DEPARTMENT OF THE ARMY
U.S. ARMY GARRISON
FORT McCLELLAN, ALABAMA 36205-5000

December 18, 2007

REPLY TO
ATTENTION OF

Office of the Site Manager

Mrs. Brandi Little
Alabama Department of Environmental Management (ADEM)
Engineering Services Section
Governmental Hazardous Waste, Land Division
1400 Coliseum Boulevard
Montgomery, Alabama 36110-2059

Dear Mrs. Little:

Please find attached a letter from the U.S. Army Corps of Engineers Huntsville Engineering and Support Center transmitting the Final *Site-Specific Final Report, FWS Land Transfer Area (Roads, Firebreaks, and High Use Areas), Fort McClellan, Alabama*, December 2007. Army responses to comments provided by ADEM on October 4, 2007 are included at Appendix E. The Army requests that ADEM provide concurrence for this report.

A copy of this letter and the attachment have been forwarded to Mr. Jim Pastorick at UXO Pro (1 Copy), and to Mr. Steve Miller of the U. S. Fish and Wildlife Service (2 Copies).

If you require additional information please contact Mrs. Lisa Holstein at 256-848-7455 or E-mail lisa.holstein@us.army.mil.

Sincerely,

Scott J. Bolton
Site Manager

Attachment

DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF:

December 18, 2007

Design Center for Ordnance
and Explosives Directorate

Ms. Brandi Little
Alabama Department of Environmental Management (ADEM)
Engineering Services Section
Governmental Hazardous Waste, Land Division
1400 Coliseum Boulevard
Montgomery, Alabama 36110-2059

Dear Ms. Little,

This letter transmits two copies of the Final *Site-Specific Final Report, FWS Land Transfer Area (Roads, Firebreaks, and High Use Areas), Fort McClellan, Alabama*, December 2007.

I certify under penalty of law that the *Site-Specific Final Report, FWS Land Transfer Area (Roads, Firebreaks, and High Use Areas), Fort McClellan, Alabama*, April 2007, and the responses to comments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you require additional information, please call me at (256) 895-1621, or email Robert.B.Jolley@usace.army.mil.

Sincerely,

Robert B. Jolley
Project Manager

Enclosures

TETRA TECH EC, INC.

05 December 2007
FWHN-FTMC-07-0024

Ms. Wanda Hampton
Contracting Officer
US Army Engineering and Support Center, Huntsville
P.O. Box 1600
Huntsville, AL 35807

Subject: Final Site Specific Final Report FWS Land Transfer Area, Fort McClellan, Alabama, Revision 2, Task Order 0020, Contract Number DACA87-99-D-0010

Dear Ms. Hampton:

The subject report has been revised to address ADEM comments on the Final Report.

Please feel free to contact me at (256) 430-3701 or (770) 331-4195 with any questions. I can also be reached by e-mail at Art.Holcomb@tteci.com.

Sincerely,
Tetra Tech EC

Arthur B. Holcomb, PE
Vice President

Enclosures, as stated

CF: Mr. Robert Jolley, US Army Engineering & Support Center, Huntsville

Tetra Tech EC
4960 Corporate Drive NW, Suite 140, Huntsville, AL 35805
TEL: 256-830-4100 FAX: 256-830-1991

Final

Site Specific Final Report
FWS Land Transfer Area
(Roads, Firebreaks, and High Use Areas)
Fort McClellan, Alabama

Task Order 0020
Contract Number DACA87-99-D-0010

Contracting Agency:
U.S. Army Engineering and Support Center
Huntsville, Alabama

Geographical Corps District:
US Army Engineer District, Mobile

Prepared by:
Tetra Tech FW, Inc.
Ft. McClellan, Alabama

DECEMBER 2007

CERTIFICATION

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

Arthur B. Holcomb P.E.
Vice President

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ADEM
Fish and Wildlife Service

ACRONYMS AND ABBREVIATIONS

AP	Armor Piercing
AP-T	Armor Piercing-Tracer
ASR	Archives Search Report
CEHNC	Corps of Engineers, Huntsville Center
CWM	Chemical Warfare Materiel
DDESB	Department of Defense Explosive Safety Board
DGPS	Differential Global Positioning System
EE/CA	Engineering Evaluation/Cost Analysis
ESS	Explosives Safety Submission
FWS	United States Fish and Wildlife Service
GIS	Geographical Information System
GPO	Geophysical Prove Out
HE	High Explosive
HEAT	High Explosive Anti Tank
IAW	in accordance with
LUC	Land Use Control
MD	Munitions Debris
MEC	Munitions and Explosives of Concern
MLNWR	Mountain Longleaf National Wildlife Refuge
MPM	Most Probable Munition
mm	millimeter
msl	mean sea level
mV	millivolt
NAD	North American Datum
NFA	No Further Action
OE	Ordnance and Explosives
ORNL	Oak Ridge National Laboratory
PD	Point Detonating
PDA	Personal Data Assistant
QA	Quality Assurance
QC	Quality Control
RFP	Request for Proposal
RLS	Registered Land Surveyor
SOW	Scope of Work
SSWP	Site-Specific Work Plan
SWWP	Site-Wide Work Plan
SUXOS	Senior Unexploded Ordnance Supervisor
TDEM	Time Domain Electromagnetic
TtFWI	Tetra Tech FW, Inc.
U.S.	United States
USATCES	United States Army Technical Center for Explosives Safety
USAESCH	United States Army Corps of Engineers, Engineering and Support Center, Huntsville
UXO	Unexploded Ordnance
UXOQC	Unexploded Ordnance Quality Control Specialist
UXOSO	Unexploded Ordnance Site Safety and Health Officer
VTA	Vehicle Towed Array

1.0 INTRODUCTION

1.0.1 This document will discuss the objectives, procedures, and results of ammunitions response in the Charlie Area of the United States (U.S.) Fish and Wildlife Service (FWS) Land Transfer Areas at Fort McClellan, Alabama. The fieldwork was performed in phases in accordance with the start dates as follows:

- Installation of signs, gates and barricades: started April 2003
- Survey and surface clearance: started October 2003
- Geophysical mapping: started December 2003
- Intrusive investigation: started January 2004

1.0.2 Fieldwork was completed in December 2004. The FWS Land Transfer Area is the Mountain Longleaf National Wildlife Refuge (MLNWR). The munitions response, performed by Tetra Tech FW, Inc. (TtFWI), was conducted in two phases. Phase 1 provided Land Use Controls (LUCs) to the area by installing gates, barriers, and signs to prevent non-essential personnel from gaining access to areas known or suspected to contain Unexploded Ordnance (UXO). Phase 2 consisted of a removal to depth of MEC in road segments (firebreaks and roads) as well as three separate sites, known as high use areas. No anomalies were investigated under paved roads as part of this task order. The three high use areas were chosen by the FWS as locations for kiosk or possible building sites in support of the MLNWR. The combined area of the roads and high use areas was approximately 128.9 acres. The road segments, installed gates and barriers, the boundary area, and the high use areas can be viewed on Figure 4-1. This document will discuss the operational procedures and results of this task order.

1.1 OBJECTIVE AND SCOPE

1.1.1 The objective of this task order was to perform Phase 1 and Phase 2 of the Scope of Work (SOW). Phase 1 consisted of installing LUCs to help prevent non-essential personnel from entering areas known to contain Munitions or Explosives of Concern (MEC), while Phase 2 was a removal to depth on the selected areas. The potential MEC that were expected to be found are listed in Table 1-1. This information was extracted from the Charlie Area Engineering Evaluation/Cost Analysis (EE/CA) and is not meant to be all-inclusive, but a representative sample of the type of items that are located within the FWS Land Transfer Areas. What was discovered during this removal action was consistent with the expected items listed below in Table 1-1.

Table 1-1
Potential MEC Within the FWS Land Transfer Areas
(from the Charlie Area EE/CA Report)

Projectile, 155mm, AP/HE
Projectile, 37mm, HE
Rifle grenade, M9, HE
Rocket, 2.36in, M6, HEAT
Rocket, 2.36in, M7, Practice
Mortar, 3”, Stokes
Rocket motor, 2.36in
Mortar, 60mm, HE, M49A2
Projectile, 75mm, Shrapnel round
Projectile, 105mm, Shrapnel
Mortar, 60mm, Practice
Black powder spotting charge, M43
Projectile, 155mm, Shrapnel
Fuze, PD, M1904
Mortar, 81mm, Practice
Mortar, 81mm, HE, M43

1.1.2 The Scope of Work associated with this Task Order included:

- PHASE 1
  - Task 1 – Install Gates, Barriers, Berms, and Fencing
  - Task 2 – Install Boundary Signs Between Public Access Areas and MEC Areas
- PHASE 2
  - Task 3 – Geophysical Prove Out
  - Task 4 – Prepare Site-Specific Work Plan (SSWP) and Explosive Safety Submission (ESS)
  - Task 5 – Geographical Information System (GIS) Application
  - Task 6 – Perform Ordnance and Explosives (OE) Surface Clearance, Brush Clearance, and Vegetation Removal
  - Task 7 – Perform Location Surveys and Mapping
  - Task 8 – Geophysical Investigation and Evaluation
  - Task 9 – Anomaly Reacquisition and Marking
  - Task 10 – Perform MEC Removal
  - Task 11 – Quality Control Plan
  - Task 12 – Not Used
  - Task 13 – Prepare Site-Specific Removal Report
  - Task 14 –Meetings
  - Task 15 – Provide Support for USAESCH Quality Assurance (QA)

1.2 SUBMITTALS, APPROVALS, AND AUTHORIZATION

1.2.1 The U.S. Army Corps of Engineers, St. Louis District, compiled an Archives Search Report (ASR) in 1996. The ASR was prepared by reviewing available records and reports documenting the history of Fort McClellan. Historical information pertaining to site operations, including a listing of site investigations conducted before 1996, is contained within the ASR. In 1998, the U.S. Army Corps of Engineers, St. Louis District, revised the ASR to include suspect Chemical Warfare Munitions (CWM) areas. The ASR was revised in July 1999 and further revised to its current form in September 2001.

1.2.2 The Final ASR presented the findings of the site inspection and evaluation of potential MEC occurrence at the former Fort McClellan. Numerous areas, suspected of being used for conventional training, had roads or firebreaks that traversed them. The Charlie Area EE/CA describes ranges and training areas located in the Charlie EE/CA study area in detail.

1.2.3 Environmental Science and Engineering completed an Environmental Baseline Survey of Fort McClellan for the U.S. Army Environmental Center, Aberdeen, Maryland, in 1998. The document summarized the current environmental condition of the Fort McClellan property.

1.2.4 Starting in early 2002, TtFWI began conducting an EE/CA within the Charlie Area of Fort McClellan. The EE/CA report is in the Draft-Final version but results from the initial investigation were used to determine the Most Probable Munition (MPM) for this project. MEC information provided in Table 1-1 was extracted from the Draft-Final Charlie Area EE/CA report.

1.2.5 On March 6, 2003, TtFWI received a Request for Proposal (RFP) and an SOW for the initial FWS Land Transfer Areas Removal Action. A proposal was submitted and an award was issued in April 2003.

1.2.6 The Draft Conventional ESS was submitted and reviewed by the USAESCH and the Fort McClellan Transition Force. After initial review and revision, the Draft-Final Conventional ESS was submitted and reviewed by the United States Army Technical Center for Explosives Safety (USATCES). The Department of Defense Explosives Safety Board (DDESB) then reviewed the Final version. A memorandum was issued by DDESB approving the ESS on September 11, 2003.

1.3 SITE LOCATION

1.3.1 Fort McClellan is located northeast of the City of Anniston in Calhoun County, Alabama. The areas known as Weaver and Blue Mountain are to the West, with the City of Jacksonville to the North and the Talladega Forest to the East. Figure 4-1 shows the location of the FWS Land Transfer Areas. The FWS Land Transfer Areas are located entirely within the MLNWR. The topographic gradient within the munitions response area varies greatly throughout the site. Local relief on Fort McClellan is in

excess of 1,320 feet. The lower elevations (700 feet above mean sea level [msl]) occur along Cane Creek, near Baltzell Gate Road, while the maximum elevations (2,063 feet above msl) occur on Choccolocco Mountain, which traverses the area in a north/south direction, with the steep easterly slopes grading abruptly into Choccolocco Valley. The western slopes are more continuous, with the southern extension maintaining elevations up to 900 feet above msl near the western reservation boundary. The northern extension decreases in elevation in the vicinity of Reilly Airfield. The central portion of Fort McClellan is characterized by flat to gently sloping land.

2.0 DISCUSSION

2.1 PHASE 1

2.1.1 Phase 1 consisted of placing signs, gates, and barriers (acting as LUCs) around areas within the Charlie Area that were known to contain UXO. Phase 1 consisted of two sub-tasks: Task 1 – Install gates, barriers, berms, and fencing; and Task 2 – Install boundary signs around MEC areas.

2.1.1 Task 1 – Install Gates, Barriers, Berms, and Fencing

2.1.1.1 Task 1 involved installing gates, barriers, and fencing as needed to limit access to the areas of the MLNWR known to contain UXO. The gates were installed by TtFWI site personnel using both hand and mechanical tools. At each location fencing was added as needed to extend the blocking barrier to prevent easy access. UXO avoidance techniques were used before any gate or barrier was installed. Photographs of the gates and barriers are included in Appendix B and are shown in Figure 4-5

2.1.2 Task 2 – Install Boundary Signs Between Public Access Areas and MEC Areas

2.1.2.1 Figure 4-5 shows the boundary that was signed around the MEC areas, and also shows the location of barriers and gates that were installed. The entire area was signed with UXO warning signs and FWS Do Not Enter signs between April and June 2003. The Do Not Enter signs were provided by the FWS. Signs were placed around the entire boundary of the suspected MEC areas at approximately 200-foot intervals. In addition to the signs placed around the MEC areas signs were also placed every 200 feet along both sides of Bains Gap Road where it passes through the suspected MEC area. Photographs of the signs installed in this task are provided in Appendix B.

2.2 PHASE 2

2.2.1 Phase 2 was a clearance to depth on certain roads/firebreaks and three sites known as high use areas. The roads/firebreaks and high use areas were designated by the U.S. Army for this removal in order to assist the FWS in their ability to manage the MLNWR. The area selected for this removal action within the FWS Land Transfer Areas covers 128.9 acres. Within the 128.9 acres there were three high use areas and 29.4 miles of roads and firebreaks. No anomalies were investigated under paved roads as part of this task order. Table 2-1 below shows the area of each high use area and the total area for the road segments within this area. Figure 4-1 shows the location of these segments and areas.

Table 2-1
Sector and High Use Area Breakdown

Sector	Area (acres)
Range 20	4
Range 21	6.5
Range 24	4
Road/firebreaks	114.4
TOTAL	128.9

2.3 SITE PREPARATION ACTIVITIES

2.3.1 Location Surveys

2.3.1.1 Boundary and Segment Setout. The boundary survey of the high use areas and the road segment marker setout was conducted by an Alabama Registered Land Surveyor (RLS) (Skipper Engineering Inc., Rainbow City, Alabama, License Number 20141). The high use areas only had the boundary surveyed instead of the 100 x 100 hundred grids. Each corner was marked with an orange painted wooden stake marked with the correct designation on the stake. The SOW specified that each corner be located in State Plane coordinates referenced from the provided boundary locations. The site location is shown on Figure 4-1, while individual high use areas can be seen on Figures 4-2 through 4-4. The road segments were marked with survey control markers spread throughout the area at strategic intersections, while location markers were placed along the center-line of all roads and firebreaks at 200-foot intervals. Figure 4-1 shows the location of road segments and the survey control markers that were installed.

2.3.1.2 All work was carried out in accordance with the requirements of the "Minimum Technical Standards for the Practice of Land Surveying in the State of Alabama". All coordinates were based on the State Plane Grid System to the North American Datum of 1983 (NAD83). TtFWI UXO Technicians provided anomaly avoidance for each survey crew in order to ensure that each survey location was clear of sub-surface anomalies prior to any survey marker being placed in the ground.

2.3.2 Brush Clearance

2.3.2.1 TtFWI performed the brush clearance in the FWS Land Transfer Areas. Brush clearance was necessary to prepare the site for subsequent phases of work including the geophysical survey, reacquisition, and intrusive OE removal activities. TtFWI used several effective means to remove and reduce the vegetation including both mechanical and manual means.

2.3.3 Geophysical Mapping

2.3.3.1 TtFWI performed the geophysical mapping of the roads, firebreaks, and high use areas within the FWS Land Transfer Areas. Data acquisition included the processing and interpretation by a qualified geophysicist. Geophysical data was collected utilizing a Time Domain Electromagnetic (TDEM) method. The EM61 Mk-II, manufactured by

Geonics LTD, was used in two methods in this task order. For the roads and firebreaks we used five (5) EM-61s installed on a VTA. Navigation information was collected using one of two methods. The first was Differential Global Positioning Systems (DGPS) in areas where a signal was available and the second was the fiducial method for areas where a DGPS signal was not available. In the high use areas we used the VTA and man carried EM-61 coil in conjunction with the DGPS. In the high use areas we used the man carried EM-61 in areas where the VTA could not go, this ensured the highest geophysical survey coverage of the high use areas. In both the high use areas, roads, and firebreaks any portion that could not be geophysically mapped or where the geophysical data was not of the quality needed, was instead cleared using a mag and dig protocol utilizing a handheld geophysical instrument (Vallon VMX2 and Schondstedt Cx-52). Due to Steep slopes and large trees along the sides of most segments, portions of virtually all segments were cleared using mag & dig techniques. The following segments were cleared entirely using mag & dig techniques: 055, 056, 057, 058, 059, 062, and 063.

2.3.3.2 The VTA was used because of the length of the roads and firebreaks, and the relative flat and open terrain of the high use areas that required geophysical investigation. The fiducial method of collecting location information of the EM-61 involved a series of markers and survey control points that were installed throughout the entire area. The survey control was placed at strategic road/firebreak intersection with fiducial markers being placed every 200 feet between these control points. When the VTA operator crossed a fiducial marker they would hit the space bar key on the laptop computer that was collecting data. This would put an electronic mark on the data that the geophysicist used to ensure proper location of the VTA. The system was selected because of its ability to provide accurate position data along the winding and up and down roads/firebreaks in this area. In the high use areas, the DGPS was used to provide navigational data since the areas were flat and open.

2.3.3.3 One TtFWI team trained in geophysical mapping, consisting of three personnel, carried out the geophysical mapping operation within the FWS Land Transfer Areas.

2.3.3.4 Prior to starting geophysical mapping in the FWS Land Transfer Areas, a Geophysical Prove Out (GPO) was performed. This GPO was used as a tool to validate the collection of data from both equipment and personnel involved. Complete details of the GPO process and outcome are available in the GPO report that was completed in December 2003 and is included in Appendix B-2.

2.3.3.5 All data was processed and analyzed in accordance with (IAW) the general processing/analysis sequence portrayed in the General Site-Wide Work Plan (SWWP). Target selection criteria were based on the smallest OE objective of the site, which was the 37mm projectile. The selection of a target was based on the relationships between the signal intensities of Channels 1 and 2, data acquisition path geometry, surrounding background characteristics, and the area shape of the potential target. In general, signal intensity peaks separated by more than a 1-meter distance were selected as individual

targets unless the characteristics of the target (i.e., shape, signal intensity, and horizontal gradient) indicated a singular target.

2.3.3.6 Overall, the final discrimination criteria used were conservative in the beginning and refined based on intrusive results as the project progressed. For this specific interpretation the definition of conservative can be summarized as follows:

- If there was uncertainty in the application of the discrimination criteria (reviewed below) due to one or more of the data characteristics (e.g., signal intensity, acquisition path geometry, anomaly shape, or influence of surrounding anomalies) being inconclusive, the target was selected for excavation.

2.3.3.7 While it is not possible in all cases to exactly quantify the interpretation process due to the complex interrelationships between the data characteristics (i.e., signal intensity, acquisition path geometry, anomaly shape, influence of surrounding anomalies, and the influence of the site characteristics (topography, vegetation, cultural features)), the following general guidelines were implemented during the interpretation process to select targets for excavation:

- In general, Channel 2 signal intensity > 3 millivolt (mV) above the local background.
- Anomaly apparent on minimum of two adjacent data acquisition lanes (the determination of "apparent" is a signal intensity at anomaly edges exceeding ~ 2mV above the local background average). If apparent on more than two data acquisition lines then Channel 2 signal intensity criteria is ~ 5 mV. If apparent on more than three data acquisition lines then Channel 2 intensity is ~ 3 mV.
- Ratio between minor and major axis of anomaly from ~ 0.5-1.5; edges of anomaly exhibit defined trend(s) and lack of a symmetrical shape.
- Minimum interference from adjacent anomalies. Where interference from other anomalies is present (e.g., heavily contaminated areas), Channel 2 signal intensity decreased.
- At the time the grid was discriminated, previous excavation information from areas and anomalies exhibiting similar data characteristics was used to assist in the discrimination process.

2.3.3.8 When comparing anomaly characteristics and excavation results, the signal intensity data should be viewed with the acquisition line path as a color-coded and/or contoured image at an appropriate color/contour interval (not greater than 2 mV).

2.3.3.9 Processed EM61 data was generated on color-coded maps to show the strength and locations of anomalies selected for reacquisition. The anomaly maps are included in Appendix D.

2.3.4 Planned Performance Feedback Procedures

2.3.4.1 A quality control (QC) process focus using planned performance feedback techniques was built into the Geophysical Investigation within the FWS Land Transfer

Areas as a precursor to the acceptance sampling. This process quality technique was designed to ensure that the quality level of the work executed in each grid was of a sufficiently high enough standard to provide the best possible chance of passing the rigorous acceptance sampling procedures once the intrusive investigation was completed. The process quality technique used to achieve this was a "false negative" feedback procedure. A false negative occurs when a geophysical anomaly is detected; but, based on its characteristics, is designated as a "no dig" (i.e., it is not thought to be an ordnance item) even though it is actually an ordnance item. As implied, a false negative can only be identified by digging the anomaly as part of a QC process. The technique involved changing a small number (approximately 10%) of the no dig anomalies in each grid/segment being randomly re-designated as "dig" anomalies. These performance feedback dig anomalies are investigated to determine an estimate of how many of the unexcavated anomalies, if any, are actually ordnance items. The number of false negatives was constantly monitored during the course of the project and that information was relayed to the interpreting geophysicists. A detailed break down of the outcome of this feedback is located in section 2.6.3 below.

2.3.4.2 A second method, which was used to validate the quality of the data, was to run the geophysical equipment through a known GPO test grid to perform a validation test. This was conducted by TtFWI as a GPO to ensure the EM-61, positioning system, and personnel were working as expected, meaning equipment was functioning correctly and personnel were properly trained to operate the equipment. This validation was performed prior to beginning the geophysical survey. GPO information is available in Appendix B.

2.4 ANOMALY REACQUISITION

2.4.1 A two-man TTFWI team used two methods to carry out anomaly location reacquisition throughout the FWS Land Transfer Areas. The procedure for reacquiring the location of the anomalies along the roads and firebreaks was to measure the distance from the closest fiducial marker and a second tape to measure out from center-line. The dig sheets produced by the geophysicist (Appendix D) show how these measurements were given to the reacquire team. Within the high use areas, the DGPS was used to put flags in based on the state plane coordinate of the anomaly. The yellow surveyor's flags had the grid/segment and anomaly number marked on them with indelible pen. An anomaly was defined as a location on the ground with a 50-centimeter radius that was likely to contain an item or items of interest (MEC/UXO) rather than a single target. The numbers of individual MEC/UXO items were accurately recorded. Anomalies that contained multiple Munitions Debris (MD) or Non-MD items were counted as one anomaly regardless of the number of items recovered from that location and weighed. This means if a marked location contained several nails, a tin can, and a fork, the items were listed as Non-MD and weighed as one big item. If a marked location contained two mortars, they were recorded separately by the field teams to ensure that a proper count of MEC/UXO items was maintained. The amount of MD and Non-MD recovered by high use area/segment is located in Appendix C.

2.5 MEC INTRUSIVE OPERATIONS

2.5.1 Intrusive operations within the FWS Land Transfer Areas commenced in January 2004 and were completed over a one-year period, ending in December 2004. A total of 5,837 geophysical anomaly locations were excavated during the investigation. It was evident from the amount and type of MEC related metallic debris recovered, that the FWS Land Transfer Areas had parts with significant historical use as military training areas/impact areas. MEC/UXO items unearthed by field teams were disposed of by detonation and were removed throughout the areas. Field teams also located items in the two other categories: MD and Non-MD. These were recovered and removed throughout the area. Figure 4-1 shows which road segments contained MEC/UXO while Figures 4-2 through 4-4 show the location of MEC/UXO located within the high use areas of the FWS Land Transfer Areas. MD and Non-MD by weight is shown in Appendix C.

2.5.2 All three high use areas and all the road segments contained areas that were not conducive to safe geophysical mapping because of terrain features. In all cases the traditional method of mag and dig was used to clear these areas. They were cleared using the Vallon VMX series hand held magnetometer and the Schodstedt Cx-52.

2.5.3 The objective of the intrusive operations was to investigate and remove all MEC items that were possible to detect. The geophysical mapping indicated the location of the target anomaly, although it was not possible to ascertain whether there were individual or multiple targets in many cases. Removal of all metallic items within a 2-foot radius around each flagged anomaly was necessary as a small shallow target produces a similar handheld instrument response to a deeper, larger target. The only way to assure that the target anomaly location was fully exploited was to clear the radius of all metallic anomalies. In a majority of cases, the anomaly location contained several metallic items at varying depths and, due to technological limitations, it was not possible to ascertain with any certainty whether the first target excavated was the item of interest and required the team to remove all metallic items from the excavation. Intrusive operations were performed by a combination of TtFWI intrusive teams and personnel provided by the UXO subcontractors Native American Environmental.

2.5.4 The Senior UXO Supervisor (SUXOS), UXO Site Safety and Health Officer (UXOSO), and Database Manager consulted each day to plan the locations of each intrusive team taking into account availability of dig sheets, equipment, required exclusion zones, team separation distances, and planned demolition activities. After the morning safety brief each day, the SUXOS assigned individual grids and documentation to intrusive team leaders for their day's work.

2.5.5 During the course of the removal action, each team was responsible for conducting daily hand-held instrument tests on the daily equipment test plot, located by the gate of the TtFWI compound, before mobilizing to their daily work location. The daily test grid contained 5 items as described in the Table 2-2 below. These daily checks are detailed in the individual team leaders' logbooks in Appendix C.

Table 2-2
Hand Held Instrument Test Grid

Stake #	Item	Depth	Angle
1	37mm Projectile, AP	7”	45 Deg Nose Down
2	Illumination Flare	4”	Level
3	60mm Mortar, Practice	12”	60 Deg Nose Down
4	M7, 2.36” Rocket, Practice	12”	60 Deg Nose Down
5	75mm Projectile, Expended	6”	Level

2.5.6 After they had received their briefings and conducted their daily vehicle and equipment checks in the compound, the intrusive teams mobilized to the work-site and commenced preparation of their equipment. Concurrent to this preparation, personnel assigned by the SUXOS conducted an area search in and around the FWS Land Transfer Areas to ensure that non-essential personnel were not present within the exclusion zones, to change gate locks to those specific to UXO operations, and to put up any needed barricades. After the check was conducted and all locks changed, the SUXOS proceeded to give the intrusive teams authorization to commence intrusive operations for the day.

2.5.7 Within each segment and high use area, the intrusive team leader assigned anomalies, which were designated by pin flags, to team members for excavation. A typical excavation in the more densely contaminated areas had multiple metallic anomalies at varying depths, which had to be investigated and cleared before addressing anomalies at lower levels. A Vallon VMX2 instrument, which is capable of detecting targets to the required depth, was used to clear each excavation. The team leader was responsible for ensuring that each excavation hole was cleared of metallic anomalies before moving to the next anomaly.

2.5.8 As each anomaly was excavated, the team leader recorded the items found at each anomaly flag on a form located on a Cassiopeia Personal Data Assistant (PDA) for nightly transfer to the project database. A geophysical map and hardcopy dig sheet were continuously reviewed to ensure that the correct numbers of anomalies were excavated. In the instance where an anomaly flag had been displaced or was missing, the SUXOS was contacted and an anomaly reacquisition team was sent to replace the anomaly flag. In the instance where a flag was missing, the team leader documented the occurrence in the team logbook located in Appendix C. Each team leader maintained an electronic logbook, which was downloaded to the project database nightly.

2.5.9 Items excavated from the anomaly locations were described as MEC, UXO, MD, Non-MD, or No Find by the field teams. All MEC/UXO items were disposed of by demolition procedures IAW the SSWP. Some of these items were classified as MEC/UXO by the field teams, but after demolition was performed it was discovered the items contained no energetic material. At that time, the anomalies were reclassified as MD. MD was defined as components of ordnance items that could not be described as MEC or UXO; examples of this category are practice items, tail fins, and any other

miscellaneous pieces of ordnance items. Non-MD was defined as miscellaneous scrap and debris that was non-ordnance related. Examples of this category include reinforced concrete, wire, rebar, trash, nails, ferrous geology (hot rocks), and pipes.

2.5.10 In the instance where nothing was found at the anomaly location, the anomaly was annotated as a "No Find". Instances where this occurred were investigated to confirm this categorization and the item was reacquired and re-dug if it was deemed necessary. Reasons for No Finds were attributed to data aberrations due to collection in challenging terrain. Throughout the entire area (FWS Land Transfer Areas) there were 590 No Finds in 5,837 geophysical digs.

2.6 FEEDBACK OF REMOVAL PERFORMANCE

2.6.1 In accordance with the process quality techniques planned for this removal action, the false negatives were constantly monitored during the investigation in order to determine the ongoing quality level of the geophysical interpretation process. The initial plan was to set the geophysical interpretation parameters at the lowest level that was estimated to be required to remove all target anomalies with a diameter of a 37mm or larger projectile, to a depth of 11 times the items diameter.

2.6.2 During the initial geophysical interpretation process of the FWS Land Transfer Areas, a total of 7,864 geophysical anomaly locations were identified (total including dig and no dig). Of these anomalies, 5,437 were designated as dig anomalies by the geophysicist. 322 of the anomaly locations were re-designated from "no dig" to "dig" anomaly locations on a random basis to provide data for the false negative rate. These re-designated anomalies were selected randomly by the database manager without subjective input from either the geophysicist or the intrusive team members. Sixteen anomalies that were changed were located under paved roads and were not investigated and were therefore not used in the calculation of the False Negative Rate. The results of the intrusive investigation were monitored constantly by the interpreting geophysicists so that the interpretation criteria and process could be modified as necessary.

2.6.3 Table 2-3 summarizes the results of the investigation at anomaly locations re-designated from "no dig" to "dig" as part of performance feedback process. The converted "digs" were not originally designated as "digs" because they did not meet the selection criteria established for the site. Table 2-3 lists 322 items, however 16 of these were located under paved surfaces. The remaining 306 items were dug and 303 definitively passed the failure criteria, resulting in a 99.02% QC acceptance rate. Field data was insufficient to make a definitive determination on whether the remaining 3 items passed the failure criteria.

Table 2-3
Results of Investigation of No Dig Anomalies

Items Recovered	Number of Items	Percentage of No Dig Items
MEC	0	0%
MD	18	5.6%
Non MD	146	45.3%
No Find	142	44.1%
Not Investigated	16	5%

2.7 RESULTS OF THE MEC REMOVAL

2.7.1 Throughout the FWS Land Transfer Areas removal, the DGPS and fiducials were used to collect position data. A geophysicist made selections and qualified UXO technicians investigated the anomalies. In areas that were not geophysically surveyed, standard mag and dig procedures were employed. The discussion that follows covers the results of these investigations.

2.7.2 Every investigated anomaly had many characteristics that were important to track. These included such things as: what exactly the item was, if it was MEC, the type of MEC, and the depth the MEC was found. A complete listing of items recovered can be found in Appendix C.

2.7.3 In July 2004 one of the intrusive teams moved 25 MEC items from two segments within the FWS clearance area to an area just outside the clearance area. The two segments were 56 and 63. This action was reported to ADEM, who investigated and issued an Administrative Order to immediately rectify the situation. The action to correct the incident is documented in a separate report (see section 5.0.4) that covers in detail the events that led to the administrative order, the corrective action taken, and what was discovered during the rework to correct the incident. The items that were actually moved out of the FWS area covered by this report have been included in the numbers stated below and in the appendices.

2.7.4 UXO. A total of 83 UXO items were recovered, these items were disposed of by demolition. Several types of UXO were found throughout the FWS Land Transfer Areas, the following is an indication of what was found:

- Mortar, 81mm, Practice, Fuzed
- Projectile, 75mm, Shrapnel
- Projectile, 155mm Shrapnel
- Projectile, 75mm, HE
- Projectile, Fuze, M1907
- Mortar, 81mm, HE
- Mortar, 60mm, HE
- Projectile, One-Pounder

2.7.5 MD. 3436 lbs of MD was found throughout the FWS Land Transfer Areas. While it was not possible to ascertain the specific munition the MD originated from in all cases, the following is an indication of what was found:

- Projectile, 75mm, Shrapnel Expended casings, pusher plates, lead balls
- Grenade, Hand, Fragmentation, Spoons, Expended Fuzes
- Projectile, 57mm, AP-T, Expended
- Mortar, 81mm, tail booms
- Grenade, Rifle, Smoke
- Mortar, 60mm, tail booms
- Trip Flare, Expended
- Ground Signal (slap flare), Expended

2.7.6 Non-MD. Approximately 35,500 lbs of Non-MD was discovered within the FWS Land Transfer Areas. The following is an indication of what was found:

- 12-18" surveyors rebar
- Bolts, nails, nuts, washers, stakes, various
- Wire (telephone, fencing, barbed, cable)
- Pipes (steel, cast iron, fence posts)
- Miscellaneous metallic trash
- Cans (ration, soda, beer, ammunition)
- Batteries, radio
- Magazine, clips
- Building material

2.7.7 A complete list of each anomaly investigated is supplied in Appendix C. Figures 4-2 through 4-4 show where UXO was located within the high use areas.

2.8 TRACKING AND DISPOSITION OF MD FOUND

2.8.1 When there was uncertainty as to whether a munition posed an explosives safety risk, the munition was initially classified as MEC. After it was vented using approved demolition procedures IAW the SSWP the item was carefully inspected to determine if it actually contained energetic material prior to performing the demolition. If it was determined than an item had not contained energetic material prior to the demolition operation, then this item was reclassified as MD by the field teams, to more accurately reflect the actual item found during the removal.

2.8.2 For the removal area covered under this document, FWS Land Transfer Areas (Roads, Firebreaks, and High Use Areas), all scrap was turned into the TtFWI scrap-processing yard and was demilitarized and disposed of under a separate Task Order.

The information on all scrap disposal can be found in the previously submitted Final Letter Report for Task Order 0023 (TTEC Correspondence # FWHN-FTMC-05-0043, Aug 5, 2005.)

3.0 TESTS

3.1 QUALITY CONTROL /QUALITY ASSURANCE

3.1.1 QC tasks were carried out by TtFWI, while QA tasks were carried out by USAESCH. The FWS Land Transfer Areas were subjected to 10% QC sampling that included geophysically surveying 10% of the road segments and 10 % of the high use areas. The QA effort was completed by the USAESCH and is described in the USAESCH QA report provided in Appendix B.

3.1.2 *Quality Control*. The QC function on this entire removal action included the three phases of QC inspection (Preparatory, Initial, and Follow-up) of the process. The FWS Land Transfer Areas also used a 10% sampling performed on the final product as well.

3.1.3 *Quality Assurance*. The QA function consisted of planned and systematic actions designed to verify that the quality met requirements in the plan. QA is an independent function designed to assess and report on whether the project quality function, as well as the project itself, achieved quality and project objectives. The USAESCH's QA process was used to ensure the entire process worked and to allow successful turnover of the area. The USAESCHs QA report is provided in Appendix B.

3.1.1 Quality Control

3.1.1.1 Project QC was split into two areas: process quality control and product quality control-acceptance sampling.

3.1.1.1 Process Quality Control

3.1.1.1.1 Process QC is concerned with improving the efficiency and effectiveness of the processes. This can be considered a prevention approach to QC because it aims to detect problems early and improve processes before the final product is produced. Process QC consisted of Preparatory, Initial, and Follow-Up Inspections on teams conducting key processes, as well as the false negative rate QC check (performance feedback) as described in section 2.3.

3.1.1.2 Preparatory Phase Inspections

3.1.1.2.1 Preparatory Phase Inspections were performed before starting each key process. The purpose of these inspections was to review applicable specifications and verify that the necessary resources, conditions, and controls were in place and compliant before the start of work activities. The specific QC checklist items assessed during the Preparatory Phase, and the results of those activities were documented on QC Surveillance Reports contained in Appendix B.

3.1.1.3 Initial Phase Inspections

3.1.1.3.1 Initial Phase Inspections were performed the first time a type of work was performed under key processes. The inspections were conducted to check preliminary work for compliance with procedures and contract specifications. Other objectives include establishing and agreeing to the acceptable level of workmanship, checking safety compliance, reviewing the Preparatory Phase Inspection, checking for omissions, and resolving differences of interpretation. The Initial Phase Inspections conducted were documented on QC Surveillance Reports contained in Appendix B.

3.1.1.4 Follow-Up Phase Inspections

3.1.1.4.1 Follow-Up Phase Inspections were performed on a scheduled and unscheduled basis. The purpose of these inspections was to ensure a continuous level of compliance and workmanship based on the quality levels established during the Preparatory and Initial Phase Inspections. The UXO Quality Control Specialist (UXOQC) and his designees were responsible for on-site monitoring of practices and operations taking place and for verification of continued compliance with the specifications and requirements. Details of the Follow-Up Phase Inspections are contained in Appendix B.

3.1.1.5 Intrusive Process Verification Inspections

3.1.1.5.1 As each segment and high use area was completed by the intrusive team, QC personnel conducted Intrusive Process Verification Inspections before accepting these grids. The inspection consisted of ensuring that the individual grid dig sheets and the intrusive results matched (i.e., no “dig” anomalies were left unexcavated). Verification was carried out by the UXOQC, the database manager, and the project geophysicist.

3.1.1.6 Geophysical Instrument Tests

3.1.1.6.1 Every occurrence of a team’s personnel or major equipment change was followed by a visit to the test grid to re-validate the team or equipment. The GPO test grid was used to document and validate that the team’s personnel and equipment met site geophysical requirements. The validation information is documented in the team logbooks in Appendix C. The data from each visit was examined by the project geophysicist to ensure that the systems were functioning correctly. Teams then proceeded to the work area.

3.1.1.7 Internal and External Process Quality Check of Geophysical Interpretation

3.1.1.7.1 Quality checks of the Geophysical Interpretation Process were conducted by senior TTFWI geophysicists and also separately by USAESCH. In addition, the complementary false negative rate and comparison of predicted to actual results ascertained whether the items selected were correctly designated as “dig” or “no dig”.

3.1.1.8 Product Quality Control –Acceptance Sampling

3.1.1.8.1 Product QC is concerned with conducting an Acceptance Inspection on the final product after all the change or value-added processes have been completed and it is otherwise ready for delivery. It should be noted that extensive process QC procedures are required to ensure that the quality of the product sampled is high enough to consistently pass the sampling. Formal Acceptance Sampling was carried out on completed segments and the high use areas using a 10% sampling plan within the FWS Land Transfer Areas. Details of the sampling are presented in the following sections.

3.1.1.8.2 Product QC consisted of ten percent of the area of each of the 183 road segments and 10% of each high use area was reinvestigated (resampled). Additionally, the entire area of 21 road segments was reinvestigated. Product QC was conducted in real time throughout the removal process. Findings were analyzed and where necessary, the process was adjusted. The UXOQC used a Vallon VMX series handheld instrument to reinvestigate (resample) 10% of every road segment and 10% of each of the 3 high use areas. Additionally, the UXOQC used a random number generator to select 21 of the 183 road segments, this was 10% of the total length of the roads that was resampled. The geophysical survey team reinvestigated (resampled) the entire area of each segment using the EM-61 in VTA mode. Thus, these 21 road segments were surveyed using geophysical methods over the entire road segment. The data was interpreted by a qualified geophysicist and returned to the project database manager. Anomalies selected as “digs” by the geophysicist were reacquired and dug. The complete geophysical results are available in Appendix D.

Table 3-1
Segments Selected for QC Sampling

003	022	024	034	040
043	061	065	069	078
088	091	098	122	124
135	138	143	155	178
183				

3.1.1.9 QC Acceptance Criteria

3.1.1.9.1 The acceptance criteria used for this task order was the same as used by the USAESCH for failure criteria. The failure criteria located in the SOW stated: “No ferrous objects with a “width” (diameter) between a 37mm projectile and a 155mm projectile at a depth of less than 11 diameters of the object.” The results from each lot are compared with the following criteria:

- Accept Criterion: No items were located that met the failure criteria.
- Reject Criterion: Any items were located that met the failure criteria.

3.1.1.9.2 In the case of acceptance, the segment was ready for turnover to the USAESCH for QA; in case of rejection, the segment was returned to the SUXOS from the UXOQC with the reason for rejection.

3.1.1.10 Geophysical Field QC Procedures

3.1.1.10.1 The geophysicist used a series of QC steps in the daily process of collecting, processing and interpreting the data. An explanation of these steps is provided below.

- Synchronize clocks +/- 1 second (computer and Allegro).
- Static test for minimum of 30 seconds prior to and at the end of each file.
- A static response test at first and last grid of day, then perform test for 3 minutes each time.
- Walk over a piece of rebar or a Schondstedt 3 times, in straight lines (side-middle-side), at the start and end of every data acquisition file.
- Walk diagonal across grid at end of survey OR repeat first acquisition line, whichever is more time effective.
- Use intelligible and repeatable file naming convention (i.e., date, team, and grid) to easily differentiate multiple files within same grid.

3.1.1.10.2 The geophysical processing QC procedures included:

- Turn Oasis log file on and save as same name as *.xyz file for each sampling grid.
- Use Oasis scripts for consistency of product.
- Scripts should create maps for c1, c2, and c4 with the appropriate color scale for objects of interest (scale should be for a few mVs above the local background, as well as be able to be easily used in areas where background fluctuates).
- Use Oasis master database to keep track of processed individual *.xyz files and use this database to generate *.xyz file for each sampling grid. Each sampling grid should be in a separate folder with all interpreted files in this folder (i.e., run scripts from this folder). This data should be available over the network for each sampling grid. For the master database, the header can be edited and changed for each *.xyz file to track progress of the survey, as well as to generate a master map of percent complete.
- All data (*.txt, *.g61, *.xyz, *.dat, and excavation results when available) should be delivered to the client representative on a weekly basis via Compact Disk Ready Only Memory (CDROM). Delivery confirmation for these data should also be recorded in the project database.
- Excavation results will be checked for all of the grids.

3.1.1.11 Results of Quality Control

3.1.1.11.1 Within the original FWS Land Transfer Areas, QC was performed on 10% of each one of the 183 road segments and on 10% of each one of the three high use areas using the Vallon VMX handheld geophysical instrument.. In addition to the 10% sampling of each segment, 100% of 21 segments were resurveyed using the same method as the original clearance. In total, 9 segments were not accepted by the UXOQC and were returned to the SUXOS for rework. The high use areas were each considered their own area and were sampled using the 10% sampling plan described above. Complete QC documentation on all segments and high use areas are located in Appendix B. Table 3-2 provides a brief explanation of the segments that were rejected by QC, why it was rejected, and corrective action taken.

3.1.1.11.2 When an item was found that caused a QC failure, a root cause analysis (see Appendix B-2) was performed on the process. The anomaly was re-evaluated based on size, shape and magnitude. If it was determined that the parameters differed from the ones established by the interpreting geophysicist (defining the threshold limit), then adjustments were made to this selection process. This change in threshold limit was then applied to all grids and data, not just the data within the lot that failed QC.

3.1.2 Quality Assurance

3.1.2.1 The USAESCH performed the standard 10% check of the area using a handheld geophysical instrument. The USAESCH also performed QA checks on the geophysical data that was collected under this task order. The USAESCH provided a QA report that details the QA process and the findings that occurred. The QA Audit Evaluation is provided on the CD that is provided with this report.

3.1.2.2 The on-site USAESCH Safety Representative performed QA of each segment and the high use areas through out the entire area. This consisted of surveying a portion (i.e., approximately 10%) of each area with a hand held geophysical instrument (Schondstedt 52cx). In areas that had a high concentration of ferrous contacts the on-site USAESCH Safety Representative investigated all anomalies encountered to ensure that no ordnance items were missed. There were no MEC items found during USAESCH QA checks. Anomalies investigated during the QA were identified as MD and Non-MD. Three segments and one of the high use areas failed the onsite USAESCH QA. Table 3-3 provides a list of items that resulted in failure and corrective action taken. The three segments and 1 high use area that failed initial USAESCH QA passed the QA survey on the second attempt. Completed and signed USAESCH Form 948s certifying QA passing of each segment and high use area are provided in Appendix B-3.

Table 3-2
QC Rejected

Segment	Date Rejected	Date Accepted	Cause for Rejection	Action Taken
012	6/16/05	6/22/04	Steel plate 6 in x 8 in x ½ inch and smoke grenade	Reworked using Mag and Dig procedures.
014	6/7/04	6/8/04	2 pieces of towing chain were found at a depth of 18 inches.	Reworked using Mag and Dig procedures.
035	6/23/04	7/1/04	3 - 3/4 x 3 inch counter sink bolts and nuts were found. at a depth of 3 inches.	Reworked using Mag and Dig procedures.
111	2/3/04	4/1/04	Found 5-gallon paint can and other scrap metal not picked by geophysicist.	Geophysicist reviewed VTA files and checked for anomalies, had any new anomalies reacquired and intrusive team rework segment.
149	12/10/03	4/19/04	Found 75mm pusher plate, door hinge, piece of fragmentation.	Determined that team had performed procedural errors. Contacted Team Leader and notified him of findings and the need to adhere to procedures. Had intrusive team rework segment # 149.
166	3/30/04	4/13/04	75mm pusher plate under flag# 48, Also steel caster wheel missed by intrusive team.	Determined that team had performed procedural errors. Contacted Team Leader and notified him of findings and the need to adhere to procedures. Reworked segment # 166.
170	4/6/04	4/21/04	Found 3.5-inch ballistic nose missed by intrusive team.	Determined that team had performed procedural errors. Contacted Team Leader and notified him of findings and the need to adhere to procedures. Reworked the segment.
176	12/3/03	4/6/04	37mm & 155mm fragmentation meeting failure criteria.	Determined that team had performed procedural errors. Contacted Team Leader and notified him of findings and the need to adhere to procedures. Had Intrusive Team rework segment.
179	3/8/04	4/8/04	Geophysicist did not pick (2) M1907 fuzes in road.	Geophysicist reviewed VTA files and checked for anomalies, had any new anomalies reacquired and intrusive team rework segment.

Table 3-3
QA Failure

Segment	Date Failed	Date Passed	Items that Caused the Failure	Action Taken
085	7/15/04	7/20/04	Scrap metal that met Failure criteria.	Reworked using Mag and Dig procedures.
101	3/31/04	6/30/04	Found Projectile, 75mm, Shrapnel, expended, at 9 inches deep.	Reworked using Mag and Dig procedures.
164	4/19/04	6/25/04	Found Projectile, 75mm, Shrapnel, expended.	Reworked using Mag and Dig procedures.
High Use Area at Range 24A	4/19/04	6/25/04	Scrap metal that met Failure criteria.	Reworked using Mag and Dig procedures.

4.0 DOCUMENTATION

4.1 MAPS

4.1.1 Figure 4-1 is the site overview and indicates which segments contained MEC/UXO through out the area. Figures 4-2 through 4-4 show where MEC/UXO was found in the three high use areas. Figure 4-5 shows the location of the gates, barriers, survey data, and areas that were signed.

4.2 REACQUISITION SHEETS (DIG SHEETS)

4.2.1 Anomalies selected for reacquisition are listed in the intrusive investigation results that are tabulated by segment in Appendix C.

4.3 SEGMENT MAPS

4.3.1 To facilitate the reacquisition process, color-coded anomaly maps were prepared for each segment. These maps were prepared using Oasis Montaj software and provide locations for each anomaly. The maps are included by segment in Appendix D.

4.4 SITE QC/QA DOCUMENTATION

4.4.1 Site QC/QA documentation, including the Corps of Engineers, Huntsville Center (CEHNC) Form 948's is included in Appendix B.

4.5 SITE SAFETY DOCUMENTATION

4.5.1 Site safety records including incident reports on two subcontractor personnel are included in Appendix B-4.

4.6 DAILY SITE ACTIVITY REPORTS

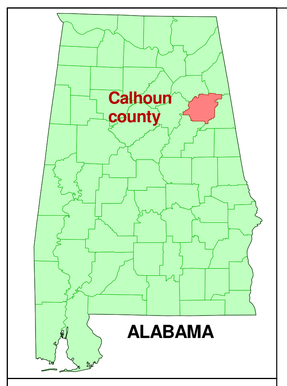
4.6.1 Daily activities reports are included in Appendix B-1.

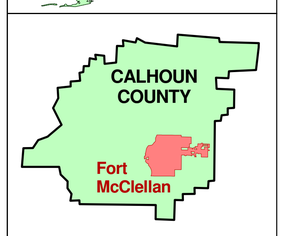
4.7 PHOTOGRAPHS

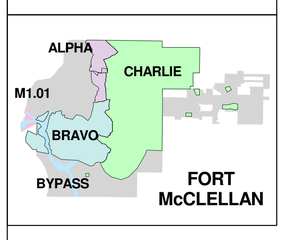
4.7.1 Selective site photographs are included in Appendix B-5.

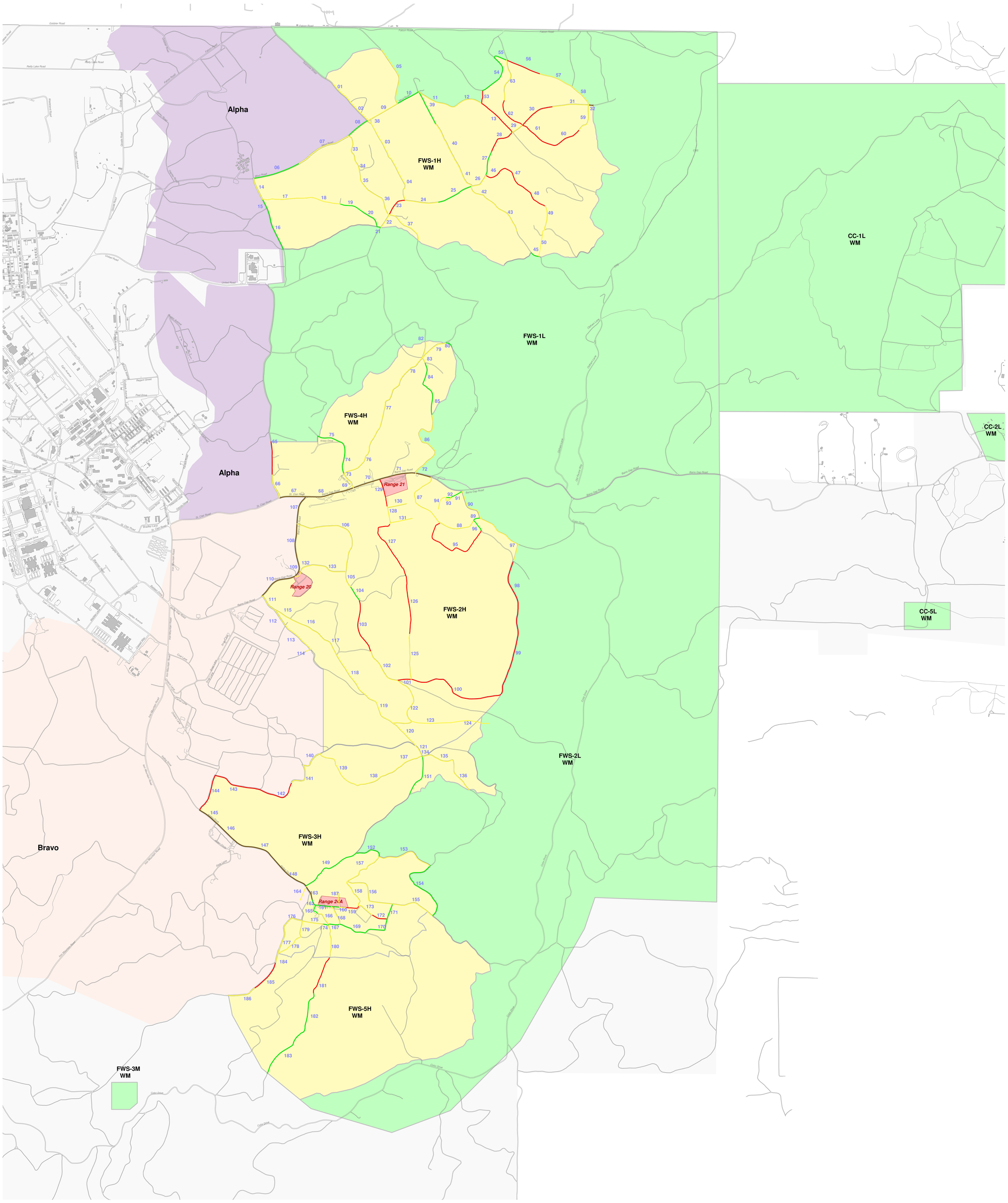
4.8 FINANCIAL BREAKDOWN

4.8.1 Costs to accomplish the time and material tasks are presented in Appendix A.









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Feet

SCALE: 1" = 1000'

TETRA TECH EC, INC.

Legend

888 Firebreak/Road Segments

Firebreak Roads by Findings

- PAVEMENT
- MUNITIONS DEBRIS
- NON-MUNITIONS DEBRIS
- UXO

- High Use Areas
- Proposed No Further Action Areas within the Charlie Study Area
- Proposed Clearance Areas within the Charlie Study Area

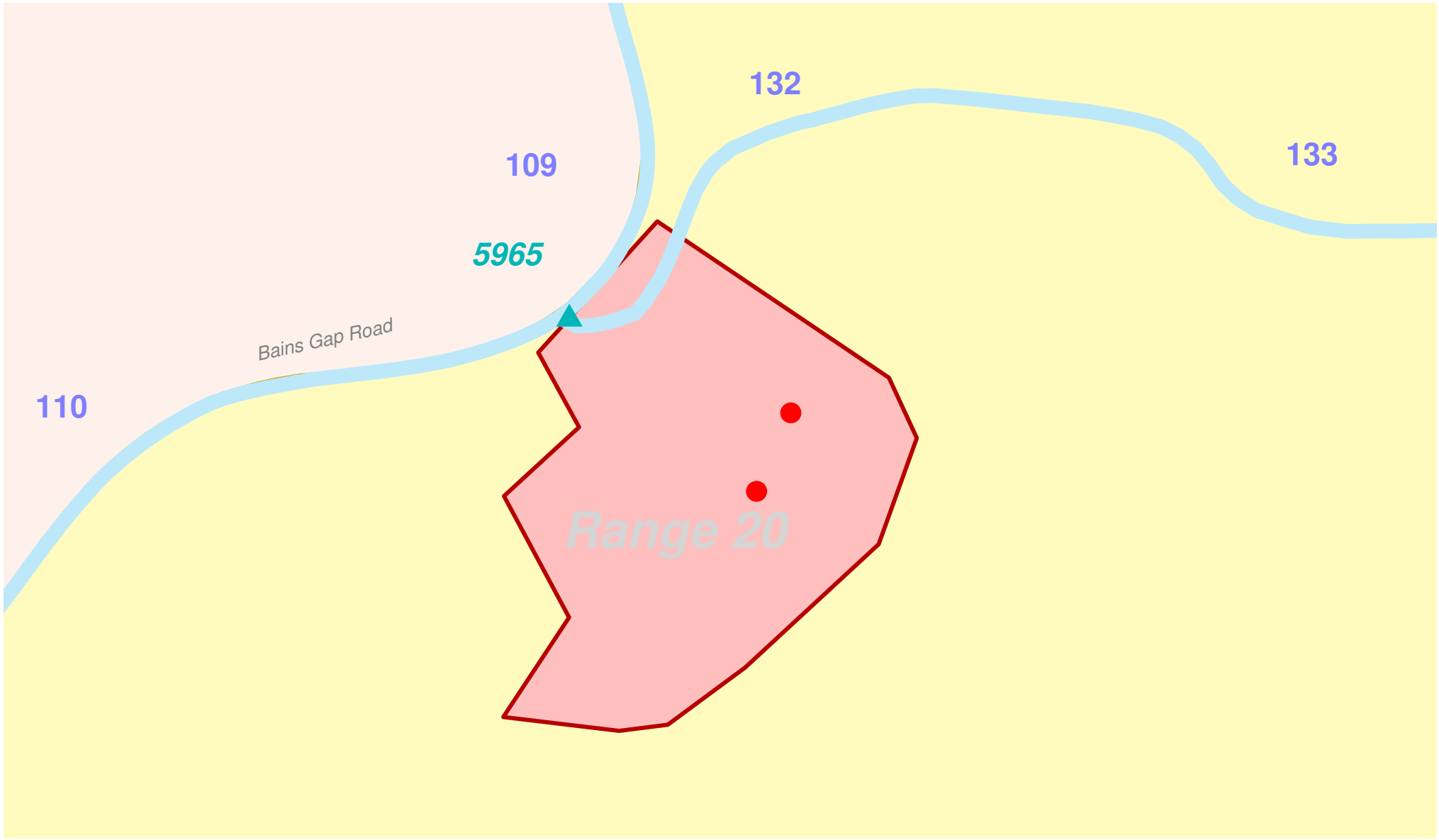
- Alpha Study Area
- Bravo Study Area
- Fort McClellan
- Roads
- Buildings

Figure 4-1

FWS LAND TRANSFER AREA

OVERVIEW

Fort McClellan,
Calhoun county,
Alabama
January 2007



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SCALE: 1" = 200'

TETRA TECH EC, INC.

Legend

888 Firebreak/Road Segments

9999 Survey Control Points & Labels

UXO

Road Area Cleared to Depth (except paved areas)

Proposed Clearance Areas within the Charlie Study Area

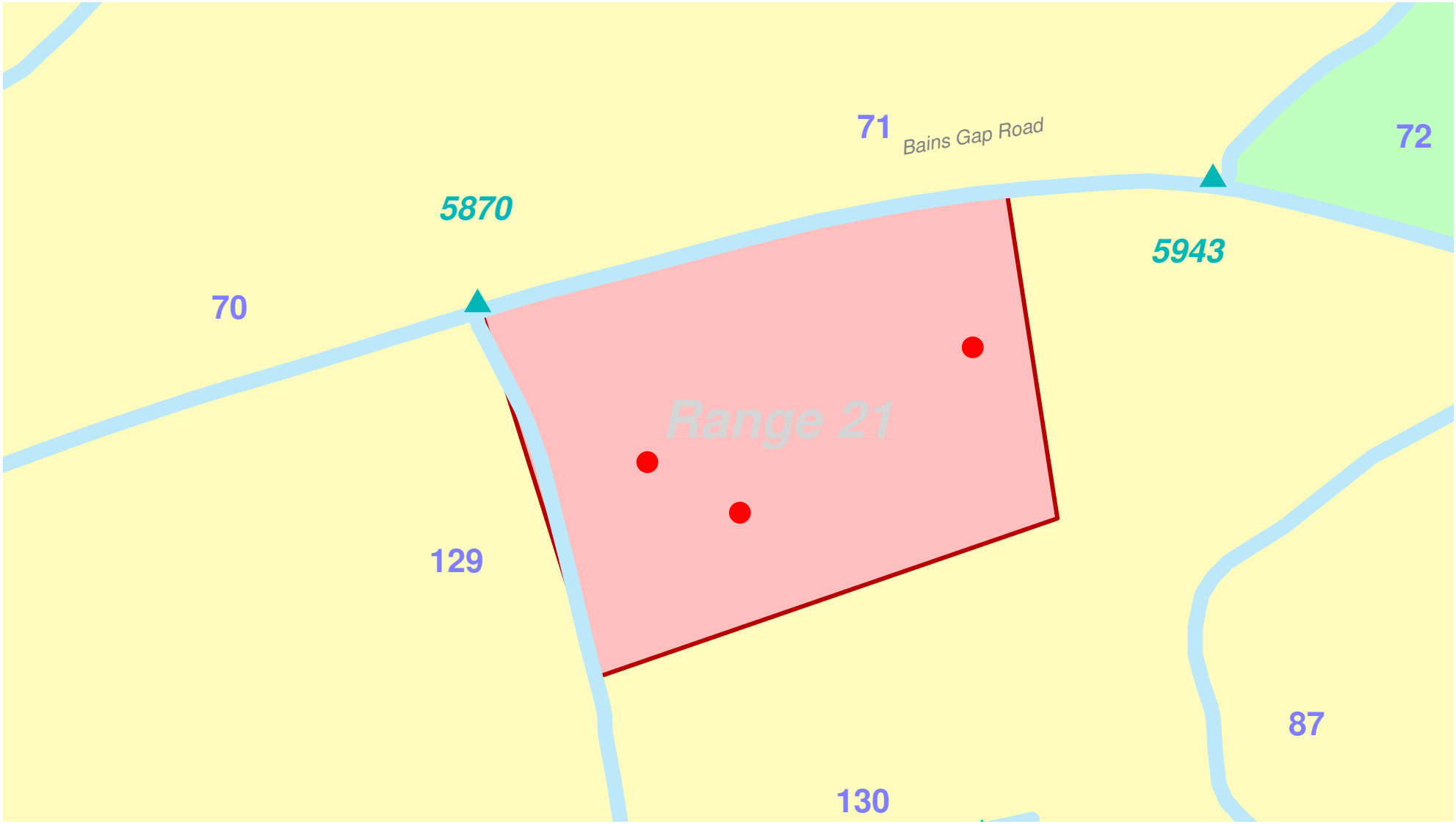
Bravo Study Area

High Use Area Cleared to Depth

Figure 4-2

FWS LAND TRANSFER AREA
Range 20

Fort McClellan, Calhoun county, Alabama
January 2007



N
W E
S

0 100 200 300 400
Feet

SCALE: 1" = 200'

TETRA TECH EC, INC.

Legend

888 Firebreak/Road Segments

9999 Survey Control Points & Labels

UXO

Road Area Cleared to Depth (except paved areas)

High Use Area Cleared to Depth

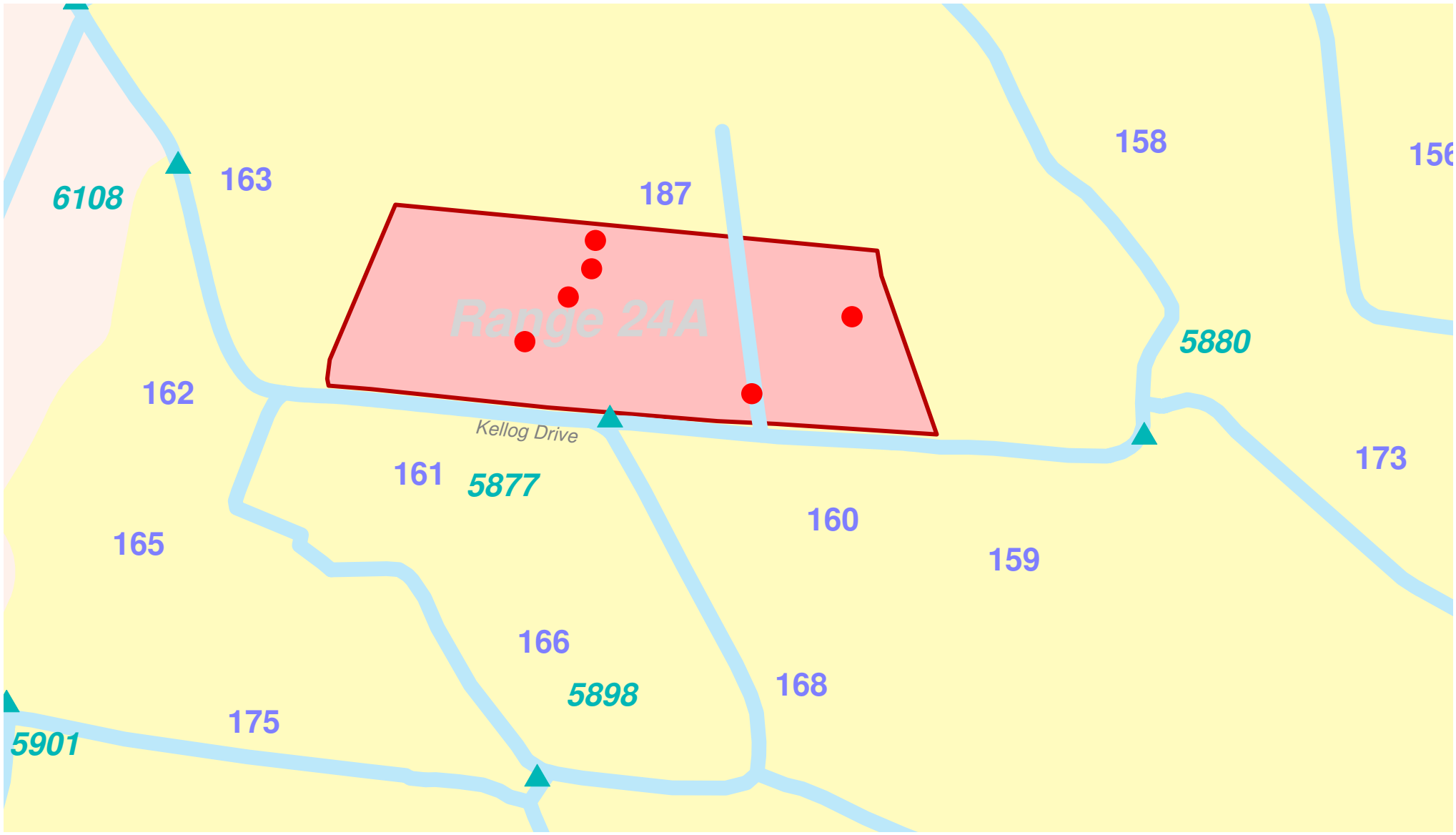
Proposed Clearance Areas within the Charlie Study Area

Proposed No Further Action Areas within the Charlie Study Area

Figure 4-3

FWS LAND TRANSFER AREA
Range 21

Fort McClellan, Calhoun county, Alabama
January 2007



N
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0 100 200 300 400
Feet

SCALE: 1" = 200'

TETRA TECH EC, INC.

Legend

888 Firebreak/Road Segments

9999 Survey Control Points & Labels

UXO

Road Area Cleared to Depth (except paved areas)

High Use Area Cleared to Depth

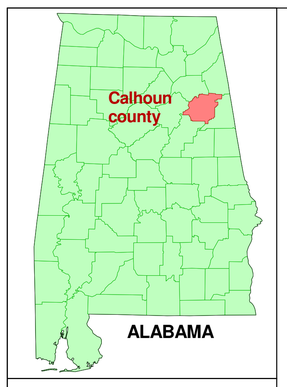
Proposed Clearance Areas within the Charlie Study Area

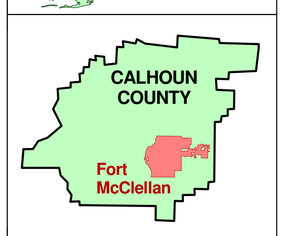
Bravo Study Area

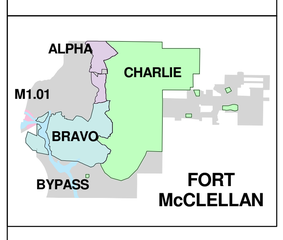
Figure 4-4

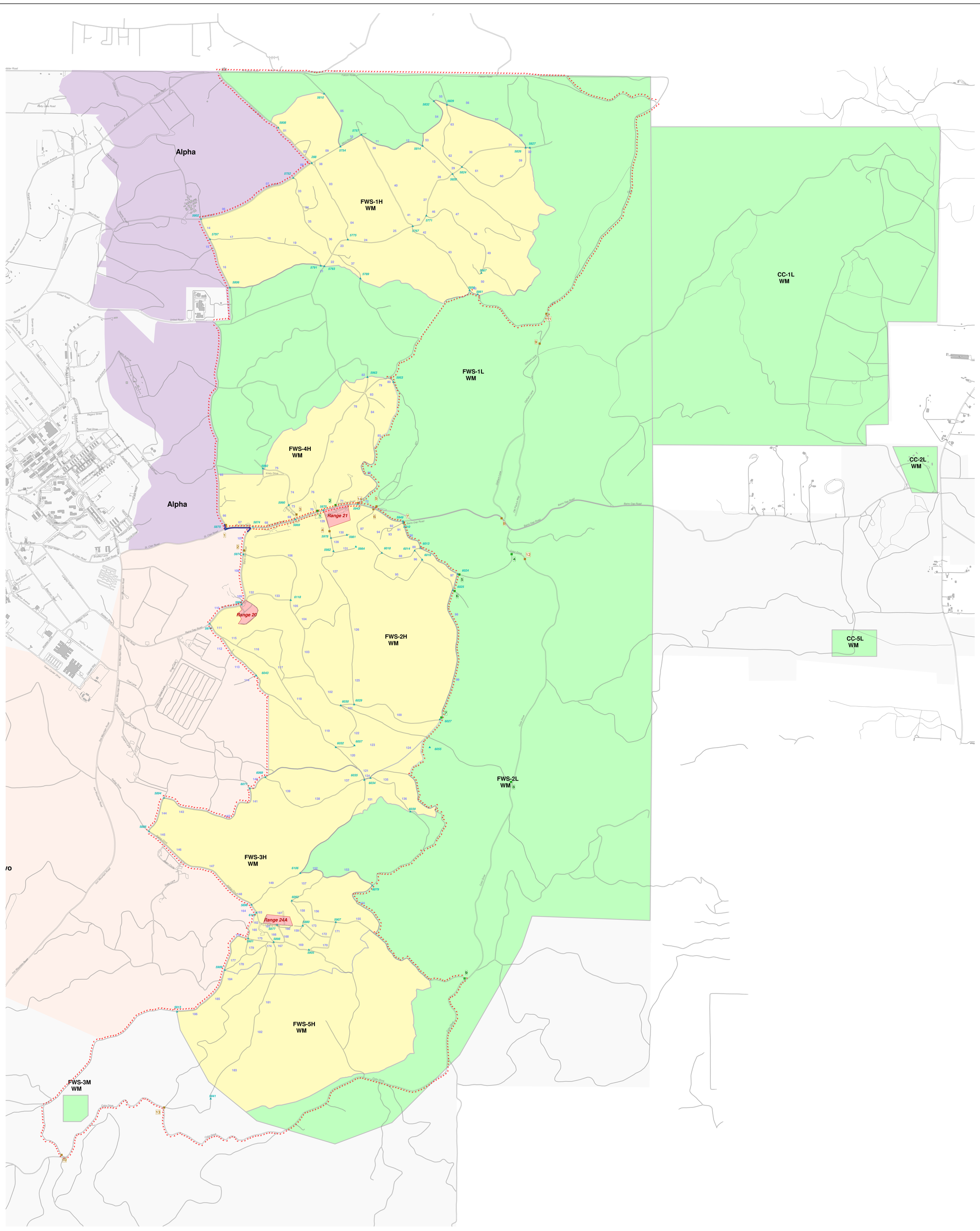
FWS LAND TRANSFER AREA
Range 24

Fort McClellan, Calhoun county, Alabama
January 2007









N
W E
S

0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000
Feet

SCALE: 1" = 1000'

TETRA TECH EC, INC.

Legend

- Firebreak/Road Segments
- Survey Control Points & Labels
- USFWS Gate Labels
- USFWS Barrier Labels
- USFWS Barriers
- USFWS Gates
- Signs Designating No Public Access Boundary
- Roads
- High Use Areas
- Proposed No Further Action Areas within the Charlie Study Area
- Proposed Clearance Areas within the Charlie Study Area
- Alpha Study Area
- Bravo Study Area
- Fort McClellan
- Road Area Cleared to Depth (except paved areas)
- Buildings

Figure 4-5

FWS LAND TRANSFER AREA

CONTROLS

Fort McClellan,
Calhoun county,
Alabama
January 2007

5.0 SUMMARY

5.0.1 A munitions response action was performed on selected roads, firebreaks, and high use areas within the FWS Land Transfer Areas in the Charlie Area at Fort McClellan. The removal action was performed prior to the completion of the EE/CA as an interim removal action. The fieldwork began January 2004 and was completed in December 2004. The work was performed by TtFWI and approved subcontractors in accordance with approved work plans. The action completed the removal action alternative of *Clearance to Depth*, as an interim removal action in areas shown in Figure 4-1.

5.0.2 The work was completed in sequential steps of site preparation: brush clearing, geophysical survey, and intrusive operations. Intrusive investigation of anomalies resulted in the excavation of 83 UXO items, 3,436 pounds of MD, and 35,532 pounds of Non-MD. Anomalies under paved roads were not investigated or removed. A complete list of MEC items discovered is included in Appendix C.

5.0.3 Selected roads, firebreaks, and high use areas within the FWS Land Transfer Areas have been cleared to depth except for anomalies under paved roads. Unpaved roads were cleared 15' either side of the road except where the road bounded a no further action area (NFA). In the instances where the road bounded a NFA area the road was cleared to the NFA area. In accordance with Mod 6 to the contract, segments 11, 12, 32, 53, 54, 55, 56, 57, and 58 were cleared to 15' on either side even through the northern side of the road was NFA. Paved roads were cleared to 20' either side of the road however, no anomalies under pavement were investigated. It is impossible to guarantee complete and total removal of all MEC items. Therefore, some limited residual risk may still remain within the boundaries of the FWS Land Transfer Areas property. The total acreage for these areas is listed in Table 2-1.

5.0.4 On July 30, 2004 the Alabama Department of Environmental Management issued an Administrative Order against TtFWI, the Army, and the FWS. The tasks required to address the requirements of the Administrative Order were addressed in the Consent Order dated November 15, 2004. The details of the results of the effort required by this order can be reviewed in the two reports; Investigation Report for segments 55, 56, 62, and 63 at Fort McClellan, Alabama, Emergency Administrative Order No. 04-086-EHW, November 2004 and the Investigation Report for the Consent Order No. 05-009-CHW, December 2004. ADEM issued a letter on September 30, 2005, stating that no further actions were required regarding the Emergency Administrative Order and the Consent Order.

6.0 REFERENCES

Environmental Science & Engineering, Inc. January 1998. *Final Environmental Baseline Survey, Fort McClellan, Alabama*. Prepared for the U.S. Army Environmental Center, Aberdeen, Maryland.

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U.S. Army Corps of Engineers, St. Louis District, 1999. Archives Search Report Findings, Fort McClellan, Anniston, Alabama. (Revision 1, September 2001)

U.S. Army Corps of Engineers, St. Louis District, 1999. Archives Search Report Maps, Fort McClellan, Anniston, Alabama. (Revision 1, September 2001)

U.S. Army Corps of Engineers, St. Louis District, 1999. Archives Search Report Conclusions and Recommendations, Fort McClellan, Anniston, Alabama. (Revision 1, September 2001)

Tetra Tech FW, Inc., 2004. *Draft-Final Charlie EE/CA at Fort McClellan, Alabama*. Prepared for the U.S. Army Corps of Engineers, Engineering and Support Center, Huntsville.

Tetra Tech FW, Inc., November 2004. *Investigation Report for segments 55, 56, 62, and 63 at Fort McClellan, Alabama,* for the Emergency Administrative Order No. 04-086-EHW.

Tetra Tech FW, Inc., December 2004. *Investigation Report*, for the Consent Order No. 05-009-CHW.

Appendix A

Supporting Documentation

A-1 Financial Data
A-2 Correspondence and Documentation
A-3 Final Site Specific Work Plan
A-4 Statement of Work

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