

After Action Report MEC Clearance of the 11-Acre Addition, McClellan, Alabama



Prepared for: Alabama Department of Transportation

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June 4, 2009

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via email

Subject: After Action Report of the 11-Acre Addition Site, McClellan, Alabama

Dear Mr. Leonard,

Matrix Environmental Services, LLC (MES) is pleased to provide the After Action Report for the 11-Acre site at McClellan, Alabama. The site has been successfully cleared to the depth of detection for munitions and explosives of concern (MEC) using best available practices. If you have any question please call me at (256) 847-0780 or (404) 414-7054. We appreciate the opportunity to work with you on this important project.

Sincerely,

MATRIX ENVIRONMENTAL SERVICES, LLC

Richard L. Satkin
Senior Project Manager

c: Buddy Cox – ALDOT
Lisa Holstein – US Army, McClellan Transition Force

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LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|----------|---|
| ADEM | Alabama Department of Environmental Management |
| ALDOT | Alabama Department of Transportation |
| ASR | Archives Search Report |
| BIP | Blow in Place |
| BMP | Best Management Practice |
| DB | Database |
| DFW | Definable Feature of Work |
| DGM | Digital Geophysical Mapping |
| DNR | Deficiency Notice Report |
| EE/CA | Engineering Evaluation/Cost Analysis |
| EM61-MK2 | Geonics EM61-MK2 time domain electromagnetic metal detector |
| FCA | Function Check Area |
| FCR | Field Change Request |
| ft | foot/feet |
| GeoQC | Geophysical QC Supervisor |
| GPO | Geophysical Prove-Out |
| HE | High Explosive |
| in | Inch |
| MD | Munitions Debris (MEC scrap) |
| MDAS | Material Documented as Safe |
| MEC | Munitions and Explosives of Concern |
| MES | Matrix Environmental Services, L.L.C. |
| MPPEH | Material Potentially Presenting an Explosive Hazard |
| MRA | Munitions Response Area |
| MRS | Munitions Response Sites |
| mV | millivolt |
| PDA | Personal Data Assistant |
| PWP | Program Work Plan |
| QA | Quality Assurance |
| QAP | DGM QA Plan |
| QC | Quality Control |
| SOP | Standard Operating Procedure |
| UoP | Unit of Production |
| USACE | U.S. Army Corps of Engineers |
| UXO | unexploded ordnance |
| UXOQC | UXO QC Supervisor |

1.0 INTRODUCTION

This After Action Report documenting the Munitions and Explosives of Concern (MEC) clearance of the 11-Acre Addition site at McClellan, Alabama has been prepared by Matrix Environmental Services, LLC (MES) for the Alabama Department of Transportation (ALDOT). Work for this task was performed under McClellan Program Work Plan (PWP)(MES, 2008), the DGM QA Plan (QAP) (MES,2004), and the Site-Specific Work Plan Addendum for the ALDOT 11-Acre Site (MES, 2009).

Site preparation activities began in February 2009 and MEC clearance activities were completed in May 2009. In total, 10.07 acres were cleared of materials potentially posing an explosive hazard (MPPEH) to the depth of detection. Four MEC items were recovered and explosively demolished during intrusive operations – three grenades and one grenade fuze. Material removed and documented as safe (MDAS) consisted of a total of 836.5 pounds of cultural debris (non-MEC related metallic scrap) and 114 pounds of munitions debris (MD) were certified as non-hazardous, removed from the site, and properly disposed of.

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

- MES – overall management, Unexploded Ordinance (UXO) escort and anomaly avoidance, intrusive investigation, quality control (QC) and quality assurance (QA)
- NAEVA Geophysics (NAEVA) – digital geophysical mapping (DGM) and data management
- C A Environmental & Construction Services, Inc. – grubbing, tree removal, denubbing, and root raking,
- L.I. Smith and Associates, Inc. – land surveying, and
- ALDOT – installation of erosion controls.

This report presents the objectives of the remediation, the procedures used, the QC and QA methods used to verify effectiveness of the remediation activities, and the results of the remediation.

This report includes the following Appendices:

- Appendix A ALDOT Correspondence
- Appendix B Land Survey Data
- Appendix C Database and GIS Data
- Appendix D DGM Data
- Appendix E Waste Disposal Records
- Appendix F Photo Log

- Appendix G QC Reports
- Appendix H Geophysical Instrumentation Certification
- Appendix I Quality Assurance
- Appendix J Electronic Copy of Report

1.1 PROJECT DESCRIPTION AND OBJECTIVE

This MEC After Action Report describes the methods, activities, and results of the MEC clearance of the 11-Acre Addition site located within the boundaries of the former Fort McClellan (McClellan), Alabama. The site, also referred to as the Iron Mountain Road Addition, is adjacent to land that was previously transferred to ALDOT for construction of the Eastern Bypass. The planned reuse of the site is an off-ramp for the Eastern Bypass.

The U.S. Army Corps of Engineers (USACE) recently completed an Engineering Evaluation/Cost Analysis (EE/CA) which recommended that construction support be implemented during the construction phase of the off-ramp (USACE, 2008). However, prior to accepting the land transfer, ALDOT contracted with MES to clear this parcel of MEC.

Site preparation activities began in February 2009 and MEC clearance activities were completed in May 2009. In total, 10.07 acres were cleared of MEC to the depth of detection over the entire site. Four MEC items were recovered and disposed of in demolition operations. The four MEC items found consisted of three hand grenades, high explosive (HE) and one grenade fuze, all of which were recovered from between 6-12-inches below ground surface.

1.2 BACKGROUND INFORMATION AND SITE HISTORY

1.2.1 Site Location

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

The 11-Acre Addition site straddles the southern boundary of the Bravo Munitions Response Area and is bisected by Iron Mountain Road, which is also known as the Industrial Access Road. The area is located approximately 0.5 miles south of Munitions Response Site 2 (MRS-2) which was cleared of MEC by MES in 2008-2009 (MES, in preparation).

1.2.2 Site History

Military training has been documented in the McClellan area since 1912, when the Alabama National Guard used it for artillery training. However, units stationed at Camp Shipp in the Blue Mountain

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Area during the Spanish American War could have used the Choccolocco Mountains for artillery training as early as 1898. The 29th Infantry Division also trained in this area prior to deployment to France during World War I. In 1917, Congress authorized the establishment of Camp McClellan. In 1929, the camp was officially designated Fort McClellan. Prior to World War II, the 27th Infantry Division assembled at Fort McClellan for training, and during the war, many other units used the site for various training purposes. Following World War II, in June 1947, Fort McClellan was placed in inactive status. Fort McClellan was reactivated in January 1950 and the site was used for National Guard training and was selected as the site for the Army's Chemical Corps School.

Fort McClellan was recommended for closure in 1995 by the Defense Base Closure and Realignment Commission and was officially closed in September of 1999.

The history of the McClellan area, as described in the *Archives Search Report (ASR) Findings* (USACE, 1999a) and *ASR Conclusions and Recommendations* (USACE, 1999b), includes training activities and demonstrations that used conventional weapons (i.e., mortars, anti-tank guns, and artillery pieces). Former ranges and training areas potentially containing MEC cover the majority of McClellan.

1.3 GENERAL OVERVIEW OF TECHNICAL APPROACH

1.3.1 Introduction

At the request of ALDOT, the site was to be cleared of existing trees as well as MEC. Site preparation and pre-intrusive activities, which were conducted using UXO avoidance and/or construction support, consisted of the following activities:

- Performing a real-time surface clearance;
- Removing all trees from the site;
- Denubbing the stumps and clearing the root balls of metallic items;
- Grubbing vegetation, including “toot-raking” the tree locations to a depth of approximately 1 foot;
- Civil survey of the site boundary and installation of grid control points;
- Digital geophysical mapping (DGM);
- DGM target selection and reacquisition;
- Mark out of non-DGM areas; and
- Installation of erosion controls.

Following site preparation activities, the site was cleared to the depth of detection using DGM-based anomaly clearance. This included the area under Iron Mountain Road, except for two steel culverts, which were exposed, but not removed. The few areas where DGM could not be performed due to steep terrain had a traditional “mag and dig” clearance performed using handheld instruments.

QC was performed to ensure that the MEC clearance was executed in general accordance with the ADEM-approved *Revision 1 to Final Program-Level Work Plan (PWP) Munitions and Explosives of Concern Remediation Alpha and Bravo Munitions Response Areas of McClellan, Anniston, Alabama* (MES, 2007).

1.3.2 Grids

To facilitate organization of work activities, safety zones, and data management, the site was divided into standard units of clearance area called grids - which are 100 ft x 100 ft in size (except for partial grids truncated by the site boundary). The grid system for the 11-Acre Addition site is shown in **Figure 2**. Each grid has a unique name indicating its position in the grid system. The leading digit is a grid zone indicator. Northing and easting position are described by a numeric sequence incrementing to the east. For example, grid N069E126 is southwestern-most grid in and N079E130 is the northeastern-most grid.

1.3.3 Units of Production

Each grid is associated with a Unit of Production (UoP) to facilitate QC testing. Each UoP consists of a group of 8 to 10 contiguous grids. The UoPs for the 11-Acre Addition are presented in **Figure 3**.

1.3.4 Definable Features of Work

Definable features of work (DFWs) for the remediation are as follows:

- Prepare Plans
- GPO Certification
- Real-time UXO Surface clearance and inspection and clearance of root balls during tree removal and grubbing
- Installation of erosion controls
- Land Surveying
- Geophysical Investigation
- Anomaly Reacquisition
- Intrusive Clearance Operations
- Inspection/Certification of MPPEH
- Data Management

1.3.5 Data Quality Objectives

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

1.3.6 Description and Operation of Database

A comprehensive site database (DB) was established to:

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

The DB was built in Access 2000 and managed by NAEVA under subcontract to MES. A NAEVA DB Manager oversaw the DB.

1.3.7 Use of Personal Data Assistants

Personal data assistants (PDAs) were used to document all aspects of project data that included: geophysical mapping, target reacquisition, data gap clearances, intrusive MEC operations, UXO demolitions operations, and blind seed placement. PDA drop-down menus were used to ensure all personnel used consistent terminology and that all data was properly recorded and transcription errors were minimized. Operational results were recorded on PDAs and synchronized with the site DB daily.

2.0 FIELD OPERATIONS

2.1 SEQUENCING OF WORK

MES managed the work at the 11-Acre Addition using a group of qualified contractors who provided the best overall value to the project, based on qualifications, price and schedule. Work was conducted in sequential phases, starting with boundary surveying, real-time surface sweep during grubbing, installation of erosion controls, DGM, reacquisition, and subsurface clearance.

2.2 GEOPHYSICAL INSTRUMENTATION AND CERTIFICATION

As this project was conducted contemporaneously with the clearance of multiple munitions response sites at McClellan, using the geophysical personnel and equipment previously certified by MES and approved by ADEM in the existing McClellan (geophysical prove-out (GPO) test site, a separate GPO was not performed. The applicable GPO report documenting DGM instrument selection and procedures for McClellan, is included in the MEC Remediation After Action Report for MRS-1 and Southern Alpha (MES, 2009 in preparation).

The sensor used for DGM was the Geonics EM61-MK2 metal detector. UXO dig teams used the Vallon to clear non-DGM areas. The Whites and Schonstedt were also used during intrusive operations to gauge completion of a dig. Geophysical instrument (both EM-61MK2 and analog instruments) and operator certifications are presented in **Appendix H**.

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

2.3 TREE REMOVAL AND GRUBBING

Tree removal and grubbing/brush removal was performed by C A Environmental & Construction Services, Inc. The grubbing activities utilized heavy equipment with root rake attachments to remove all vegetation to a depth of approximately 1 foot. MES performed a real-time surface clearance using a magnetometer and UXO avoidance during grubbing and tree cutting. UXO personnel walked ahead of the brush cutters and performed a visual and hand-held magnetometer assisted surface sweep to identify and remove all MEC and non-MEC hazards. During the real-time surface clearance, no MEC items and approximately 5 lbs of MD were recovered.

MES also performed a magnetometer inspection and clearance of all root balls during root raking activities and prior to any trees being disposed offsite. No MEC items were recovered during the root ball inspections.

2.4 LAND SURVEYING

Surveying of boundaries and grid corners was performed by L.I. Smith and Associates, Inc., an Alabama licensed professional land surveyors in Alabama State Plane East Zone coordinates (1983) in U.S. Survey Feet. MES UXO Technicians provided anomaly avoidance for the survey crew in order to ensure that each survey location was clear of sub-surface anomalies before the stake was driven into the ground. Land survey data is included in Appendix B.

Surveying of boundaries and grids was performed by LI Smith and Associates. See **Appendix B** for survey data and Statements of Survey Control.

A 100 ft by 100 ft grid system was established throughout the work site. Each southwest corner of the grid was surveyed, marked by a wooden stake, and identified by a unique grid alpha/numeric marking to facilitate grid-by-grid tracking. **Figure 4** shows the grid-based system.

2.5 INSTALLATION OF EROSION CONTROLS

ALDOT personnel, using MES UXO personnel for anomaly avoidance support installed erosion controls at intervals along the site drainages. These erosion controls consisted of hay bales and sediment fencing.

2.6 DIGITAL GEOPHYSICAL MAPPING

NAEVA performed all DGM tasks using two-person teams operating Geonics EM61-MK2s in accordance with the PWP. The second EM6-MK2 time gate, which is also known as Channel 2, was the primary data channel used for geophysical mapping and interpretation. A custom electronic odometer built into one of the wheels triggered the recording of geophysical data at a rate of one reading every 10 cm (approximately 3 readings per foot, twice the standard EM61-MK2 wheel-mode sampling rate).

2.6.1 Fiducial Methods

The use of local (fiducial) coordinates relative to the surveyed grid corners was used as a means of achieving accurate data positioning. NAEVA's data acquisition teams pulled tape measures between the grid corner stakes. Painted survey ropes were laid perpendicular to the tape measures at 25-ft intervals. Each rope had been marked with alternating paint dots every 2.5 ft to facilitate straight-line data collection paths. Geophysical data was collected every 10 cm along these data collection lines using the EM61-MK2's integrated survey wheel.

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

2.6.2 Identification of Non-DGM Areas During Data Collection

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

2.7 DATA PROCESSING

NAEVA utilized qualified geophysicists to perform all data processing tasks for the 11-Acre Addition. The raw and processed data files, contour maps, and target lists were posted to the project FTP site for review by project QC personnel.

2.7.1 Pre-processing

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

2.7.2 Initial Processing

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

- Data evaluation for data density and coverage
- Auto-leveling of four bottom coil channels, with additional leveling refinement of Channel 2 data
- Lag correction
- Gridding of data
- Additional filtering and data enhancement, as necessary
- Generation of polygon files to clip gridded data at line breaks
- Spatial referencing of culture features noted during data collection
- Target selection and evaluation of anomalies at or above the designated 7 mV threshold
- Conversion of data from local coordinates to State Plane coordinates, and

- Generation of final geophysical maps (local and State Plane coordinates), target lists and XYZ files.

The data processing methods and parameters for each grid are documented in the Data Processing tables of the project DB (**Appendix C**). A map showing a mosaic of the EM61-MK2 DGM data is shown on **Figure 5**.

2.7.2.1 Target Selection

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

2.7.2.2 Delineation of Non-DGM Areas

In some areas, digital geophysical data could not be collected due to the presence of erosion control measures, creeks, or steep slopes. In such cases, polygon files were generated based on the line paths to show breaks in the data collection line. The polygon files were drawn on the geophysical maps and used to mask areas in which no DGM actually occurred. Field notes collected during DGM were imported into Oasis Montaj and noted culture was placed on the map.

2.8 REACQUISITION

All targets selected by NAEVA's data processors as well as any QA/QC picks made by the QC Geophysicist or the QA Geophysicist, were reacquired in the field using an EM61-MK2. The EM61-MK2 was used in analog mode to locate the peak location of each anomaly target. Boundaries of the non-DGM clearance areas were also marked out with spray paint by the reacquisition team.

2.8.1 Field Methods

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

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

2.9 INTRUSIVE MEC OPERATIONS

2.9.1 Intrusive Operations

Intrusive teams were provided a grid information package containing DGM grid maps and target lists with mV readings and comments. The basic tactical approach to intrusive operations remained consistent throughout the clearance phases.

2.9.2 Non-DGM Areas

UXO teams were required to check their DGM maps and identify any data gaps present in the grid. UXO teams used a Vallon detector to clear 100% of the area of data gaps (such as erosion control measures, creeks and steep slopes).

2.10 DEMOLITION OPERATIONS

2.10.1 Demolition

Positive identification, location, and condition of the MEC item determined whether items were blown in place (BIP) or consolidated. In those instances when fired or dropped MEC item was safe to move, the items were transported, consolidated and disposed at the demolition range, otherwise items were blow in place (BIP).

2.10.2 Demolition Shot Summary

Consolidated demo operations were conducted at the intentional detonation area located near Snap Lane in MRS-2. Items deemed not safe to move were rendered safe by BIP demolition procedures. The items explosively investigated, are provided in the table listed below. **Table 2-1** summarizes the MEC items that were explosively investigated and contained energetic material.

TABLE 2-1: EXPLOSIVELY INVESTIGATED ITEMS THAT CONTAINED ENERGETIC MATERIAL

| Total Item(s) | Item(s) Type | Phase of Work | Ordnance Filler |
|---------------|--------------------|---------------|-----------------|
| 3 | Hand Grenade (HE) | DGM | HE |
| 1 | Fuze, Hand Grenade | DGM | Pyrotechnic |

2.11 WASTE DISPOSAL

2.11.1 Waste Generated

MD (MEC-related scrap) and CD (non-MEC-related scrap) were sorted and inspected in accordance with the WP and DoD Instruction 4141.62 “Management and Disposition of Material Potentially Presenting an Explosive Hazard” (December 2004). This inspection process insured that MD and CD were properly sorted, demilitarized as needed, secured and did not present an explosive hazard. MD and CD were secured in separate locking roll-off containers after inspection.

When the roll-offs are full, the CD and demilitarized MD will be released to a local scrap recycler after final inspection with a signed 1348-1A custody document. The containers of all scrap will remain secured until they are processed by the recycler. Shipping manifests will be submitted under separate cover to be included in **Appendix E**.

3.0 MEC REMOVAL ACTION CLEARANCE RESULTS

3.1 SUMMARY OF ITEMS RECOVERED

Four MEC items (2.5 lbs) were recovered during the clearance and are shown on **Figure 4**. In addition, a total of 111.5 lbs of MD was recovered and summarized in the table below.

TABLE 3-1 MD (MEC SCRAP) WEIGHT FOUND

| Total Weight (LBS) | Item(s) Type | Phase of Work |
|--------------------|------------------------------|---------------|
| 12.0 | 37mm AP | DGM |
| 24.5 | Grenade (Practice) | DGM |
| 10.5 | Fuze | DGM |
| 2.5 | Rifle Grenade (Illumination) | DGM |
| 3.5 | Slap Flare | DGM |
| 12.5 | Trip Flare | DGM |
| 46.0 | Small Arms | DGM |
| 111.5 | Total | |

4.0 QUALITY CONTROL (QC) TESTING

This section discusses the QC program that was implemented during the remediation of the 11-Acre Addition site. This section summarizes the DQOs and discusses the three phases of (quality) control, and the results of the QC program.

4.1 DATA QUALITY OBJECTIVES

The following approved DQOs were used for this project.

Land Surveying

- Survey/positional accuracy – due to canopy cover, conventional survey methods were used to survey in boundaries and grid corners. The accuracy of these systems was within +/- 1 in.

Geophysical Investigation

- The geophysical contractor must find 95% of all seed items in the GPO test grid to certify equipment and personnel as having successfully passed the GPO.
- Daily function checks of the geophysical instruments must be within tolerances specified in the PWP and finalized in the GPO.
- Continuous recording of geophysical data (no unexplained sensor data gaps).
- Continuous recording of positional data (no unexplained positional data gaps).
- The geophysical contractor must be able to accurately relocate a DGM target anomaly to within a critical radius of 2.5 ft.

Intrusive Investigation

- All hand-held detectors and data collection and positioning systems will perform daily performance checks in accordance with SOPs or manufacturer's specifications at FCA.
- Each UXO surface clearance team must perform a daily instrument functional check at an FCA to verify that the instruments are working properly.
- 100% QC reacquisition and Geonics EM61-MK2 time domain electromagnetic metal detector (EM61-MK2) interrogation will be performed on all no-find locations.
- Positively identify 100% of MEC items as to type, fuze, condition, and filler based on knowledge/training/reference material.
- The UXO Quality Control Specialist (QCS) will verify the identification of 100% of all MEC items.

MEC item clearance depth DQOs are as follows:

TABLE 4-1 MEC ITEM CLEARANCE DEPTH DQOS

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

UoP Certification

- Field inspection and interrogation of 100% of targets with an EM61-MK2 after all the targets in the UoP have been excavated, were performed to verify that all anomaly locations were intrusively investigated and properly cleared by the UXO teams.
- A minimum of one grid out of each UoP was reprocessed and retargeted by QC and compared with the geophysical contractor’s targets.

4.2 THREE PHASE QC PROGRAM

A three-phase QC program was implemented as a means to verify accomplishment of the Definable Features of Work. This program consisted of Preparatory, Initial, and Follow-up QC inspections. Work did not begin on a DFW until a successful preparatory phase inspection was completed and documented.

4.2.1 Preparatory Phase Inspection

The Preparatory Phase was a pre-operational briefing and training prior to production start. It consisted of a briefing by the QC team and Senior Unexploded Ordnance Supervisor for specific tasks. The briefing covered QC check sheet specifics and any SOPs relating to the task. During the briefing, the QC team and operations personnel identified specific procedures, and equipment needed to accomplish the task.

4.2.2 Initial Phase Inspection

The QC team conducted an initial phase inspection the first time a DFW was performed. This inspection checked that preliminary work met PWP specifications, was safely executed, and that an acceptable level of workmanship was achieved.

4.2.3 Follow-up Phase Inspections

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

4.3 SIX-STEP QC PROCESS

The six-step QC process was implemented in accordance with the PWP and incorporates the three phase inspections across DFWs of the grid clearance process.

4.3.1 QC Step 1

Preparatory and Initial QC Phase Inspection

4.3.2 QC Step 2

Follow-up QC Phase Inspection

4.3.3 QC Step 3: Geophysical Data Reprocessing

The Geophysical Quality Control Supervisor (GeoQC) independently reprocessed the geophysical data for one grid in each UoP and developed maps and target lists that were compared to the NAEVA maps and target lists. Minor discrepancies in target selection existed due to the interpretative nature of geophysical target selection. If discrepancies between the maps and target lists existed, the GeoQC and the geophysical data processor compared processing techniques and agreed to standard processing procedures. At this time, the GeoQC also checked the blind QC seed items against the DGM results and target lists for this UoP.

4.3.4 QC Step 4, Activity QC Inspection

Activity QC inspections and surveillances were performed using QC developed check sheets.

4.3.5 QC Step 5, Excavation Sampling Inspection Reports

Step 5 of the QC process consisted of 100% post excavation dig checks and data gap checks to verify workmanship using an EM61-MK2.

4.3.6 QC Step 6, Target Data mV Comparison to Excavation Results

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

4.4 UOP CERTIFICATION PACKAGES

The UoP Certification Packages document each UoP successfully passing the six QC steps and are included in **Appendix G**. Part of the UoP certification process required that at least one grid from a UoP be selected and reprocessed by GeoQC.

4.4.1 UoP Certification Requirements

All UoPs passed the certification requirements. The geophysical data that composes the UoPs is included in **Appendix D** for the 11-Acre Addition site. UoPs certification packages are included in **Appendix G**, and include:

- QC reprocessed data
- QC checklists
- QC target lists, and
- QA/QC grid tracking tables.

4.5 QC FUNCTION TESTS

To ensure quality DGM data, NAEVA conducted daily QC tests, which were evaluated on a daily basis to ensure that both personnel and equipment was functioning at optimal levels. Each NAEVA DGM team conducted daily morning and end of day (am and pm) Static tests and Lag tests to document proper instrument function. In addition a set of repeat data lines were collected for every grid dataset. All QC tests were reviewed by the GeoQC as part of the Six-Step QC Process. The QC test data and results are compiled in **Appendix G**.

4.6 QC BLIND SEEDS

See **Appendix G** for the complete QC seed lists.

4.6.1 DGM Seeding

QC placed a minimum one blind seed item per UoP in accordance with the PWP. The purpose of the QC seed program was to verify geophysical mapping and clearance activities were successfully implemented. A total of 10 blind seeds were installed; each blind seed was detected by DGM, targeted, and recovered during intrusive operations.

4.7 FIELD CHANGE REQUESTSS

No field change requests (FCRs) were implemented.

4.8 DEFICIENCY NOTICE REPORTS

No deficiency notice reports (DNRs) were implemented.

5.0 QUALITY ASSURANCE (QA)

In addition to the Quality Control provided by the contractors, MES provided DGM QA in accordance with the *Site-Wide Digital Geophysical Mapping Quality Assurance Plan, McClellan, Anniston, Alabama* dated November 2004 (QAP).

5.1 DGM QA

DGM QA was performed in accordance with the requirements stipulated in QAP. The goal of the geophysical QA program is to ensure that the type and quantity of geophysical data collected are useable and sufficient to support the clearance of all detectable MEC from the removal action areas. The QA data is included as **Appendix I**, except for the QC/QA Grid Inspection Reports, which are included in **Appendix G**. The DGM QA process and results are summarized below.

5.1.1 DGM QA Process

The geophysics and DGM related portions of the MEC Removal Action for the 11-Acre Addition As outlined in the QAP, QA measures performed are organized and discussed as follows:

- Review of GPO certification,
- Review of QC Reports,
- Review of pre-dig DGM data packages,
- Review of reacquisition and post-dig DGM DB,
- Reprocessing of raw data, and
- Review of blind seed detection and recovery results.

5.1.2 DGM QA Results and Conclusions

Metrics for the ten critical DGM QC measures identified in the QAP were evaluated as follows:

Table 5-1 Contractor Critical DGM QC Measures and Metrics

| Critical QC Measures | Metric |
|--------------------------------|---|
| Blind Seeded QA Items | Target and recover all seeds |
| Background Noise | 3.5mV peak-to-peak (Ch2) in static tests and "normal" histograms |
| Along Track Sampling | 0.31 feet (fixed by survey wheel) |
| Across Track Sampling | 2.5 feet |
| Latency Correction | No visible "herring bones" |
| Data Leveling | Geosoft leveling - rolling window ≥ 100 points to baseline response |
| Signal to Noise Ratio Variance | Static noise 3.5mV peak-to-peak (Ch2) and standard static response variance $\leq 20\%$ |

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| | |
|--------------------|---|
| Anomaly Selection | Geosoft UX-Detect threshold selection of 7mV (Ch2). Acceptable targeting of compound anomalies. |
| Positioning Errors | Total error ≤ 2.5 feet for DGM data/targets |
| Reacquisition | Comparable mV response, position < 2.5 feet |

Pre-dig DGM grid data packages and accompanying QC data, surveillances, and reports were reviewed for compliance with the PWP, critical QC metrics, and completeness and effectiveness of QC by MES QA. Full QA review was performed on 6 (15% of area) of the DGM grid packages submitted by NAEVA. Systematic discrepancies were not found. Because of the short duration of this project, DGM repeatability was evaluated by replicate line evaluation and assessment of remapping data from the ongoing remapping in the adjacent MRSs. Anomaly reacquisition data was found to be of acceptable quality for spatial offset and correspondence of anomaly amplitude. Less than 1% of anomalies were not found during reacquisition. None of the data packages failed in QA, giving an acceptable QA pass rate of 100%.

These results are documented in the QC/QA Inspection reports (**Appendix G**). Dig results, QC data and surveillances were also reviewed. The false alarm rate was within acceptable parameters. Total no-finds and geologic responses/hot rock were less than 0.1% of all excavated anomalies for 11-Acre Addition. All seed items were recovered.

In summary, the DGM QA program results for the 11-Acre Addition indicate that the data quality and QC performance goals for the removal action were met. No critical or systematic DGM performance discrepancies were found.

5.2 QA CONCLUSIONS

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

- The geophysical data collected for the remediation was useable and sufficient to support the clearance of MEC.
- The QC processes functioned as intended.
- Geophysical QA concurred that the remediation met the quality objectives set forth in the QAP and the PWP.

6.0 CONCLUSION

The MEC clearance to depth for the 11-Acre Addition site has been successfully accomplished. No further action is required. Unrestricted future use with deed notification of the former historical use of the property is recommended.

7.0 REFERENCES

Department of Defense, (DoD) Instruction 4141.62 “Management and Disposition of Material Potentially Presenting an Explosive Hazard” (December 2004).

MES, Revision 1 to Final Program-Level Work Plan Munitions and Explosives of Concern Remediation, Alpha and Bravo Munitions Response Areas of McClellan, Anniston, Alabama (September 2007).

MES, Site-Wide Digital Geophysical Mapping Quality Assurance Plan, McClellan, Anniston, Alabama (November 2004).

MES, Site-Specific Operations and Safety Plan, ALDOT 11-Acre Site, McClellan, Alabama (February 2009).

MES, Munitions and Explosives of Concern Remediation After Action Report, Munitions Response Site 1 and Southern Alpha, Draft Document (MES, in preparation).

USACE, Archives Search Report (ASR) Findings (1999a)

USACE, Archives Search Report (ASR) Conclusions and Recommendations (1999b)

USACE, Engineering Evaluation/Cost Analysis Iron Mountain Road Addition Fort McClellan, Alabama (July 2008)

Figures

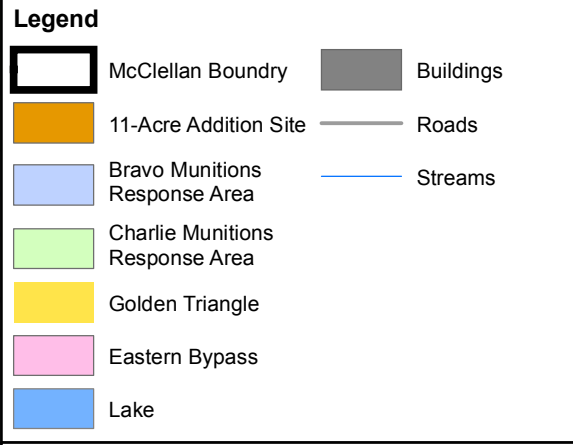
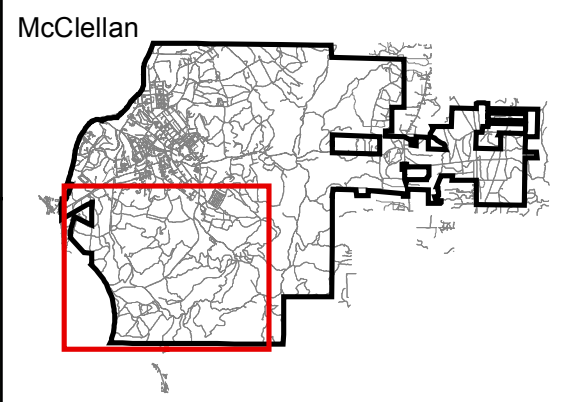
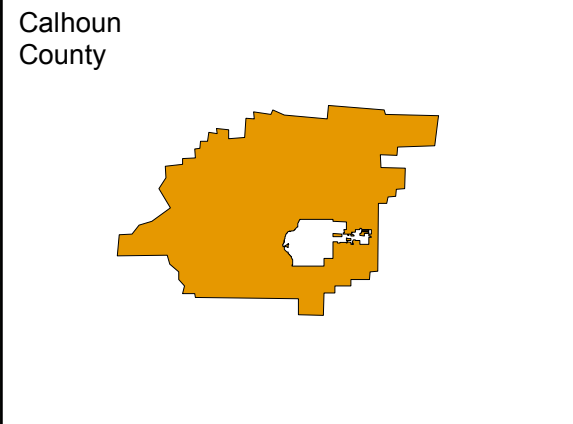
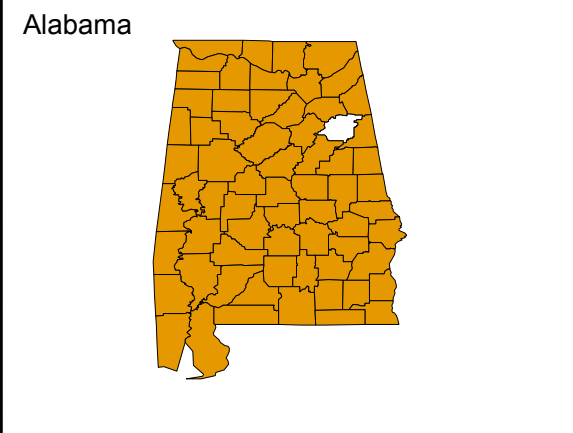
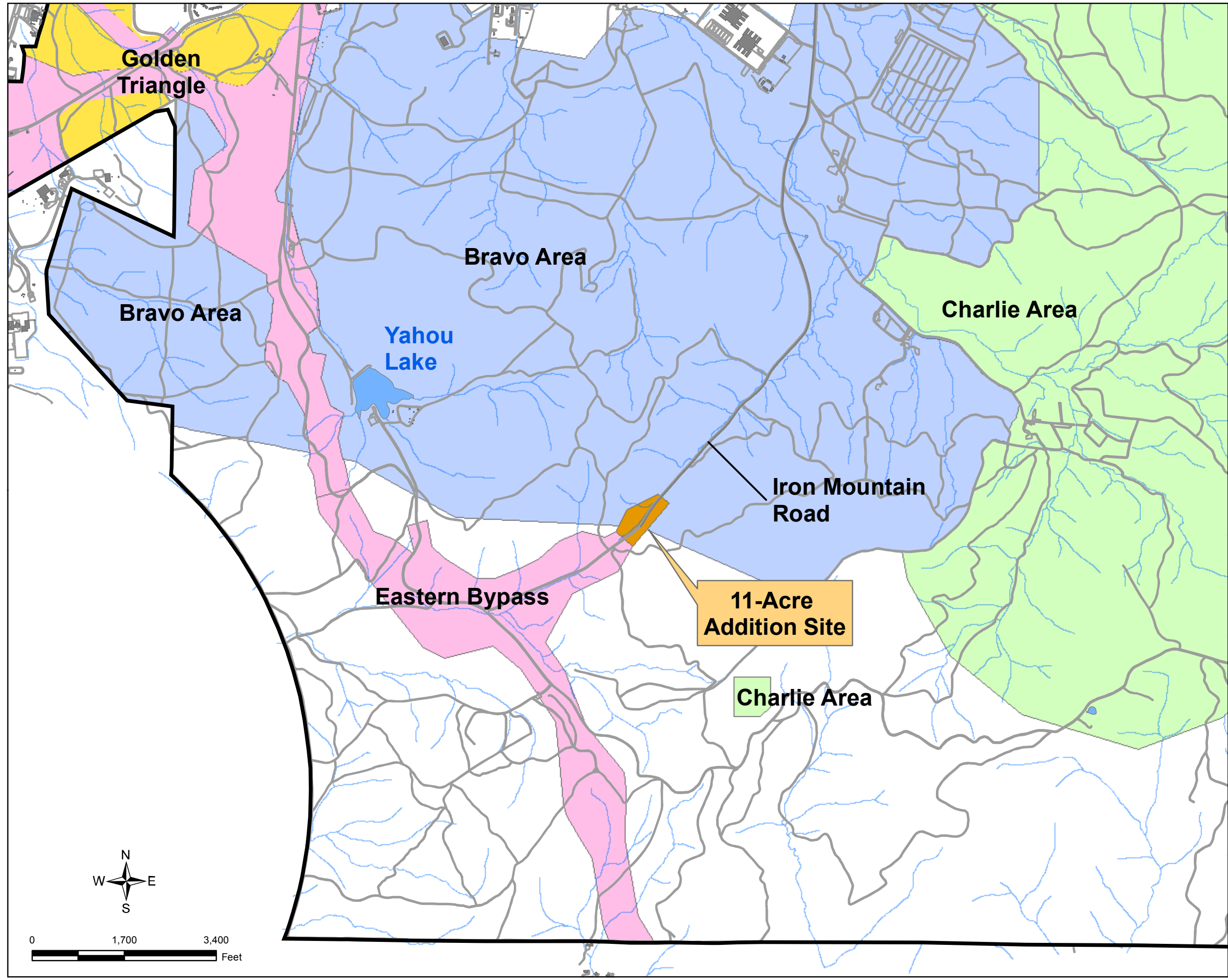
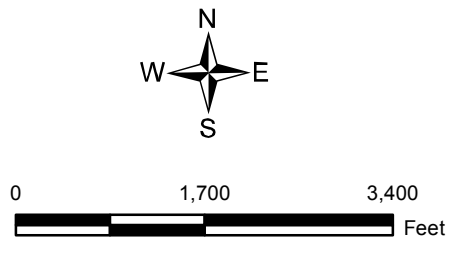
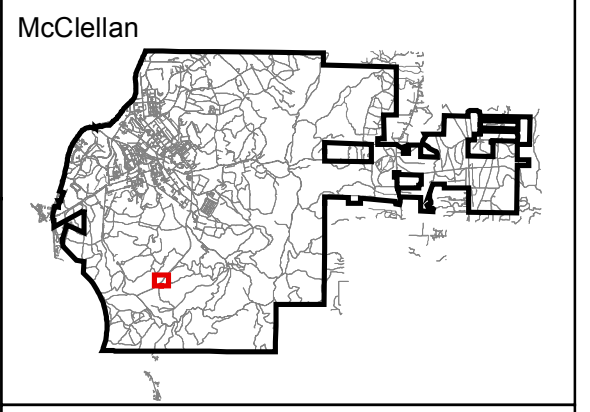
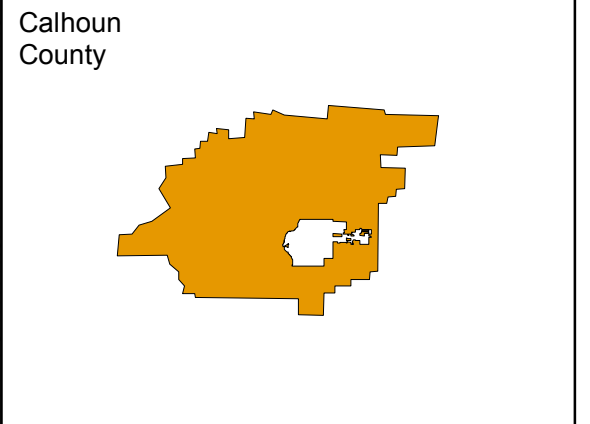
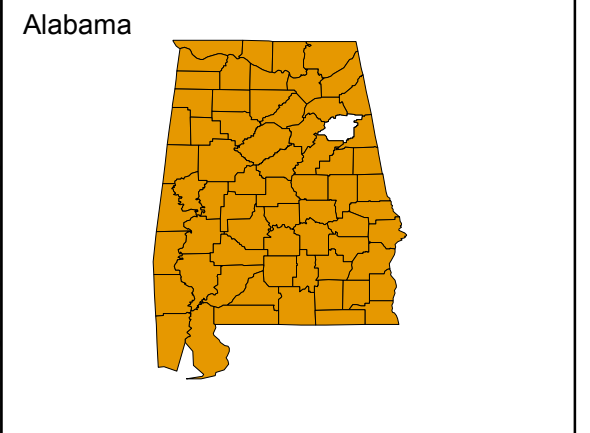
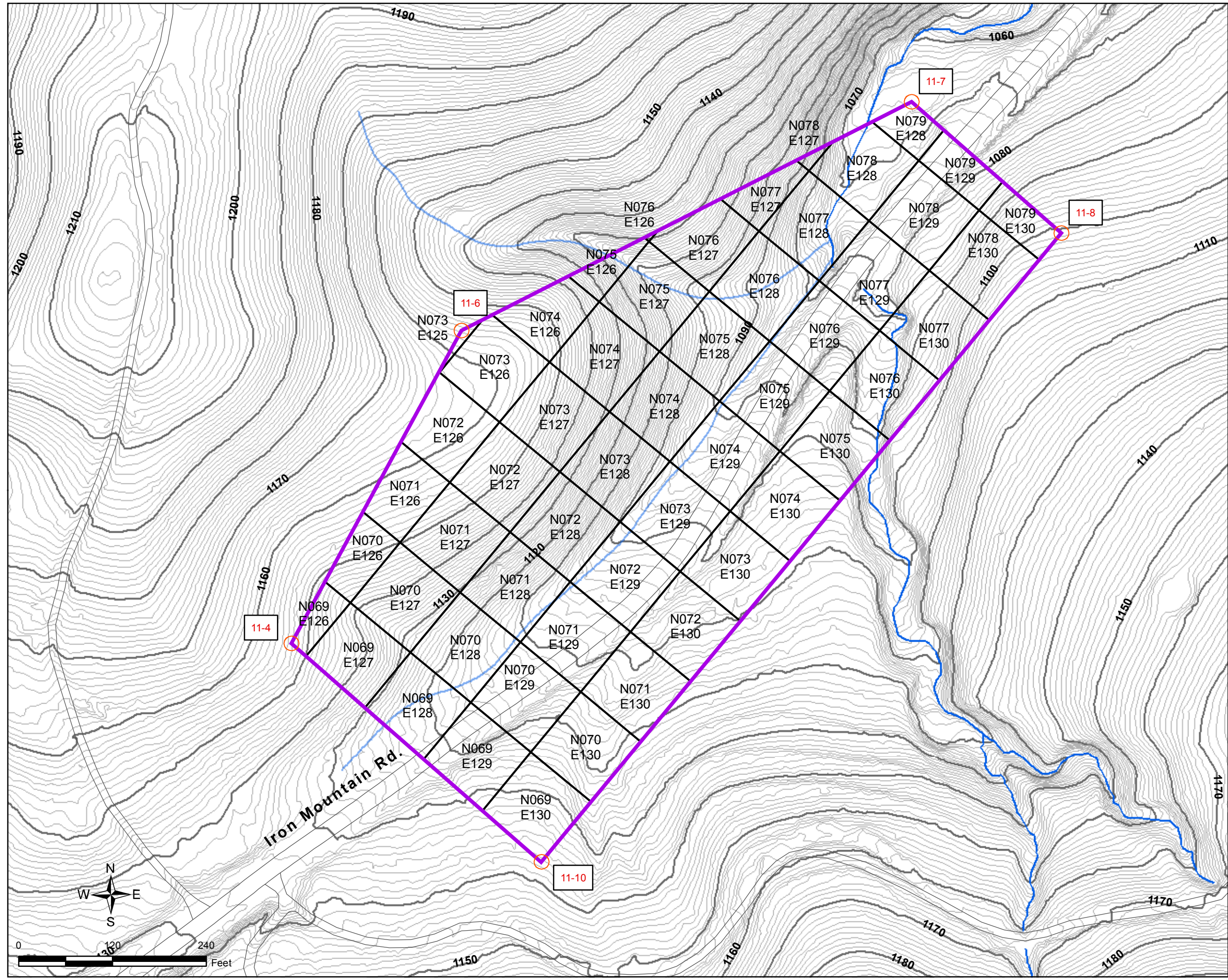


FIGURE 1
11-Acre Addition Site Location
 McClellan
 Anniston, Alabama

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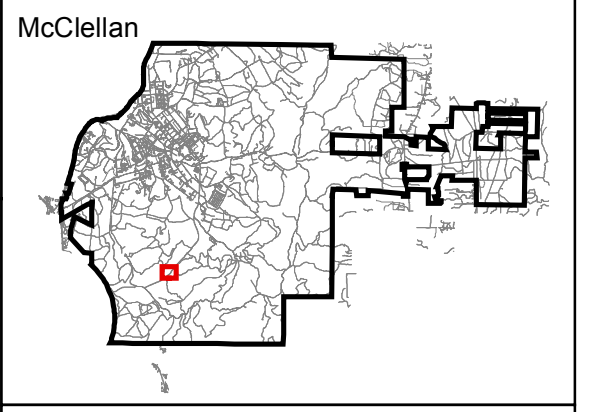
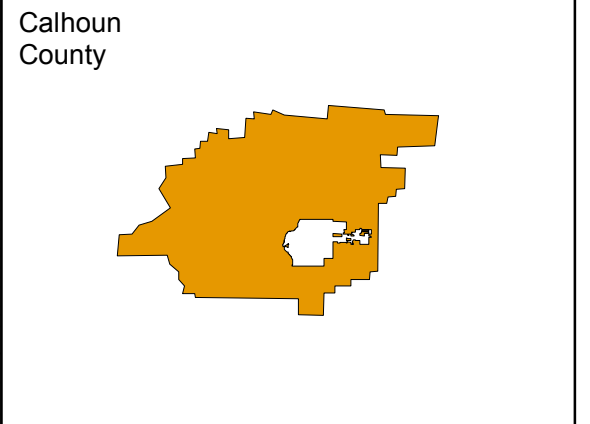
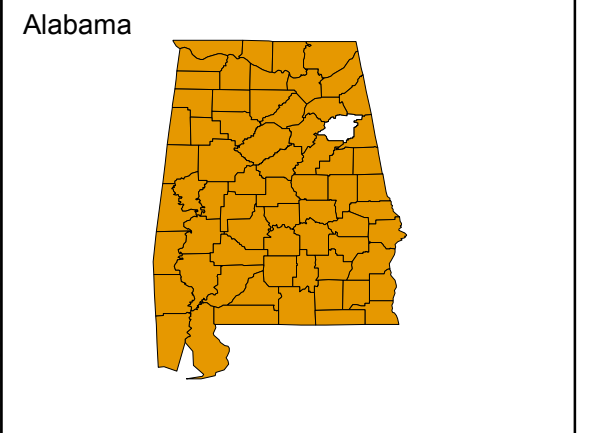
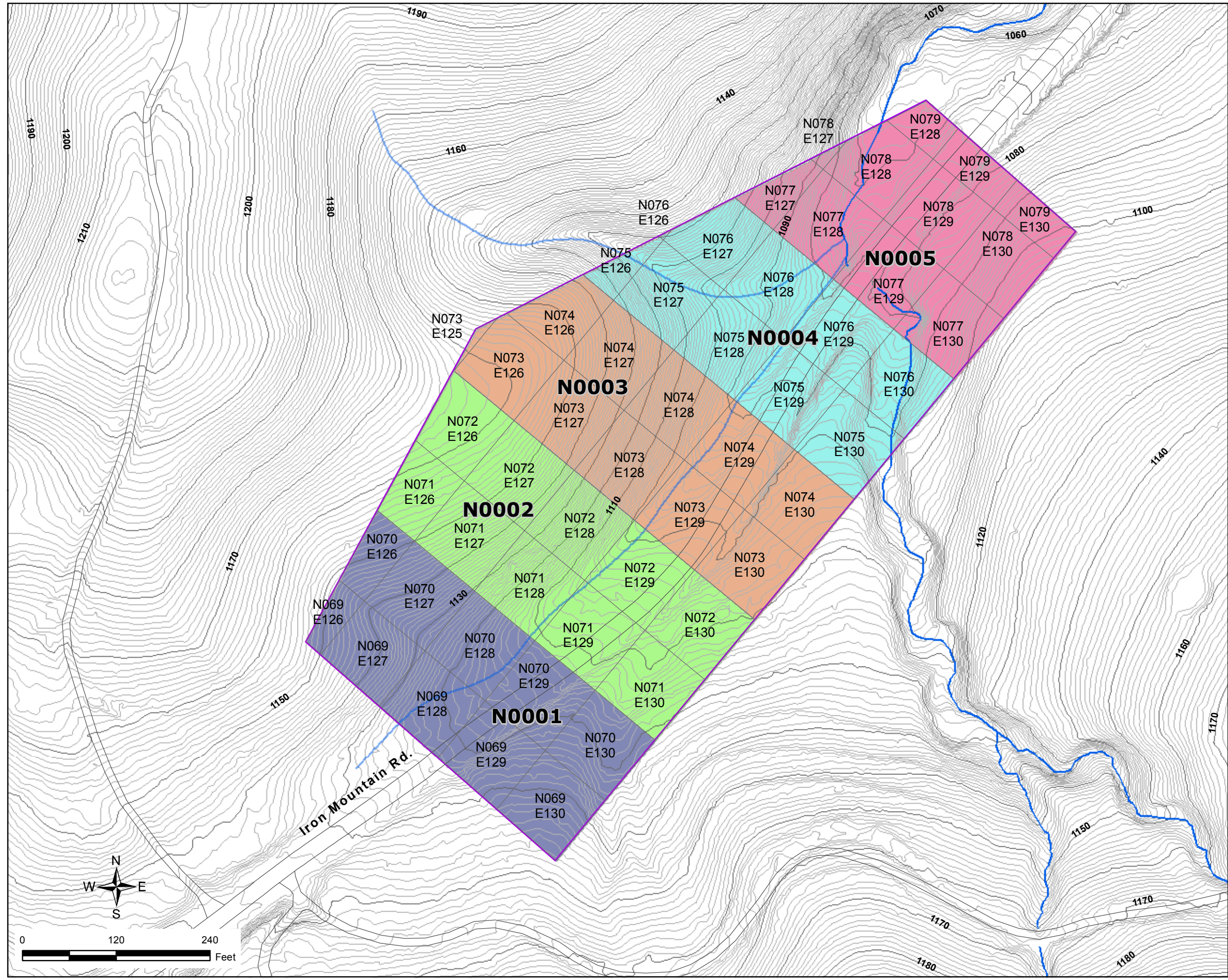
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- Parcel Boundary
- Grid Network
- Roads
- Streams
- Index Contour (10 foot)
- Intermediate Contour (1 foot)

FIGURE 2
11-Acre Addition Site Grid Network
 McClellan
 Anniston, Alabama

Matrix Environmental Services, L.L.C.
 Integrated Environmental Solutions

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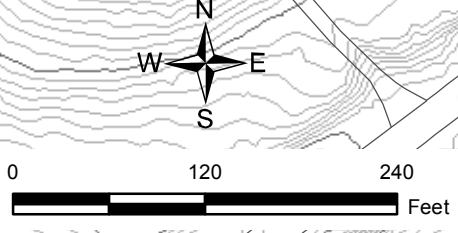


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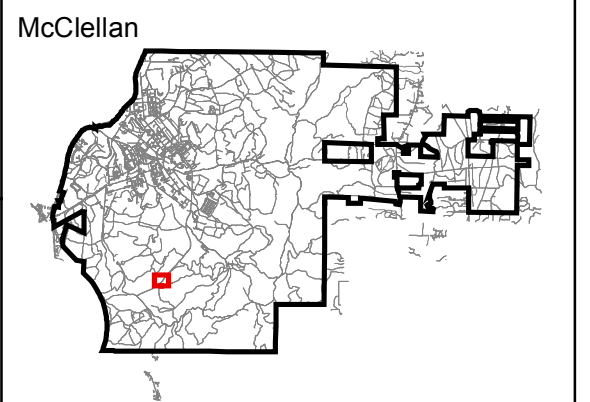
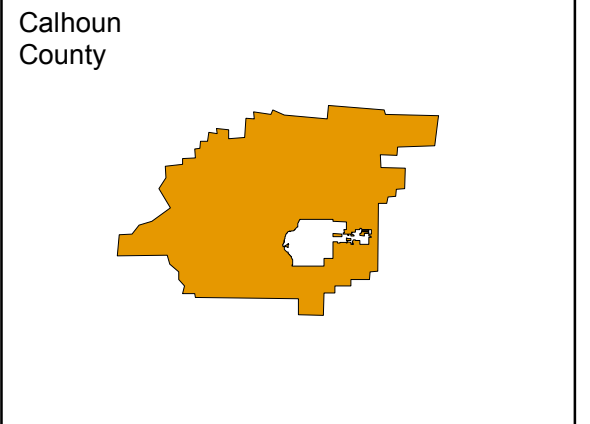
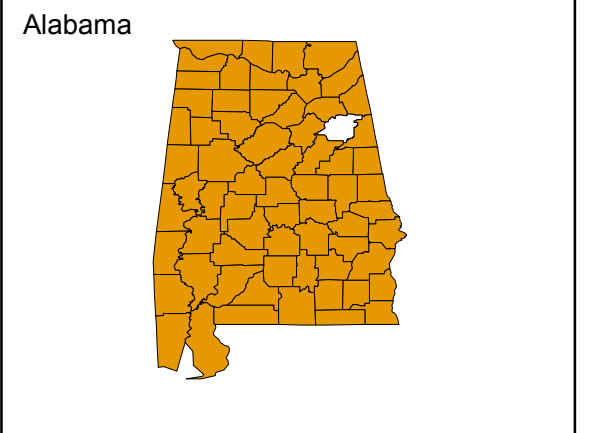
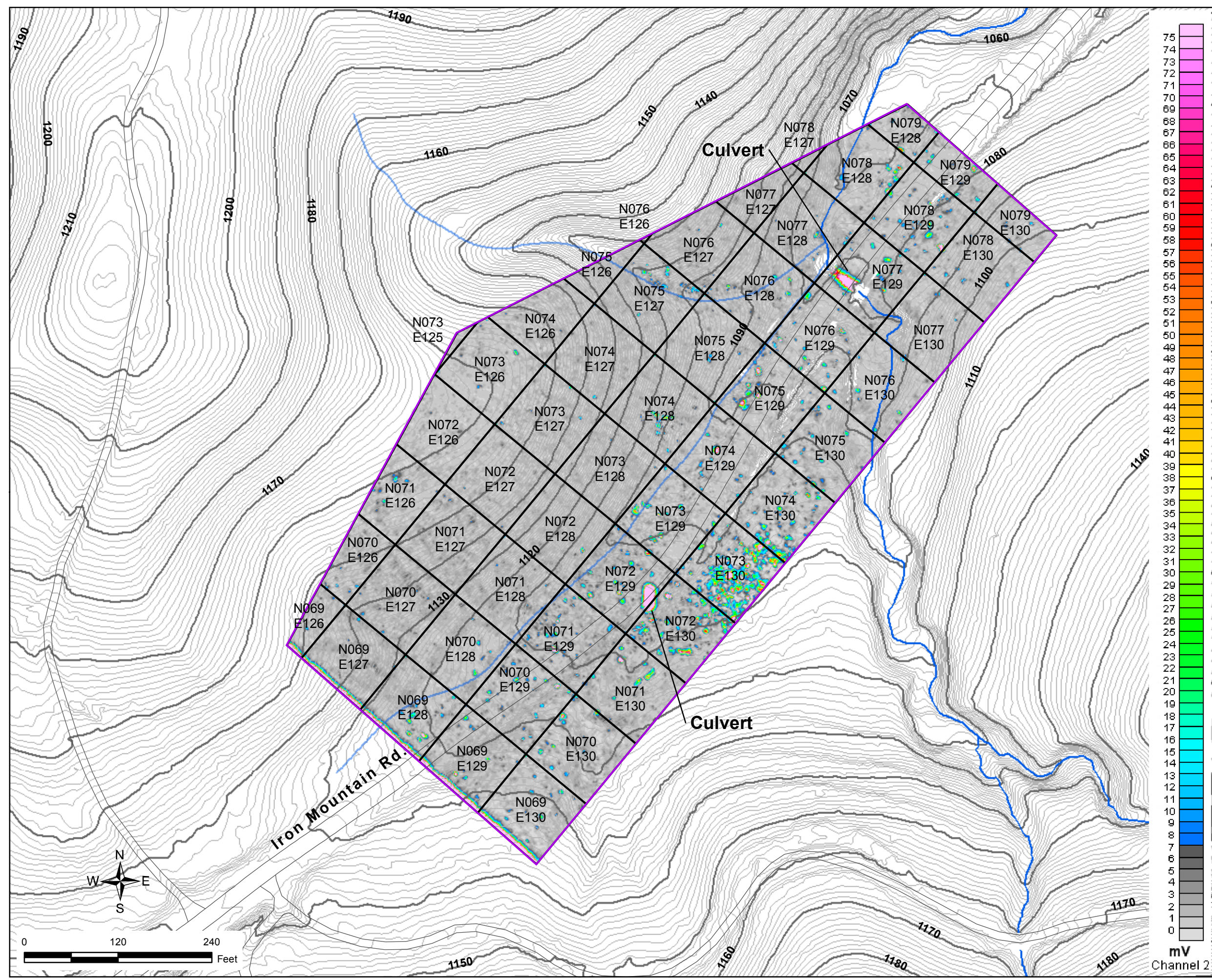
- Parcel Boundary
- Grid Network
- Roads

FIGURE 3
11-Acre Addition Site UOPs
 McClellan
 Anniston, Alabama

Matrix Environmental Services, LLC
 Integrated Environmental Solutions



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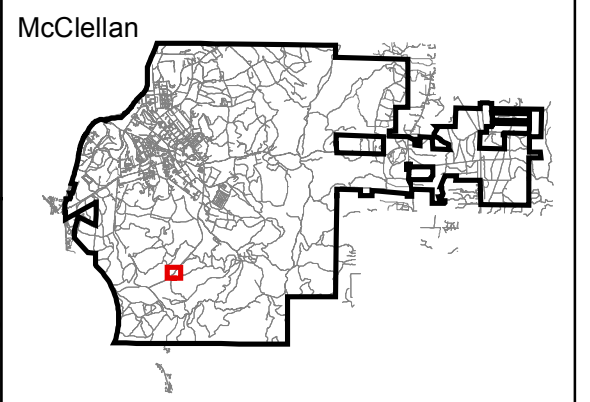
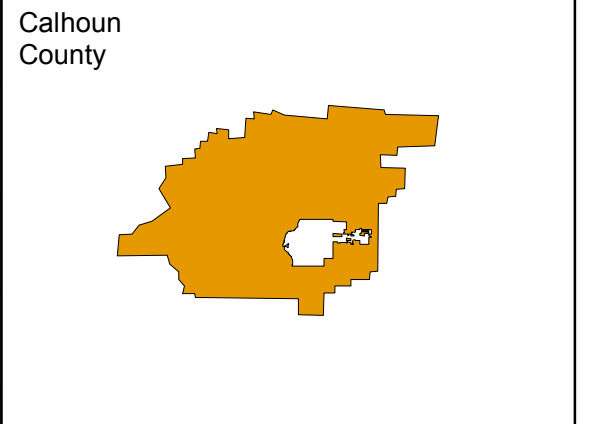
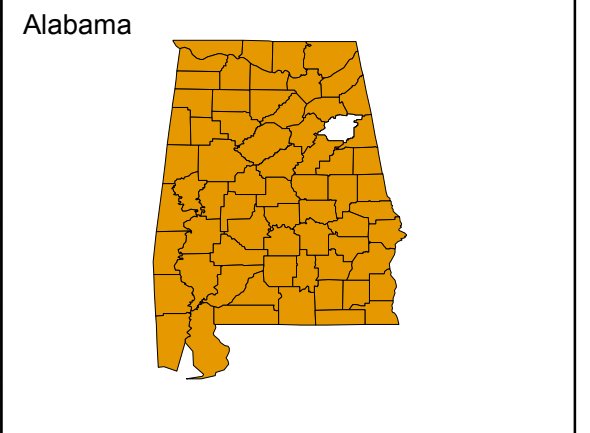
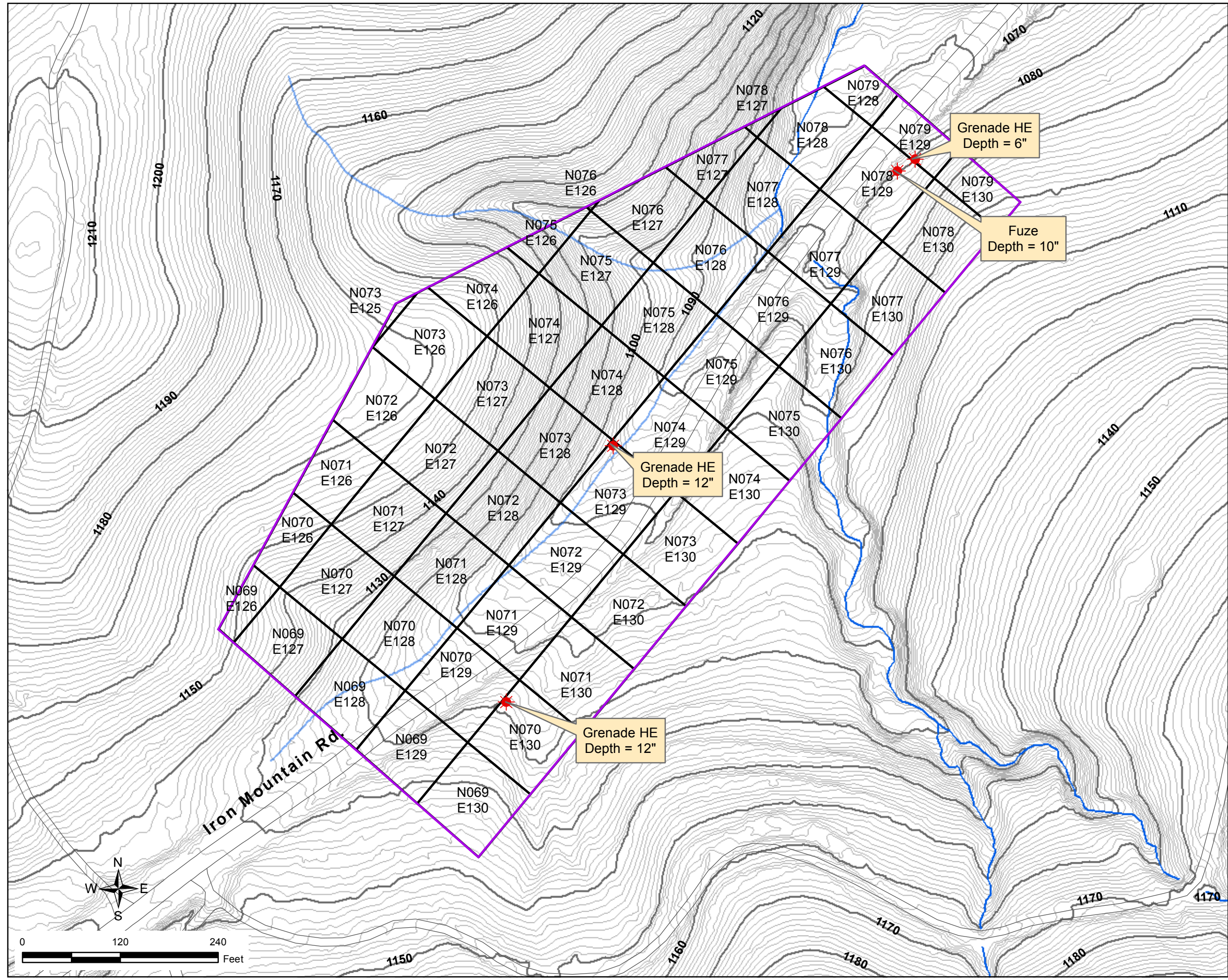


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- Parcel Boundary
- Grid Network
- Roads
- Streams
- Index Contour (10 foot)
- Intermediate Contour (1 foot)

FIGURE 4
11-Acre Addition EM61-MK2
Geophysical Mosaic
 McClellan
 Anniston, Alabama
 Matrix
 Environmental
 Services, L.L.C.
Regional Environmental Solutions

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Legend

- MEC Item
- Parcel Boundary
- Grid Network
- Roads
- Streams
- Index Contour (10 foot)
- Intermediate Contour (1 foot)

FIGURE 5
11-Acre Addition Site MEC Finds
 McClellan
 Anniston, Alabama

Matrix Environmental Services, LLC
 Integrated Environmental Solutions

