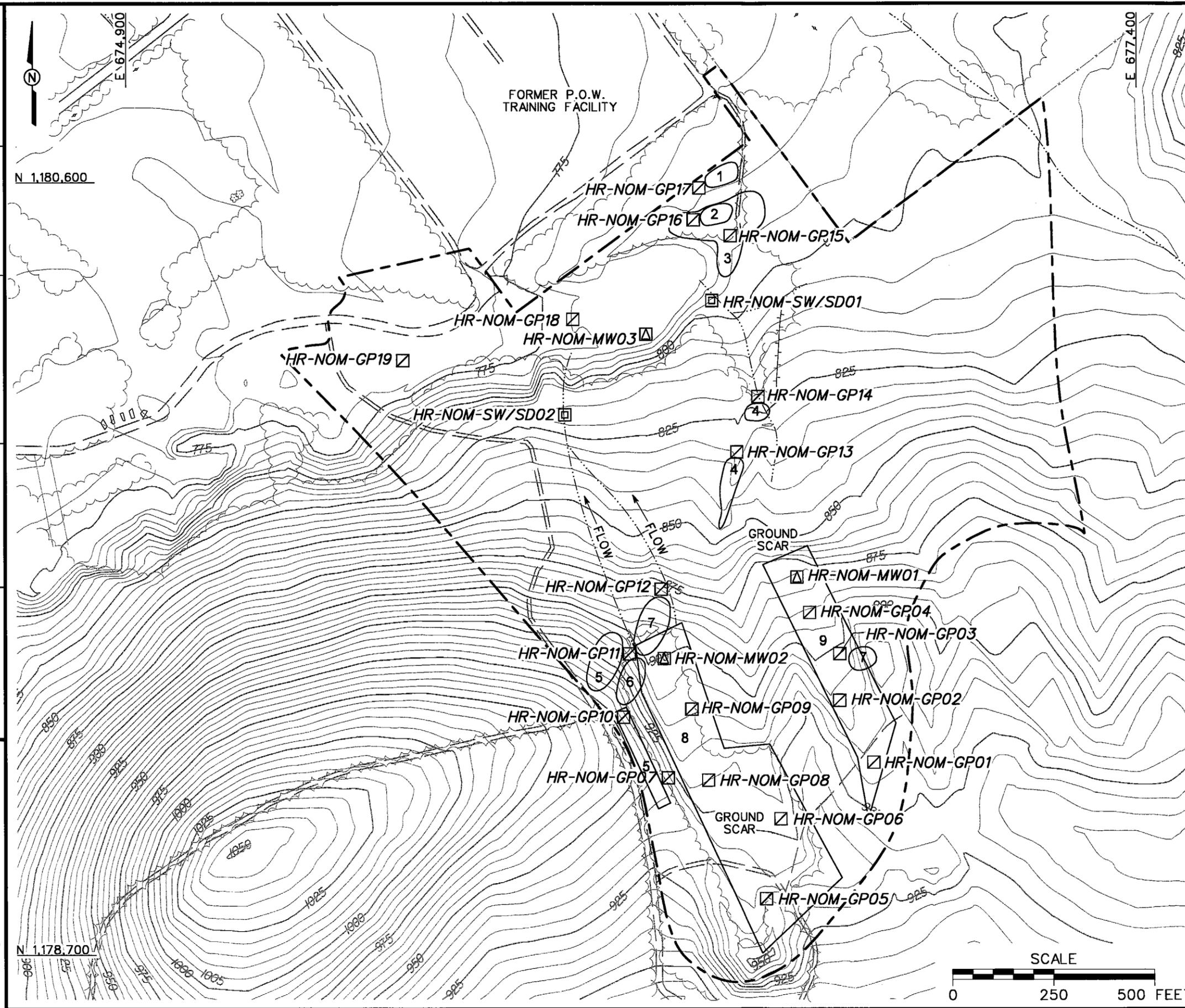
Table 4-1

Sampling Locations and Rationale
 Area North of MOUT Site
 Fort McClellan, Alabama

(Page 3 of 3)

Sample Location	Sample Media	Sample Location Rationale
HR-NOM-MW02	Surface soil subsurface soil and groundwater	Soil boring surface soil, subsurface soil, and groundwater samples to be placed in the southern portion of the area of investigation. This sample location is in the northern end of a ground scar with lead bullets and other debris on the surface. This sample location is down slope of most of the ground scar. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and location-specific geology, and provide information on groundwater quality in the residuum aquifer.
HR-NOM-MW03	Surface soil subsurface soil and groundwater	Soil boring surface soil, subsurface soil, and groundwater samples to be placed in the northern portion of the area of investigation. This sample location is at the edge of a level area and down slope of the central area of the site. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the location and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the location for food and/or habitat purposes.
HR-NOM-SW/SD01	Surface water and Sediment	The sample location is in the northern portion of the area and in the intermittent stream that flows north in the western portion of the area of investigation. This intermittent stream begins near the down slope end of the ground scar that has lead bullets and other debris on the surface. Sample data will indicate if contaminant releases have occurred from runoff in this area from former activities in this area. Sample data will also be used to assess potential impacts to aquatic biota in the waterway and other ecological receptors that may utilize the waterway for food and/or habitat purposes.
HR-NOM-SW/SD02	Surface water and Sediment	The sample location is in the northern portion of the area and in the intermittent stream that flows north in the central-eastern portion of the area of investigation. This intermittent stream begins near the down slope end of both ground scars that have lead bullets on the surface. Sample data will indicate if contaminant releases have occurred from runoff in this area from former activities in this area. Sample data will also be used to assess potential impacts to aquatic biota in the waterway and other ecological receptors that may utilize the waterway for food and/or habitat purposes.

DWG. NO.: 796887es.248
 PROJ. NO.: 796887
 INITIATOR: J. RAGSDALE
 PROJ. MGR.: J. YACOUB
 DRAFT. CHK. BY: S. MORAN
 ENGR. CHK. BY: S. MORAN
 DATE LAST REV.:
 DRAWN BY:
 STARTING DATE: 11/19/01
 DRAWN BY: D. BOMAR
 12/20/01 03:47:58 PM
 DBILLING
 c:\cadd\design\796887es.248



LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- AREA OF INVESTIGATION
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE
- PROPOSED SURFACE WATER/SEDIMENT SAMPLE LOCATION
- PROPOSED SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- PROPOSED GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION

TRAINING AIDS/PHYSICAL FEATURES OBSERVED

- ① WOOD AND METAL DEBRIS
- ② LARGE MOUND
- ③ BORROW AREA
- ④ APPROXIMATE LOCATION OF RUSTED 55-GALLON DRUMS WITH BULLET HOLES
- ⑤ SEVERAL FOX HOLES
- ⑥ SLAP FLARE, SMALL ARMS 7.62mm CASINGS, AND MANY M-16 (5.56mm) BLANKS
- ⑦ APPROXIMATELY 6 SHOT UP 55-GALLON DRUMS
- ⑧ GROUND SCAR WITH BULLET FRAGMENTS AND A SMALL AMOUNT OF MISCELLANEOUS DEBRIS (e.g., CONCRETE, PVC PIPE, METALS AND 5-GALLON CANS)
- ⑨ GROUND SCAR WITH BULLET FRAGMENTS

FIGURE 4-1
PROPOSED SAMPLE LOCATION
AREA NORTH OF MOUT SITE

U. S. ARMY CORPS OF ENGINEERS
 MOBILE DISTRICT
 FORT McCLELLAN
 CALHOUN COUNTY, ALABAMA
 Contract No. DACA21-96-D-0018



Table 4-2

Surface Soil and Subsurface Soil Sample Designations and QA/QC Sample Quantities,
Aera North of MOUT Site

(Page 1 of 3)

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
HR-NOM-GP01	HR-NOM-GP01-SS-PP0001-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives VOCs, SVOCs, CL Pesticides, OP Pesticides, and CL Herbicides
	HR-NOM-GP01-DS-PP0002-REG	2-4				
HR-NOM-GP02	HR-NOM-GP02-SS-PP0003-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives
	HR-NOM-GP02-DS-PP0004-REG	2-4				
HR-NOM-GP03	HR-NOM-GP03-SS-PP0005-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives
	HR-NOM-GP03-DS-PP0006-REG	2-4				
HR-NOM-GP04	HR-NOM-GP04-SS-PP0007-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives VOCs, SVOCs, CL Pesticides, OP Pesticides, and CL Herbicides
	HR-NOM-GP04-DS-PP0008-REG	2-4	HR-NOM-GP04-DS-PP0009-FD		HR-NOM-GP04-DS-PP0008-MS/MSD	
HR-NOM-GP05	HR-NOM-GP05-SS-PP0010-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives
	HR-NOM-GP05-DS-PP0011-REG	2-4				
HR-NOM-GP06	HR-NOM-GP06-SS-PP0012-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives
	HR-NOM-GP06-DS-PP0013-REG	2-4				
HR-NOM-GP07	HR-NOM-GP07-SS-PP0014-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives
	HR-NOM-GP07-DS-PP0015-REG	2-4				
HR-NOM-GP08	HR-NOM-GP08-SS-PP0016-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives
	HR-NOM-GP08-DS-PP0017-REG	2-4	HR-NOM-GP08-DS-PP0018-FD			
HR-NOM-GP09	HR-NOM-GP09-SS-PP0019-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives
	HR-NOM-GP09-DS-PP0020-REG	2-4				
HR-NOM-GP10	HR-NOM-GP10-SS-PP0021-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives VOCs, SVOCs, CL Pesticides, OP Pesticides, and CL Herbicides
	HR-NOM-GP10-DS-PP0022-REG	2-4				

Table 4-2

Surface Soil and Subsurface Soil Sample Designations and QA/QC Sample Quantities,
Aera North of MOUT Site

(Page 2 of 3)

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
HR-NOM-GP11	HR-NOM-GP11-SS-PP0023-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives
	HR-NOM-GP11-DS-PP0024-REG	2-4				
HR-NOM-GP12	HR-NOM-GP12-SS-PP0025-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives
	HR-NOM-GP12-DS-PP0026-REG	2-4				
HR-NOM-GP13	HR-NOM-GP13-SS-PP0027-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives
	HR-NOM-GP13-DS-PP0028-REG	2-4				
HR-NOM-GP14	HR-NOM-GP14-SS-PP0029-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives
	HR-NOM-GP14-DS-PP0030-REG	2-4				
HR-NOM-GP15	HR-NOM-GP15-SS-PP0031-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives
	HR-NOM-GP15-DS-PP0032-REG	2-4				
HR-NOM-GP16	HR-NOM-GP16-SS-PP0033-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives
	HR-NOM-GP16-DS-PP0034-REG	2-4				
HR-NOM-GP17	HR-NOM-GP17-SS-PP0035-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives
	HR-NOM-GP17-DS-PP0036-REG	2-4				
HR-NOM-GP18	HR-NOM-GP18-SS-PP0037-REG	0-1	HR-NOM-GP18-SS-PP0038-FD			TAL Metals, Nitroaromatic/Nitramine Explosives
	HR-NOM-GP18-DS-PP0039-REG	2-4				
HR-NOM-GP19	HR-NOM-GP19-SS-PP0040-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives
	HR-NOM-GP19-DS-PP0041-REG	2-4				
HR-NOM-MW01	HR-NOM-MW01-SS-PP0042-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives
	HR-NOM-MW01-DS-PP0043-REG	2-4				

Table 4-2

**Surface Soil and Subsurface Soil Sample Designations and QA/QC Sample Quantities,
Aera North of MOUT Site**

(Page 3 of 3)

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
HR-NOM-MW02	HR-NOM-MW02-SS-PP0044-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives VOCs, SVOCs, CL Pesticides, OP Pesticides, and CL Herbicides
	HR-NOM-MW02-DS-PP0045-REG	2-4	HR-NOM-MW02-DS-PP0046-FD		HR-NOM-MW02-DS-PP0045-MS/MSD	
HR-NOM-MW03	HR-NOM-MW03-SS-PP0047-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives
	HR-NOM-MW03-DS-PP0048-REG	2-4				

^a Actual sample depth selected for analysis will be at the discretion of the site geologist and will be based on field observation.

FD - Field duplicate.

FS - Field split.

MS/MSD - Matrix spike/matrix spike duplicate.

QA/QC - Quality assurance/quality control.

REG - Field sample.

TAL - Target analyte list.

TCL - Target compound list.

VOC - Volatile organic compound.

SVOC - Semivolatile organic compound.

CL - Chlorinated.

OP - Organophosphate.

determined in the field by the on-site geologist, based on actual field observations and utility clearance results.

4.2.2.2 Sample Collection

Subsurface soil samples will be collected from soil borings at a depth greater than 1 foot below ground surface in the unsaturated zone. The soil borings will be advanced and soil samples collected using the direct-push sampling procedures specified in Section 4.7.1.1 of the SAP (IT, 2000a). In areas where site access does not permit the use of a direct-push rig, the samples will be collected using a hand-auger.

Soil samples will be collected continuously for the first 4 feet or until either groundwater or refusal is reached. A detailed lithological log will be recorded by the on-site geologist for each borehole. At least one subsurface sample from each borehole will be selected for analysis. The collected subsurface soil samples will be field-screened using a PID in accordance with Section 4.15 of the SAP to measure samples exhibiting elevated readings exceeding background (readings in ambient air). Typically, the subsurface soil sample showing the highest reading (above background) will be selected and sent to the laboratory for analysis. If none of the samples indicates a reading exceeding background using the PID, the deepest interval from the soil boring will be sampled and submitted to the laboratory for analysis. Subsurface soil samples will be selected for analysis from any depth interval if the on-site geologist suspects PSSCs at the interval. Site conditions such as lithology may also determine the actual sample depth interval submitted for analysis. The depth of the boring may be extended beyond four feet bgs and more than one subsurface soil sample will be collected if field measurements and observations indicate a possible layer of PSSCs and/or additional sample data would provide insight to the existence of any PSSCs.

Sample documentation and COC will be recorded as specified in Section 4.13 of the SAP.

Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are listed in Section 5.0, Table 5-1 of the QAP. The samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

4.2.3 Permanent Residuum Monitoring Wells

Three permanent residuum monitoring wells will be installed at the Area North of MOUT Site. The permanent residuum monitoring well locations are shown on Figure 4-1. The rationale for each monitoring well locations is presented in Table 4-1. The monitoring well boreholes will be

drilled to the top of bedrock, or until adequate groundwater is encountered to install a well with a 10- to 20-foot screen. Monitoring wells will be installed using a truck-mounted hollow-stem auger drill rig. The monitoring well casing will consist of new 2-inch inside-diameter, Schedule 40, threaded, flush-joint polyvinyl chloride (PVC) pipe. Attached to the bottom of the well casing will be a section of new threaded, flush-joint, 0.010-inch continuous wrap PVC well screen, approximately 10 to 20 feet long.

At the discretion of the IT site manager, a sump (composed of new, 2-inch ID, schedule 40, threaded, flush-joint PVC) may be attached to the bottom of the well screen. After the casing and screen materials are lowered into the boring, a filter pack will be installed around the well screen. In wells installed to depths of 20 feet or less, the filter pack material will be gravity filled. In wells installed to depths of 20 feet or more, the filter pack will be tremied into place. The filter pack will be installed from the bottom of the well to approximately five feet above the top of the well screen. The filter pack will consist of 20/40 silica sand. A fine sand (30/70 silica sand), approximately five feet thick, may be placed above the filter pack. A bentonite seal, approximately five feet thick, will be placed above the filter pack (or fine sand, if used). The remaining annular space will be grouted with a bentonite-cement mixture, using approximately 7 to 8 gallons of water and approximately 5 pounds of bentonite per 94 pound bag of Type I or Type II Portland cement. The grout will be tremied into place from the top of the bentonite seal to ground surface.

Soil samples for lithology will be collected starting at 5 feet bgs and at five-foot intervals to the total depth of the hole during hollow-stem auger drilling to provide a detailed lithologic log. The samples will be collected for lithology using a 24-inch-long, 2-inch-or-larger-diameter split-spoon sampler. The soil borings will be logged in accordance with American Standard for Testing and Materials Method D 2488 using the Unified Soil Classification System. The soil samples will be screened in the field using a PID for potential volatile organic compounds. The monitoring wells will be drilled, installed, and developed as specified in Section 4.8 and Appendix C of the SAP (IT, 2000a). The exact monitoring well locations will be determined in the field by the on-site geologist, based on actual field conditions.

4.2.4 Groundwater Sampling

Groundwater samples will be collected from the three monitoring wells completed at the Area North of MOUT Site, as presented in Section 4.2.3 and 4.2.4.

4.2.4.1 Sample Locations and Rationale

Groundwater samples will be collected from the monitoring well locations shown on Figure 4-1. The groundwater sampling rationale is listed in Table 4-1. The groundwater sample designations, depths, and required QA/QC sample quantities are listed in Table 4-3.

4.2.4.2 Sample Collection

Prior to sampling monitoring wells, static water levels will be measured from each of the monitoring wells installed at the site to define the groundwater flow in the residuum aquifer. Water level measurements will be performed as outlined in Section 4.18 of the SAP (IT, 2000a). Groundwater samples will be collected in accordance with the procedures outlined in Section 4.9.1.4 of the SAP. Low-flow groundwater sampling methodology outlined in the August 2000 letter report to USACE (IT, 2000b) may be used as deemed necessary by the IT Site Manager.

Sample documentation and COC will be recorded as specified in Section 4.13 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are listed in Section 5.0, Table 5-1 of the QAP (IT, 2000a). The samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

4.2.5 Surface Water Sampling

Two surface water samples will be collected from site of the Area North of MOUT Site. Surface water samples will be collected from the two intermittent streams that flow north at the site.

4.2.5.1 Sample Locations and Rationale

The rationale for each surface water sampling location is listed in Table 4-1. The surface water samples will be collected from the proposed locations on Figure 4-1. Surface water sample designations and QA/QC sample requirements are listed in Table 4-4. The exact sampling locations will be determined in the field by the ecological sampler, based on drainage pathways and actual field observations.

4.2.5.2 Sample Collection

The surface water samples will be collected in accordance with procedures specified in Section 4.9.1.3 of the SAP (IT, 2000a). Sample documentation and COC will be recorded as specified in Section 4.13 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are listed in Section 5.0, Table 5-1, of the QAP. The samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

Table 4-3

**Groundwater Sample Designations and QA/QC Sample Quantities
Area North of MOUT Site
Fort McClellan, Alabama**

Sample Location	Sample Designation	Sample Matrix ^a	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
HR-NOM-MW01	HR-NOM-MW01-GW-PP3001-REG	Groundwater				TAL Metals, Nitroaromatic/Nitramine Explosives
HR-NOM-MW02	HR-NOM-MW02-GW-PP3002-REG	Groundwater	HR-NOM-MW02-GW-PP3003-FD		HR-NOM-MW02-GW-PP3003-MS/MSD	TAL Metals, Nitroaromatic/Nitramine Explosives VOCs, SVOCs, CL Pesticides, OP Pesticides, and CL Herbicides
HR-NOM-MW03	HR-NOM-MW03-GW-PP3004-REG	Groundwater				TAL Metals, Nitroaromatic/Nitramine Explosives

^a Groundwater samples will be collected from the approximate midpoint of the saturated screened interval of the monitoring well.

FD - Field duplicate.

FS - Field split.

MS/MSD - Matrix spike/matrix spike duplicate.

QA/QC - Quality assurance/quality control.

REG - Field sample.

TAL - Target analyte list.

TCL - Target compound list.

VOC - Volatile organic compound.

SVOC - Semivolatile organic compound.

CL - Chlorinated.

OP - Organophosphate.

Table 4-4

**Surface Water and Sediment Sample Designations and QA/QC Sample Quantities
Area North of MOUT Site
Fort McClellan, AL**

Sample Location	Sample Designation	Sample Matrix	Sample Depth (ft)	QA/QC Samples			Analytical Suite
				Field Duplicates	Field Splits	MS/MSD	
HR-NOM-SW/SD01	HR-NOM-SW/SD01-SW-PP2001-REG HR-NOM-SW/SD01-SD-PP1001-REG	Surface water sediment	N/A 0-0.5				TAL Metals, Nitroaromatic/Nitramine Explosives
HR-NOM-SW/SD02	HR-NOM-SW/SD02-SW-PP2002-REG HR-NOM-SW/SD02-SD-PP1002-REG	Surface water sediment	N/A 0-0.5	HR-NOM-SW/SD02-SD-PP1003-FD			TAL Metals, Nitroaromatic/Nitramine Explosives VOCs, SVOCs, CL Pesticides, OP Pesticides, and CL Herbicides

N/A - Not Applicable.

FD - Field duplicate.

FS - Field split.

MS/MSD - Matrix spike/matrix spike duplicate.

QA/QC - Quality assurance/quality control.

REG - Field sample.

TAL - Target analyte list.

TCL - Target compound list.

VOC - Volatile organic compound.

SVOC - Semivolatile organic compound.

CL - Chlorinated.

4.2.6 Sediment Sampling

Two sediment samples will be collected from the site of the Area North of MOUT Site. These sediment samples will be collected at the same locations as the surface water samples described in Section 4.2.6.

4.2.6.1 Sample Locations and Rationale

The proposed locations for the sediment samples are shown in Figure 4-1. The rationale for each sediment sampling location is presented in Table 4-1. The sediment sample designation and QA/QC sample requirements are listed in Table 4-4. The actual sediment sample points will be at the discretion of the ecological sampler, based on the drainage pathways and actual field observations.

4.2.6.2 Sample Collection

Sediment samples will be collected in accordance with the procedures specified in Section 4.9.1.2 of the SAP. Sample documentation and COC will be recorded as specified in Section 4.13 of the SAP. The sediment samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

4.3 Decontamination Requirements

Decontamination will be performed on sampling and non-sampling equipment to prevent cross-contamination between sampling locations. Decontamination of sampling equipment will be performed in accordance with the requirements presented in Section 4.10.1.1 of the SAP (IT, 2000a). Decontamination of non-sampling equipment will be performed in accordance with the requirements presented in Section 4.10.1.2 of the SAP.

4.4 Surveying of Sample Locations

All areas at this site must be cleared for UXO avoidance before any surveying activities will commence. Sampling locations will be marked with pin flags, stakes, and/or flagging and will be surveyed using either global positioning system (GPS) or conventional civil survey techniques, as necessary to obtain the required level of accuracy. Horizontal coordinates will be referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983. Elevations will be referenced to the North American Vertical Datum of 1988.

Horizontal coordinates for soil sample locations will be recorded using a GPS to provide accuracy within 1 meter. Because of the need to use permanent monitoring wells to determine

water levels, a higher level of accuracy is required. Monitoring wells will be surveyed to an accuracy of 0.1 foot for horizontal coordinates and 0.01 foot for elevations, using survey-grade GPS techniques and/or conventional civil survey techniques, as required. Procedures to be used for GPS surveying are described in Section 4.3 of the SAP. Conventional land survey requirements are presented in Section 4.19 of the SAP.

4.5 Analytical Program

Samples collected at locations specified in this chapter of this SFSP will be analyzed for specific suites of chemicals and elements based on the history of site usage, as well as EPA, ADEM, FTMC, and USACE requirements. Target analyses for samples collected from Area North of MOUT Site, consist of the following list of analytical suites:

- Target analyte metals - Method 6010B/7000
- Nitroaromatic/nitramine explosives – Method 8330.

Approximately, ten percent of the samples will be analyzed for the following list of analytical suites:

- Target Compound List Volatile Organic Compounds – Method 5035/8260B
- Target Compound List Semivolatile Organic Compounds – Method 8270C
- Chlorinated pesticides - Method 8081A
- Chlorinated herbicides - Method 8151A
- Organophosphorous pesticides - Method 8141A

In addition, sediment samples will be analyzed for the following list of parameters:

- Total Organic Carbon - Method 9060
- Grain Size - ASTM D-421/D-422.

The samples will be analyzed using EPA SW-846 methods, including Update III Methods where applicable, as presented in Table 4-5 in this SFSP and Table 6-1 in the QAP. Data will be reported in accordance with definitive data requirements of Chapter 2 of the USACE Engineering Manual 200-1-6, *Chemical Quality Assurance For Hazardous, Toxic And Radioactive Waste (HTRW) Projects* (USACE, 1997), and evaluated by the stipulated requirements for the generation of definitive data (Section 3.1.2 of the QAP). Chemical data will be reported by the laboratory via hard-copy data packages using Contract Laboratory Program-like forms, along

Table 4-5

**Analytical Samples
Site Investigation
Area North of MOU Site
Fort McClellan, Calhoun County, Alabama**

Parameters	Analysis Method	Sample Matrix	TAT Needed	Field Samples			QA/QC Samples ^a					EMAX	QA Lab
				No. of Sample Points	No. of Events	No. of Field Samples	Field Dups (10%)	Splits w/ QA Lab (0%)	MS/MSD (5%)	Trip Blank (1/ship)	Eq. Rinse (1/wk/matrix)	Total No. Analysis	Total No. Analysis
Area North of MOU Site: 5 water matrix samples (3 groundwater samples and 2 surface water samples); 46 soil matrix samples (22 surface soil samples, 22 subsurface soil samples, and 2 sediment samples)													
All samples will be analyzed for the following parameters:													
TAL Metals	6010B/7000	water	normal	5	1	5	1		1		2	10	0
Nitroaromatic/Nitramine													
Explosives	8330	water	normal	5	1	5	1		1		2	10	0
TAL Metals	6010B/7000	soil	normal	46	1	46	5		2		4	59	0
Nitroaromatic/Nitramine													
Explosives	8330	soil	normal	46	1	46	5		2		4	59	0
Approximately 10% of the samples will be analyzed for the following parameters:													
TCL VOCs	5035/8260B	Water	normal	1	1	1	1		1	1	1	6	0
TCL SVOCs	8270C	Water	normal	1	1	1	1		1		1	5	0
CL Pesticides	8081A	Water	normal	1	1	1	1		1		1	5	0
OP Pesticides	8141A	Water	normal	1	1	1	1		1		1	5	0
Cl Herbicides	8151A	Water	normal	1	1	1	1		1		1	5	0
TCL VOCs	5035/8260B	soil	normal	5	1	5	2		1		2	11	0
TCL SVOCs	8270C	soil	normal	5	1	5	2		1		2	11	0
CL Pesticides	8081A	soil	normal	5	1	5	2		1		2	11	0
OP Pesticides	8141A	soil	normal	5	1	5	2		1		2	11	0
Cl Herbicides	8151A	soil	normal	5	1	5	2		1		2	11	0
Sediment samples only:													
TOC	9060	sediment	normal	2	1	2						2	0
Grain Size	ASTM421/422	sediment	normal	2	1	2						2	0
Area North of MOU Site:				136	27	0	16	1	27	223	0		

^aField duplicate, QA split, and MS/MSD samples were calculated as a percentage of the field samples collected per site and were rounded to the nearest whole number. Trip blank samples will be collected in association with water matrix samples for VOC analysis only. Assumed four field samples per day to estimate trip blanks. Equipment blanks will be collected once per event whenever sampling equipment is field decontaminated and re-used. They will be repeated weekly for sampling events that are anticipated to last more than 1 week. Assumed 20 field samples will be collected per week to estimate number of equipment blanks.

Ship samples to: EMAX Laboratories, Inc
1835 205th Street
Torrance, CA 90501
Attn: Elizabeth McIntyre
Tel: 424-618-8889
Fax: 424-618-0818

MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
TAL - Target analyte list.
TOC - Total organic carbon.
ASTM- American Society for Testing and Materials.

TCL - Target compound list.
VOC - Volatile organic compound.
SVOC - Semivolatile organic compound.
CL - Chlorinated.
OP - Organophosphate.

with electronic copies. These packages will be validated in accordance with EPA National Functional Guidelines by Level III criteria.

4.6 Sample Preservation, Packaging, and Shipping

Sample preservation, packaging, and shipping will follow the procedures specified in Section 4.13.2 of the SAP (IT, 2000a). Completed analysis request/COC records will be secured and included with each shipment of coolers to:

Attn: Sample Receiving/Elizabeth McIntyre
EMAX Laboratories, Inc.
1835 205th Street
Torrance, California 90501
Telephone: (424) 618-8889.

4.7 Investigation-Derived Waste Management

Management and disposal of the investigation-derived wastes (IDW) will follow procedures and requirements described in Appendix D of the SAP (IT, 2000a). The IDW expected to be generated at Area North of MOUT Site will include decontamination fluids, drill cuttings, purge water, and disposable personal protective equipment.

4.8 Site-Specific Safety and Health

Health and safety requirements for this SI are provided in the SSHP attachment for Area North of MOUT Site. The SSHP attachment will be used in conjunction with the installation-wide SHP.

5.0 Project Schedule

The project schedule for the SI activities will be provided by the IT Project Manager to the Base Realignment and Closure Cleanup Team and will be in accordance with the work plan.

6.0 References

Environmental Science and Engineering, Inc. (ESE), 1998, *Final Environmental Baseline Survey, Fort McClellan, Alabama*, prepared for U.S. Army Environmental Center, Aberdeen Proving Ground, Maryland, January.

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U.S. Army Corps of Engineers (USACE), 1997, *Chemical Quality Assurance For Hazardous, Toxic and Radioactive Waste (HTRW) Projects*.

U.S. Department of Agriculture (USDA), 1961, *Soil Survey, Calhoun County, Alabama*, Soil Conservation Service, Series 1958, No. 9, September 1961.

U.S. Environmental Protection Agency (EPA), 1993, *Data Quality Objectives Process for Superfund, Interim Final Guidance*, EPA 540-R-93-071, September.

ATTACHMENT 1
LIST OF ABBREVIATIONS AND ACRONYMS

List of Abbreviations and Acronyms

2,4-D	2,4-dichlorophenoxyacetic acid	BOD	biological oxygen demand	CWA	chemical warfare agent
2,4,5-T	2,4,5-trichlorophenoxyacetic acid	BRAC	Base Realignment and Closure	CWM	chemical warfare material; clear, wide mouth
2,4,5-TP	silvex	Braun	Braun Intertec Corporation	CX	dichloroformoxime
3D	3D International Environmental Group	BSC	background screening criterion	'D'	duplicate; dilution
Abs	skin absorption	BTAG	Biological Technical Assistance Group	DAF	dilution-attenuation factor
Amsl	above mean sea level	BTEX	benzene, toluene, ethyl benzene, and xylenes	DANC	decontamination agent, non-corrosive
AC	hydrogen cyanide	BTOC	below top of casing	°C	degrees Celsius
AcB2	Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded	BTV	background threshold value	°F	degrees Fahrenheit
AcC2	Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded	BW	biological warfare	DCE	dichloroethene
AcD2	Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded	BZ	breathing zone; 2-quinuclidinyl benzilate	DDD	dichlorodiphenyldichloroethane
AcE2	Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded	C	ceiling limit value	DDE	dichlorodiphenyldichloroethene
ACGIH	American Conference of Governmental Industrial Hygienists	Ca	carcinogen	DDT	dichlorodiphenyltrichloroethane
ADEM	Alabama Department of Environmental Management	CAB	chemical warfare agent breakdown products	DEH	Directorate of Engineering and Housing
ADPH	Alabama Department of Public Health	CAMU	corrective action management unit	DEP	depositional soil
AEC	U.S. Army Environmental Center	CCAL	continuing calibration	DI	deionized
AEL	airborne exposure limit	CCB	continuing calibration blank	DID	data item description
AET	adverse effect threshold	CD	compact disc	DIMP	di-isopropylmethylphosphonate
AHA	ammunition holding area	CDTF	Chemical Defense Training Facility	DMBA	dimethylbenz(a)anthracene
AL	Alabama	CEHNC	U.S. Army Engineering and Support Center, Huntsville	DMMP	dimethylmethylphosphonate
ALAD	-aminolevulinic acid dehydratase	CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	DOD	U.S. Department of Defense
amb.	Amber	CERFA	Community Environmental Response Facilitation Act	DOJ	U.S. Department of Justice
amsl	above mean sea level	CESAS	Corps of Engineers South Atlantic Savannah	DOT	U.S. Department of Transportation
ANAD	Anniston Army Depot	CG	carbonyl chloride (phosgene)	DP	direct-push
AOC	area of concern	CFC	chlorofluorocarbon	DPDO	Defense Property Disposal Office
APT	armor-piercing tracer	CFDP	Center for Domestic Preparedness	DPT	direct-push technology
ARAR	applicable or relevant and appropriate requirement	ch	inorganic clays of high plasticity	DQO	data quality objective
AREE	area requiring environmental evaluation	CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine	DRMO	Defense Reutilization and Marketing Office
ASP	Ammunition Supply Point	CK	cyanogen chloride	DRO	diesel range organics
ASR	Archives Search Report	cl	inorganic clays of low to medium plasticity	DS	deep (subsurface) soil
AST	aboveground storage tank	Cl.	chlorinated	DS2	Decontamination Solution Number 2
ASTM	American Society for Testing and Materials	CLP	Contract Laboratory Program	DWEL	drinking water equivalent level
ATSDR	Agency for Toxic Substances and Disease Registry	CN	chloroacetophenone	E&E	Ecology and Environment, Inc.
ATV	all-terrain vehicle	CNB	chloroacetophenone, benzene, and carbon tetrachloride	EBS	environmental baseline survey
AWARE	Associated Water and Air Resources Engineers, Inc.	CNS	chloroacetophenone, chloropicrin, and chloroform	EC ₅₀	effects concentration for 50 percent of a population
AWWSB	Anniston Water Works and Sewer Board	Co-60	cobalt-60	ECBC	Edgewood Chemical/Biological Command
'B'	Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)	CoA	Code of Alabama	EDQL	ecological data quality level
BCF	blank correction factor	COC	chain of custody; contaminant of concern	EE/CA	engineering evaluation and cost analysis
BCT	BRAC Cleanup Team	COE	Corps of Engineers	Elev.	elevation
BERA	baseline ecological risk assessment	Con	skin or eye contact	EM	electromagnetic
BEHP	bis(2-ethylhexyl)phthalate	COPC	contaminant of potential concern	EMI	Environmental Management Inc.
BFB	bromofluorobenzene	COPEC	contaminant of potential environmental concern	EM31	Geonics Limited EM31 Terrain Conductivity Meter
BFE	base flood elevation	CQCSM	Contract Quality Control System Manager	EM61	Geonics Limited EM61 High-Resolution Metal Detector
BG	Bacillus globigii	CRL	certified reporting limit	EOD	explosive ordnance disposal
bgs	below ground surface	CRZ	contamination reduction zone	EODT	explosive ordnance disposal team
BHC	betahexachlorocyclohexane	Cs-137	cesium-137	EPA	U.S. Environmental Protection Agency
bkg	background	CS	ortho-chlorobenzylidene-malononitrile	EPC	exposure point concentration
bls	below land surface	CSEM	conceptual site exposure model	EPIC	Environmental Photographic Interpretation Center
		ctr.	container	ER	equipment rinsate

List of Abbreviations and Acronyms (Continued)

MPA	methyl phosphonic acid	oh	organic clays of medium to high plasticity	RD	remedial design
MPM	most probable munition	ol	organic silts and organic silty clays of low plasticity	RDX	cyclonite
MR	molasses residue	OP	organophosphorus	RfD	reference dose
MS	matrix spike	ORP	oxidation-reduction potential	ReB3	Rarden silty clay loams
mS/cm	millisiemens per centimeter	OSHA	Occupational Safety and Health Administration	REG	regular field sample
MSD	matrix spike duplicate	OSWER	Office of Solid Waste and Emergency Response	REL	recommended exposure limit
MTBE	methyl tertiary butyl ether	OWS	oil/water separator	RFA	request for analysis
msl	mean sea level	oz	ounce	RGO	remedial goal option
MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes, severely eroded	PA	preliminary assessment	RI	remedial investigation
mV	millivolts	PAH	polynuclear aromatic hydrocarbon	RL	reporting limit
MW	monitoring well	Parsons	Parsons Engineering Science, Inc.	RPD	relative percent difference
Na	sodium	Pb	lead	RRF	relative response factor
NA	not applicable; not available	PCB	polychlorinated biphenyl	RSD	relative standard deviation
NAD	North American Datum	PCE	perchloroethene	RTECS	Registry of Toxic Effects of Chemical Substances
NAD83	North American Datum of 1983	PCP	pentachlorophenol	RTK	real-time kinematic
NAVD88	North American Vertical Datum of 1988	PDS	Personnel Decontamination Station	SAD	South Atlantic Division
NAS	National Academy of Sciences	PEL	permissible exposure limit	SAE	Society of Automotive Engineers
NCP	National Contingency Plan	PES	potential explosive site	SAIC	Science Applications International Corporation
ND	not detected	Pest.	pesticides	SAP	installation-wide sampling and analysis plan
NE	no evidence; northeast	PETN	pentarey thritol tetranitrate	sc	clayey sands; sand-clay mixtures
ne	not evaluated	PFT	portable flamethrower	Sch.	Schedule
NEW	net explosive weight	PG	professional geologist	SCM	site conceptual model
NFA	No Further Action	PID	photoionization detector	SD	sediment
ng/L	nanograms per liter	PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes	SDG	sample delivery group
NGVD	National Geodetic Vertical Datum	POL	petroleum, oils, and iubicants	SDZ	safe distance zone; surface danger zone
Ni	nickel	PP	peristaltic pump	SEMS	Southern Environmental Management & Specialties, Inc.
NIC	notice of intended change	ppb	parts per billion	SFSP	site-specific field sampling plan
NIOSH	National Institute for Occupational Safety and Health	PPE	personal protective equipment	SGF	standard grade fuels
NLM	National Library of Medicine	ppm	parts per million	SHP	installation-wide safety and health plan
NPDES	National Pollutant Discharge Elimination System	PPMP	Print Plant Motor Pool	SI	site investigation
NPW	net present worth	ppt	parts per thousand	SL	standing liquid
No.	number	PR	potential risk	SLERA	screening-level ecological risk assessment
NOAA	National Oceanic and Atmospheric Administration	PRG	preliminary remediation goal	sm	silty sands; sand-silt mixtures
NOAEL	no-observed-adverse-effects-level	PSSC	potential site-specific chemical	SM	Serratia marcescens
NR	not requested; not recorded; no risk	pt	peat or other highly organic silts	SOP	standard operating procedure
NRC	National Research Council	PVC	polyvinyl chloride	sp	poorly graded sands; gravelly sands
NRCC	National Research Council of Canada	QA	quality assurance	SP	submersible pump
ns	nanosecond	QA/QC	quality assurance/quality control	SQRT	screening quick reference tables
N-S	north to south	QAP	installation-wide quality assurance plan	Sr-90	strontium-90
NS	not surveyed	QC	quality control	SRA	streamlined human health risk assessment
nT	nanotesla	QST	QST Environmental, Inc.	Ss	stony rough land, sandstone series
NTU	nephelometric turbidity unit	qty	quantity	SS	surface soil
nv	not validated	Qual	qualifier	SSC	site-specific chemical
O&G	oil and grease	'R'	rejected data; resample	SSHO	site safety and health officer
O&M	operation and maintenance	R&A	relevant and appropriate	SSHP	site-specific safety and health plan
OB/OD	open burning/open detonation	RAO	removal action objective	SSL	soil screening level
OD	outside diameter	RBC	risk-based concentration	SSSL	site-specific screening level
OE	ordnance and explosives	RCRA	Resource Conservation and Recovery Act	SSSSL	site-specific soil screening level

List of Abbreviations and Acronyms (Continued)

ER-L	effects range-low	GPS	global positioning system	ITEMS	IT Environmental Management System™
ER-M	effects range-medium	GS	ground scar	'J'	estimated concentration
ESE	Environmental Science and Engineering, Inc.	GSA	General Services Administration; Geologic Survey of Alabama	JeB2	Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded
ESN	Environmental Services Network, Inc.	GSBP	Ground Scar Boiler Plant	JeC2	Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded
ESV	ecological screening value	GSSI	Geophysical Survey Systems, Inc.	JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes
Exp.	explosives	GST	ground stain	JPA	Joint Powers Authority
E-W	east to west	GW	groundwater	K	conductivity
EZ	exclusion zone	gw	well-graded gravels; gravel-sand mixtures	K _{ow}	octonal-water partition coefficient
FAR	Federal Acquisition Regulations	HA	hand auger	L	lewisite; liter
FB	field blank	HCl	hydrochloric acid	LC ₅₀	lethal concentration for 50 percent of population tested
FD	field duplicate	HD	distilled mustard	LD ₅₀	lethal dose for 50 percent of population tested
FDA	U.S. Food and Drug Administration	HDPE	high-density polyethylene	l	liter
FedEx	Federal Express, Inc.	HEAST	Health Effects Assessment Summary Tables	LBP	lead-based paint
FEMA	Federal Emergency Management Agency	Herb.	herbicides	LCS	laboratory control sample
FFE	field flame expedient	HHRA	human health risk assessment	LC ₅₀	lethal concentration for 50 percent population tested
Fil	filtered	HI	hazard index	LD ₅₀	lethal dose for 50 percent population tested
Flt	filtered	HNO ₃	nitric acid	LEL	lower explosive limit
FMDC	Fort McClellan Development Commission	HQ	hazard quotient	LOAEL	lowest-observed-advserse-effects-level
FML	flexible membrane liner	HQ _{screen}	screening-level hazard quotient	LT	less than the certified reporting limit
FMP 1300	Former Motor Pool 1300	hr	hour	LUC	land-use control
FOMRA	Former Ordnance Motor Repair Area	H&S	health and safety	LUCAP	land-use control assurance plan
Foster Wheeler	Foster Wheeler Environmental Corporation	HSA	hollow-stem auger	LUCIP	land-use control implementation plan
Frtn	fraction	HTRW	hazardous, toxic, and radioactive waste	max	maximum
FS	field split; feasibility study	'I'	out of control, data rejected due to low recovery	MCL	maximum contaminant level
FSP	field sampling plan	ICAL	initial calibration	MCPA	4-chloro-2-methylphenoxyacetic acid
ft	feet	ICB	initial calibration blank	MDC	maximum detected concentration
ft/ft	feet per foot	ICP	inductively-coupled plasma	MDCC	maximum detected constituent concentration
FTA	Fire Training Area	ICRP	International Commission on Radiological Protection	MDL	method detection limit
FTMC	Fort McClellan	ICS	interference check sample	mg	milligrams
FTRRA	FTMC Reuse & Redevelopment Authority	ID	inside diameter	mg/kg	milligrams per kilogram
g	gram	IDL	instrument detection limit	mg/kg/day	milligram per kilogram per day
g/m ³	gram per cubic meter	IDLH	immediately dangerous to life or health	mg/kgbw/day	milligrams per kilogram of body weight per day
G-856	Geometrics, Inc. G-856 magnetometer	IDM	investigative-derived media	mg/L	milligrams per liter
G-858G	Geometrics, Inc. G-858G magnetic gradiometer	IDW	investigation-derived waste	mg/m ³	milligrams per cubic meter
gal	gallon	IEUBK	Integrated Exposure Uptake Biokinetic	mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils
gal/min	gallons per minute	ILCR	incremental lifetime cancer risk	MHz	megahertz
GB	sarin	IMPA	isopropylmethyl phosphonic acid	µg/g	micrograms per gram
gc	clay gravels; gravel-sand-clay mixtures	IMR	Iron Mountain Road	µg/kg	micrograms per kilogram
GC	gas chromatograph	in.	inch	µg/L	micrograms per liter
GCL	geosynthetic clay liner	Ing	ingestion	µmhos/cm	micromhos per centimeter
GC/MS	gas chromatograph/mass spectrometer	Inh	inhalation	min	minimum
GCR	geosynthetic clay liner	IP	ionization potential	MINICAMS	miniature continuous air monitoring system
GFAA	graphite furnace atomic absorption	IPS	International Pipe Standard	ml	inorganic silts and very fine sands
GIS	Geographic Information System	IRDMIS	Installation Restoration Data Management Information System	mL	milliliter
gm	silty gravels; gravel-sand-silt mixtures	IRIS	Integrated Risk Information Service	mm	millimeter
gp	poorly graded gravels; gravel-sand mixtures	IRP	Installation Restoration Program	MM	mounded material
gpm	gallons per minute	ISCP	Installation Spill Contingency Plan	MMBtu/hr	million Btu per hour
GPR	ground-penetrating radar	IT	IT Corporation	MOGAS	motor vehicle gasoline

List of Abbreviations and Acronyms (Continued)

STB	supertropical bleach
STC	source term concentration
STEL	short-term exposure limit
STOLS	Surface Towed Ordnance Locator System®
Std. units	standard units
SU	standard unit
SUXOS	senior UXO supervisor
SVOC	semivolatile organic compound
SW	surface water
SW-846	U.S. EPA's <i>Test Methods for Evaluating Solid Waste: Physical/Chemical Methods</i>
SWPP	storm water pollution prevention plan
SZ	support zone
TAL	target analyte list
TAT	turn around time
TB	trip blank
TBC	to be considered
TCA	trichloroethane
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TCDF	tetrachlorodibenzofurans
TCE	trichloroethene
TCL	target compound list
TCLP	toxicity characteristic leaching procedure
TDGCL	thiodiglycol
TDGCLA	thiodiglycol chloroacetic acid
TERC	Total Environmental Restoration Contract
TIC	tentatively identified compound
TLV	threshold limit value
TN	Tennessee
TNT	trinitrotoluene
TOC	top of casing; total organic carbon
TPH	total petroleum hydrocarbons
TRADOC	U.S. Army Training and Doctrine Command
TRPH	total recoverable petroleum hydrocarbons
TSCA	Toxic Substances Control Act
TSDF	treatment, storage, and disposal facility
TWA	time-weighted average
UCL	upper confidence limit
UCR	upper certified range
'U'	not detected above reporting limit
USACE	U.S. Army Corps of Engineers
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USAEC	U.S. Army Environmental Center
USAEHA	U.S. Army Environmental Hygiene Agency
USACMLS	U.S. Army Chemical School
USAMPS	U.S. Army Military Police School
USATCES	U.S. Army Technical Center for Explosive Safety
USATEU	U.S. Army Technical Escort Unit
USATHAMA	U.S. Army Toxic and Hazardous Material Agency

USC	United States Code
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	underground storage tank
UTL	upper tolerance level
UXO	unexploded ordnance
UXOQCS	UXO Quality Control Supervisor
UXOSO	UXO safety officer
V	vanadium
VOA	volatile organic analyte
VOC	volatile organic compound
VOH	volatile organic hydrocarbon
VQlfr	validation qualifier
VQual	validation qualifier
VX	nerve agent (O-ethyl-S-[diisopropylaminoethyl]-methylphosphonothiolate)
Weston	Roy F. Weston, Inc.
WP	installation-wide work plan
WS	watershed
WSA	Watershed Screening Assessment
WWI	World War I
WWII	World War II
XRF	x-ray fluorescence
yd ³	cubic yards

R – Data is rejected

SAIC – Data Qualifiers, Codes and Footnotes, 1995 Remedial Investigation

N/A – Not analyzed

ND – Not detected

Boolean Codes

LT – Less than the certified reporting limit

Flagging Codes

9 – Non-demonstrated/validated method performed for USAEC

B – Analyte found in the method blank or QC blank

C – Analysis was confirmed

D – Duplicate analysis

I – Interfaces in sample make quantitation and/or identification to be suspicious

J – Value is estimated

K – Reported results are affected by interfaces or high background

N – Tentatively identified compound (match greater than 70%)

Q – Sample interference obscured peak of interest

R – Non-target compound analyzed for but not detected (GC/MS methods)

S – Non-target compound analyzed for and detected (GC/MS methods)

T – Non-target compound analyzed for but not detected (non GC/MS methods)

U – Analysis in unconfirmed

Z – Non-target compound analyzed for and detected (non-GC/MS methods)

Qualifiers

J – The low-spike recovery is low

N – The high-spike recovery is low