

FINAL

Proposed Plan

NFA Areas, FUDS #E05IL000701

Aircraft Bombing Area – Area D, FUDS #E05IL000708

Obstacle Area – Area M, FUDS #E05IL000709

East Landfill – Area R, FUDS #E05IL000710

Wastewater Treatment Plant – Sludge Digesters, FUDS #E05IL000711

**Former Camp Ellis Military Reservation
Fulton County, Illinois**

FUDS #E05IL0007

April 2016

Prepared for:



**U.S. Army Engineering & Support Center
Huntsville, Alabama**



IE QMS

Check and Review Record

Project Name	Former Camp Ellis Military Reservation	Client Name	USACE – Louisville District
Project Location	Fulton County, Illinois	PM Name	Craig Johnson
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Type	<input type="checkbox"/> Detail Check	<input type="checkbox"/> Coordination Review	<input type="checkbox"/> Constructability Review	<input type="checkbox"/> Bidability Review
	<input checked="" type="checkbox"/> Independent Technical Review (ITR)	<input type="checkbox"/> Calculation Check (can also use QMS Form 3-3)	<input type="checkbox"/> Other:	For Subconsultant, Client, or Third-Party Information Review, use Form 3-11.

(This section is to be completed by the Project Manager or the PM's Designee.)

Individual Assigned:	Jeff Voelker	Comments Required by:	7-Apr-2016
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Review Scope

<input type="checkbox"/> Technical edit for elements such as grammar, punctuation and formatting.	<input type="checkbox"/> Completion of review of client and third-party information.	<input type="checkbox"/> Basis and validity of conclusion / recommendation.
<input type="checkbox"/> Detail Check of calculations and graphics.	<input checked="" type="checkbox"/> Soundness of approach/design.	<input checked="" type="checkbox"/> Organization, clarity and completeness.
<input type="checkbox"/> Completion of Detail Check	<input type="checkbox"/> Conformance with standards	<input type="checkbox"/> Application of Statements of Limitations.
<input type="checkbox"/> Other:		

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and

Checker / Reviewer confirms that the work product Check / Review is complete.

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CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

URS Group, Inc. (URS) has completed the Final of the Proposed Plan at the former Camp Ellis Military Reservation in Fulton County, Illinois. Notice is hereby given that an independent technical review has been completed that is appropriate to the level of risk and complexity inherent in the Final of the Proposed Plan. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions were verified. This included reviews of (*assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level of data obtained; and reasonableness of the results*), including whether the product meets the customer's needs consistent with law and existing United States Army Corps of Engineers Policy. The URS internal review form is attached.



Craig Johnson, CHMM
Project Manager

4/08/2016

Date

**The public is invited to comment on a Proposed Plan
for the former Camp Ellis Military Reservation.**

PUBLIC COMMENT PERIOD

April 13, 2016 through May 16, 2016

PUBLIC MEETING

April 26, 2016

7:00 p.m.

Easley Museum

210 W. Broadway

Ipava, Illinois 61441

Comments on the Proposed Plan will be accepted during the public comment period. Comments or questions concerning this Proposed Plan, or the Preferred Alternatives, should be addressed to:

USACE-Louisville District

Attn: CELRL-PM-M-E (Valerie Doss)

600 Martin Luther King Jr. Place

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Telephone: (502) 315-6108

For more information, please visit the Information Repositories, which contain project documentation supporting development of this Proposed Plan.

Western Illinois University Library –
Special Collections Department
1 University Circle
Macomb, IL 61455
Phone: (309) 298-2717
<http://www.wiu.edu/libraries>

Library Hours:

Monday-Friday: 8:00 a.m. to 4:30 p.m.
Saturday/Sunday: Closed

Easley Museum
210 W. Broadway
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Museum Hours:

Tuesday and Friday: 10:00 a.m. to 4:00 p.m.
Saturday/Sunday: Closed (Opened on
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ACRONYMS

ARARs	Applicable or Relevant and Appropriate Requirements
BCY	bank cubic yards
bgs	below ground surface
BIP	blown-in-place
CEMR	Former Camp Ellis Military Reservation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	chemical of concern
COPCs	chemicals of potential concern
cPAHs	carcinogenic PAHs
DD	Decision Document
DERP	Defense Environmental Restoration Program
DGM	digital geophysical mapping
DoD	Department of Defense
DoDI	Department of Defense Instruction
EE/CA	Engineering Evaluation/Cost Analysis
EM	Engineer Manual

ESS	Explosives Safety Submission
FS	Feasibility Study
FUDS	Formerly Used Defense Sites
HA	Hazard Assessment
HMX	octahydro-tetranitro-1, 3, 5, 7-tetrazocine
HTRW	Hazardous, Toxic, and Radioactive Waste
IEPA	Illinois Environmental Protection Agency
LUC	Land Use Control
MC	munitions constituents
MD	munitions debris
MDAS	material documented as safe
MEC	munitions and explosives of concern
mg/kg	milligrams per kilogram
mm	millimeter
MPPEH	material potentially presenting an explosive hazard
MRS	Munitions Response Site
MRSPP	Munitions Response Site Prioritization Protocol
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	No Further Action
NPL	National Priorities Lists
O&M	operation and maintenance
PAH	polynuclear aromatic hydrocarbon
PAOI	Potential Area of Interest
PCB	polychlorinated biphenyl
PP	Proposed Plan
PRG	Preliminary Remediation Goal
RA	Removal Action
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RO	Remediation Objective
ROE	right-of-entry
RRD	range-related debris
SI	Site Inspection
SUXOS	Senior UXO Supervisor
SVOC	semi-volatile organic compound
TACO	Tiered Approach to Corrective Action Objectives
TCLP	Toxicity Characteristic Leaching Procedure
TNT	2,4,6-trinitrotoluene
TPH	total petroleum hydrocarbons
UECA	Uniform Environmental Covenants Act
U.S.	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
UU/UE	unlimited use/unrestricted exposure
UXO	unexploded ordnance
UXOQCS	UXO Quality Control Specialist
UXOSO	UXO Safety Officer
VOC	volatile organic compound
WWTP	Wastewater Treatment Plant
XRF	X-ray fluorescence

1 Introduction

The former Camp Ellis Military Reservation (CEMR) is a **Defense Environmental Restoration Program (DERP)** property under the United States (U.S.) Army Corps of Engineers (USACE) Great Lakes and Ohio River Division **Formerly Used Defense Sites (FUDS)** program. The property is identified as FUDS property #E05IL0007.

A FUDS is defined as real property that was owned by, leased to, or otherwise possessed by the U.S. and under the jurisdiction of the Secretary of Defense that was transferred from the control of the Department of Defense (DoD) prior to 17 October 1986. Execution of the FUDS program was delegated by DoD, through the Headquarters of the Army, to USACE. The delegation made USACE the chief executor for environmental restoration activities at FUDS. The FUDS program was established under DERP and addresses releases or threatened releases attributable to the DoD that occurred prior to 17 October 1986. The cleanup mission for the FUDS program is to perform appropriate, cost-effective cleanup of contamination caused by DoD and to protect human health and the environment. USACE is charged with planning and implementing environmental investigations and remedial actions associated with DoD contamination at the former CEMR.

USACE is the lead agency at the former CEMR (**Figure 1**), Fulton County, Illinois. USACE, in coordination with the support agency and lead state regulatory agency, Illinois Environmental Protection Agency (IEPA), is requesting public comment on this **Proposed Plan (PP)**. This PP was developed for the following Munitions Response Sites (MRSs) and Potential Areas of Interest (PAOIs):

- No Further Action (NFA) Areas, FUDS Project #E05IL000701
- Aircraft Bombing Area - Area D, which includes former Mines North MRS (Area F North), FUDS Project #E05IL000708
- Obstacle Area - Area M, FUDS Project #E05IL000709
- East Landfill - Area R, FUDS Project #E05IL000710
- Wastewater Treatment Plant (WWTP) - Sludge Digesters, FUDS Project #E05IL000711

This PP was prepared in accordance with Section 117(a) of the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)** of 1980 and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA and the NCP provide authority and a regulatory framework to respond to releases or threatened releases of hazardous substances that may endanger public health or the environment. They also provide

opportunities for public input during the site decision-making process.

Investigations were completed to support evaluation of explosive hazards and human health and environmental risks associated with releases of hazardous substances and/or military munitions related to former property use by the DoD. Media investigated included soil, surface water, sediment, and groundwater.

This PP summarizes the **Remedial Investigation (RI)** (URS 2014, 2015a) recommendations (**Table 1**) and the **Feasibility Study (FS)** (URS 2015b, 2015c) alternatives and presents the preferred alternatives. This PP presents the preferred alternatives proposed for the Aircraft Bombing Area - Area D, Obstacle Area - Area M, East Landfill - Area R, and WWTP - Sludge Digesters (**Figure 2**). IEPA concurs with the preferred alternatives.

Areas for which no unacceptable risks were identified for human or ecological receptors were grouped together. No Further Action is recommended for these areas, referred to as 'NFA Areas,' which are listed below.

- Skeet Range MRS
- Rocket, Rifle, and Hand Grenades MRS (Area A)
- Rocket, Rifle Grenades, and Mortars MRS (Area B and Area E)
- Rockets and Rifle Grenades MRS (Area C)
- Demolition Area MRS (Area G)
- Decontamination Area East MRS (Area P East)
- Demolition Site MRS (Area L)
- Chemical Training Area MRS (Area Q)
- Hand Grenade Court (Area J)
- Gas Obstacle Course MRS (Area O)
- Decontamination Area MRS (Area P West)
- Range Complex Number 1
- Infiltration Range (Area H East PAOI)
- Infiltration Range (Area H West PAIO)
- Gas Chambers (Area N PAOI)
- West - Small Landfill (Area R PAOI)
- West - Large Landfill (Area R PAOI)
- Hazardous, Toxic, and Radioactive Waste (HTRW PAOI)
- All Other Lands (Area S PAOI)

Investigation at the Rockets, Rifle Grenades and Mortars Area (Area B Northeast), Rockets and Rifle Grenades Area (Area C West), Rockets and Rifle Grenades Area (Area C Northeast), Mines South Area (Area F South), and Range Complex Number 1 Transition Range and Known Distance Ranges South could not be completed due to unsuccessful attempts at securing a right-of-entry (ROE) (**Figure 2**). If/when ROE is obtained, work may recommence on the site.

Documents pertaining to the MRSs and PAOIs, including this PP, are available for public review in the CEMR information repositories. The information repositories are located at the Western Illinois University Library – Special Collections Department, in Macomb, Illinois; at the Easley Museum in Ipava, Illinois; and at the USACE – Louisville District in Louisville, Kentucky.

USACE will host a public meeting on April 26, 2016, to discuss the **preferred alternatives** presented in this PP for the NFA Areas, Aircraft Bombing Area - Area D, Obstacle Area - Area M, East Landfill - Area R, and WWTP - Sludge Digesters. The public is invited to review all alternatives and comment on the plan from April 13, 2016, through May 16, 2016. After evaluating public comments, USACE will finalize the preferred remedial action or select another remedial action based on new information or public comments. The final selection, public comments, and comment responses will be documented in the **Decision Document** (DD).

2 Former CEMR History

Starting in April 1943, Camp Ellis was used for basic training and advanced unit training of engineer, medical, and signal corps, as well as quartermaster troops, totaling about 125,000 soldiers during World War II. The entire facility had over 2,300 buildings, including 1,100 barracks, a 1,500-bed hospital, heating and electrical systems, a water filtration plant, a sewage treatment plant, an air strip, maintenance shops, a warehouse area, and a prisoner of war camp. Several types of ranges and training areas were used, primarily from 1943 to 1945, for small arms and munitions such as hand grenades, rifle grenades, rockets, mortars, and mines. Bombs were dropped in one area during an aircraft demonstration in 1944. Munitions items encountered and removed from the MRSs during previous investigations included 81-millimeter (mm) mortars, practice mines, and 2.36-inch rockets. By February 1945, the installation training mission ended, and a portion of the facility was used by the Illinois Army National Guard from 1946 to 1950, primarily for rifle training and equipment storage in the vicinity of the Known Distance Ranges. Buildings were sold in 1950. CEMR property was sold back to private landowners by the end of 1955.

3 Background and Site Characteristics

This section presents the site-specific background information and a summary of previous investigations completed at the MRSs and PAOIs in this PP. The primary goal of the investigations to date at CEMR was to characterize the nature and extent of **munitions and explosives of concern** (MEC) and hazardous substances

(including **munitions constituents** [MC]); assess explosive hazards and risks to human health, safety, and the environment; and to evaluate potential remedial options pursuant to CERCLA and the NCP.

A variety of field investigation approaches and methodologies were used to achieve characterization goals at the MRSs. Geophysical surveys were performed at the MRSs to detect metallic surface and subsurface objects in the soil that may be indicative of MEC. These detections are commonly referred to as anomalies. The types of geophysical survey modes used to meet characterization goals are described below.

- **Transect-based digital geophysical mapping (DGM):** This type of survey was performed along transects (i.e., straight lines) using instrumentation that generates a visual image of metallic anomalies on the ground surface and in the subsurface. This survey mode was performed in large, open areas to evaluate anomaly densities. Anomalies identified during transect-based DGM that were indicative of MEC were selected (i.e., targets) and intrusively investigated (i.e., unearthed) to determine if the metallic anomaly was MEC, **munitions debris** (MD), range-related debris (RRD), or non-munitions related debris.
- **Transect-based analog survey** (also known as “mag and dig”): This type of survey was performed on areas that were inaccessible to DGM equipment (e.g., due to safety concerns or presence of heavy vegetation), but accessible using handheld analog equipment that generates sound to indicate metallic anomalies on the ground surface and in the subsurface. This survey mode was performed in areas with dense vegetation to evaluate anomaly densities. Anomalies identified during analog transect-based surveying were intrusively investigated as they were discovered.
- **Grid-based DGM survey:** This type of survey was performed on areas where MEC, MD, or RRD were identified. The survey was performed on square grids of approximately 100 feet by 100 feet (30 meters by 30 meters) placed in the area of interest using instrumentation that generates a visual image of metallic anomalies on the ground surface and in the subsurface. Anomalies that were indicative of MEC were selected as targets and intrusively investigated.

Approved sampling methodologies were used to determine the horizontal and vertical extent of hazardous substances meeting the characterization goals at the MRSs and PAOIs.

3.1 NFA Areas

The RI (URS 2014, 2015a) resulted in the collection, evaluation, and synthesis of a large amount of information regarding past activities at the former CEMR

including current on-site conditions with respect to the nature and extent of MEC and MC/HTRW, physical setting and land use, and MEC hazard and MC/HTRW risk assessment results. Areas with investigative results supporting a NFA recommendation in the RI (URS 2014) were collectively grouped into NFA Areas (**Figure 3**). The areas included in NFA Areas are presented in **Table 1**.

3.2 Aircraft Bombing Area - Area D

The Aircraft Bombing Area - Area D (**Figure 4**) is a MEC site occupying approximately 130 acres in the northeast quadrant of the former CEMR, bordered on the east by the Spoon River. The Aircraft Bombing Area - Area D includes the former Mines North MRS (Area F North) as described in the RI (URS 2014). Its prior military use was for aircraft bombing, strafing demonstration, and mine training. The eastern two-thirds of the Aircraft Bombing Area - Area D is cultivated, while the western one-third is comprised of hilly woodlands and brush.

Transect geophysical surveys were completed during the Engineering Evaluation/Cost Analysis (EE/CA) (Parsons 2006). Anomalies were investigated, and those identified as munitions-related were removed. Two MEC items (both 81mm mortars) were found at the surface and destroyed in place. A follow-on MEC Removal Action (RA) (Cape/EODT 2009) was completed across a 34-acre area within the MRS; no MEC items were found. No MC/HTRW sampling occurred during the EE/CA (Parsons 2006) or RA (CAPE/EODT 2009).

During the RI (URS 2014) the following were geophysically surveyed and intrusively investigated:

- approximately 3,570 feet of DGM transects,
- six 100-foot by 100-foot DGM grids,
- sixteen 50-foot by 50-foot DGM grids, and
- approximately 2,347 feet of analog transects.

Areas of high munitions anomaly density were not identified during the RI and MC was not suspected. Anomalies were investigated, and those identified as munitions-related were removed. No MEC items were identified during the RI. The RI recommended that the Aircraft Bombing Area - Area D move forward to an FS to address potential MEC.

3.3 Obstacle Area - Area M

The Obstacle Area - Area M (**Figure 5**) is a MEC site occupying approximately 108 acres south of the Spoon River in the northeast quadrant of the former CEMR, bordering the town of Bernadotte, Illinois. The northeast portion of the area is mainly level bottomland used for crops. A mixture of cropland and steep wooded slopes

occupy the remainder of the area. Its prior military use was for engineer mine training and battle demonstration.

Transect geophysical surveys were completed during the EE/CA (Parsons 2006) where ROE was obtained. Anomalies were investigated, and those identified as munitions-related were removed. Two MEC items (both M1 practice mines) were also found and destroyed in place. Pursuant to the EE/CA recommendation, a follow-on MEC RA (Cape/EODT 2009) was completed across a 5-acre area. Three MEC items were found (two M1 practice mines, one M1 fuze) and destroyed in place.

Discrete pre-detonation and post-detonation soil samples were collected at the MEC locations. Explosives were detected in a post-detonation sample at one of the MEC locations and two of these explosives (2,4,6-trinitrotoluene [TNT] and octahydro-tetranitro-1, 3, 5, 7-tetrazocine [HMX]) exceeded the Illinois Non-Tiered Approach to Corrective Action Objectives (TACO) objectives for the soil component of the groundwater exposure route for Class I and Class II groundwater classifications. Lead exceeded Class I and Class II groundwater standards in both pre-detonation and post-detonation Synthetic Precipitation Leaching Procedure samples (Cape/EODT 2009). However, no explosives were detected in soil samples re-collected in 2010 (SCS Engineers 2011).

During the RI (URS 2014) the following were geophysically surveyed and intrusively investigated:

- approximately 4,181 feet of DGM transects,
- eight 100-foot by 100-foot DGM grids,
- five 50-foot by 50-foot DGM grids,
- 2.02 acres of complete DGM coverage,
- three 50-foot by 50-foot analog grids, and
- approximately 7,759 feet of analog transects.

Anomalies were investigated, and those identified as munitions-related were removed. Three MEC items (M4 mines) were identified during the RI intrusive investigation and were destroyed on site. Soil samples collected at MEC item locations were analyzed for explosives and metals with results below human health screening values. The RI recommended that the Obstacle Area - Area M move forward to an FS to address potential MEC.

3.4 East Landfill - Area R

East Landfill - Area R (**Figure 6**) is the site of the “Old Dump and Salvage Yard” and currently consists of sloped cropland. Review of historical aerial photographs and topographical maps suggest that operations at the site were primarily surficial, with trash resulting from salvage operations potentially placed, burned, and/or disposed of in shallow trenches only 2 to 3 feet deep in a burn-and-

cover disposal operation, as was common practice at small or temporary installations.

Information gathered during the Contamination Evaluation (E&E 1990) and site visits in 1995 and 1996 indicate that the East Landfill - Area R contained two mounded areas. Cinder material and scattered discarded bottles were visible during sampling activities (E&E 1990). Debris was noted within the soil at depths ranging from 1.5 to 3.5 feet below ground surface (bgs) (E&E 1990). Two shallow subsurface soil samples were collected from these debris-occupied depths. The samples were analyzed for volatile organic compounds (VOCs), total petroleum hydrocarbons (TPH), and metals. TPH was detected at one location at 45.6 milligrams per kilogram (mg/kg) and mercury at 26.4 mg/kg, above its TACO Tier 1 Construction Worker Remediation Objective (RO). In 1995, trash was visible at the surface (USACE 1998). In 1996, after site improvements were made by the landowner (vegetation removal and grading), only cinders and broken glass remained visible at the surface (USACE 1996). The Preliminary Assessment site reconnaissance confirmed that no visual signs of the former landfill exist (Parsons 2004).

During the Site Inspection (SI) (Law 2002), a geophysical survey using EM-31 and a magnetometer was conducted, which identified anomalous areas interpreted as the lateral extent of potential buried waste. Monitoring wells were installed from 13.8 to 18.7 feet bgs. Soil and groundwater samples were collected and analyzed for VOCs, semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), metals, pesticides, and cyanide. Soil sampling depths ranged from 0 to 20 feet bgs. Traces of methylene chloride, a common laboratory contaminant, were detected in soil. Two pesticides, alpha-BHC and dieldrin were detected in soil but are commonly used in farming practices and were not considered to be associated with CEMR activity. Metals were detected in soil within naturally occurring ranges. Total metals were detected in groundwater, some above Illinois Class I groundwater standards, but the results were not confirmed by dissolved metal analyses and presumed to be related to sediment in the samples. All other analytes were not detected. Samples were not collected from within the interpreted landfill extent; therefore, the presence of buried waste, or its depth, could not be confirmed during the SI.

During the limited site investigation, completed in 2009, two downgradient monitoring wells were installed and monitored for four quarters for VOCs, SVOCs, PCBs, explosives, and metals. Lead was detected slightly above the Illinois Class I groundwater standard, but within the range of lead concentrations detected at background wells, where lead was also detected slightly above the

Illinois Class I groundwater standard. Based on the groundwater analytical results, there was no further need for sampling and the monitoring wells were abandoned in December 2008, following October 28, 2008, IEPA concurrence.

An RI Addendum (URS 2015a) was completed to collect the data necessary to adequately characterize the nature and extent of DoD related contamination associated with the Area R – East Landfill. A visual survey of approximately 32 acres identified a few debris items on the ground surface. Fifty-five test pits were completed which indicated moderate to significant debris ranging in depths from 0 to 11 feet bgs. Eighty-nine investigative soil samples were collected and analyzed for SVOCs (including polynuclear aromatic hydrocarbons [PAHs]), metals, pesticides, and pH. All analytes, except six PAHs and three metals, were below applicable screening levels. Only lead and naphthalene were retained as **chemicals of potential concern** (COPCs).

Groundwater samples from five temporary monitoring wells installed at test pit locations were collected and analyzed for SVOCs, PAHs, and metals. SVOC and PAH concentrations were below applicable screening levels. Metals were detected above screening levels, but differences between total and dissolved metals results indicated that suspended soil particles were present in the total metals samples. In order to collect an unfiltered groundwater sample less influenced by suspended soil particles, a permanent monitoring well was installed in February 2016. Analyte concentrations in groundwater collected from the permanent monitoring well did not exceed screening levels. Groundwater is not retained as a media of concern at East Landfill - Area R.

3.5 Wastewater Treatment Plant - Sludge Digesters

The WWTP consisted of treatment tanks, a pump station, two digesters, a concrete pad for sludge drying, settling ponds, and areas for land-applying dried sludge located just north of Tater Creek (**Figure 7**). The digesters are open to the environment. The diameter of each digester is about 50 feet and the interior depth below the top of the concrete wall is about 20 feet, as reported in the Archives Search Report (USACE 1998). The top of the wall above the ground surface on the outside of the digesters ranges from about 4 feet at the north side of the east digester to about 10 to 12 feet on the south side of the west digester. The bottom of the digesters is vegetated with grass; one small tree was observed growing in the east digester. The walls appear to be intact and in relatively good condition.

Previous soil and sediment/sludge sampling and analysis have not indicated the presence of contamination above background or above IEPA TACO Tier 1 residential soil

ROs with the exception of metals in sediment/sludge from the two former sludge digesters. Recreational/trespasser use of the site was noted during the site visit in 1996. It was also noted that WWTP - Sludge Digesters posed a safety hazard, since a fall into the tanks could result in a serious injury (USACE 1996). Soil sampling depths ranged from 0 to 6 feet, from the top of the sludge to the bottom of the digesters.

Additional samples were not collected during the RI (URS 2014). Metals in sediment/sludge within the concrete digester structures would not be expected to migrate to deeper subsurface soil or groundwater. The sediment/sludge samples collected inside the digesters exceeded default risk-based screening levels for metals; however, the only reasonable exposure would be for a very limited frequency and short duration. Based on the exposure frequency and duration, risk assessment protocols were not completed, but the sediment/sludge should still be addressed as part of CEMR's risk management approach. There is threat of release of hazardous substances (arsenic, lead, and mercury) associated with deterioration/integrity of concrete and weather-related events such as precipitation and freeze/thaw. In the event of release, hazardous substances would impact soil beneath the digesters. The RI recommended that WWTP - Sludge Digesters move forward to an FS to address contaminated material (sediment/sludge) that remains inside the digesters to achieve NFA for WWTP - Sludge Digesters.

A visual survey, sediment/sludge depth measurements, and additional sampling were completed during the RI Addendum (URS 2015a). Vegetation, underbrush, and small trees were observed on the bottom surface of the digesters. The depth of sludge varied from 3 to 6 feet at the west digester and 1 to 5 feet at the east digester. One composite sample was collected from each digester and analyzed for Toxicity Characteristic Leaching Procedure (TCLP) Resource Conservation and Recovery Act (RCRA) metals and total RCRA metals. Mercury was detected above the U.S. Environmental Protection Agency (USEPA) Regional Screening Level in both total composite samples. The TCLP RCRA metals were detected in the sediment/sludge samples, but did not exceed the federal TCLP limits. Therefore, the sediment/sludge within the digesters is not characteristically hazardous. Based on total metals concentrations, CERCLA reportable quantities of some metals are present.

3.6 Public Involvement

The Public Involvement Plan (URS 2012) was issued to present how the public will be informed and involved in the RI/FS process at CEMR. The USACE-Louisville District hosted a public meeting on, April 26, 2012, at the

Easley Pioneer Museum, Ipava, Illinois. The meeting agenda included an overview of the CERCLA process, ROE discussions, and the technical approach for scheduled investigative activities. Visual aids were provided to depict the location of the investigative activities and the public was encouraged to ask questions.

A fact sheet was issued to the public in November 2014. The fact sheet presented the CERCLA process and indicated that the current investigations were part of the RI/FS. The fact sheet also presented the next steps in the CERCLA process and path forward for the MRSs and PAOIs at CEMR.

4 Scope and Role of Action

Following completion of the response actions for the following areas, USACE anticipates being able to conclude its investigation and remediation of the former CEMR property where ROE has been granted by the appropriate landowners.

4.1 NFA Areas

Unacceptable risks to human health and the environment have not been identified for the NFA areas. Therefore, remedial alternatives were not developed for them.

4.2 Aircraft Bombing Area - Area D

It is anticipated that the preferred alternative, if selected, will constitute the final response action for the Aircraft Bombing Area - Area D. The overall strategy of USACE will permanently reduce the toxicity, mobility, and volume of MEC which constitutes an explosive hazard at the site.

4.3 Obstacle Area - Area M

It is anticipated that the preferred alternative, if selected, will constitute the final response action for the Obstacle Area - Area M. The overall strategy of USACE will permanently reduce the toxicity, mobility, and volume of MEC which constitutes an explosive hazard at the site.

4.4 East Landfill - Area R

It is anticipated that the preferred alternative, if selected, will constitute the final response action for the East Landfill - Area R. The overall strategy of USACE will permanently reduce the toxicity, mobility, and volume of hazardous substances contributing to human health risks at the site.

4.5 Wastewater Treatment Plant - Sludge Digesters

It is anticipated that the preferred alternative, if selected, will constitute the final response action for the WWTP -

Sludge Digesters. The overall strategy of USACE will eliminate the potential threatened release of a hazardous substance at the site.

5 Summary of Site Risks

This section presents the nature and extent of MEC, MC, and HTRW-related contamination; the potential routes of migration; results of the MEC Hazard Assessment (HA), human health risk assessment, and ecological risk assessment completed for applicable MRSs and PAOIs; and the assigned priority generated from the Munitions Response Site Prioritization Protocol (MRSP) tables, which was based on the overall condition at each MRS and the explosive safety and environmental hazards.

The former CEMR is in Fulton County, Illinois, and consisted of approximately 17,995 acres. All of the property is currently privately owned by over 100 landowners (Parsons 2006). Most of the former CEMR acreage is agricultural, with corn and soybeans the predominant crops. Some recreational hunting may also be occurring at the Aircraft Bombing Area - Area D and the Obstacle Area - Area M. The eastern two-thirds of the Aircraft Bombing Area - Area D is cultivated, while the western one-third is comprised of hilly woodlands and brush. The northeast portion of the Obstacle Area - Area M is mainly level bottomland used as cropland. A mixture of cropland and steep wooded slopes occupy the remainder of the area. There are a few residential homes on the former CEMR, although the future land use is not expected to change significantly. **Human receptors** include residents, site workers (farmers, ranchers), construction workers, and recreational users/trespassers (hunters). Only non-cropland has potentially viable ecological habitat and **ecological receptors**.

5.1 NFA Areas

No unacceptable risks to human health and the environment were identified for the NFA areas. Based on geophysical surveys, if no MEC or munitions anomaly sources were identified, there were no sources of MC; therefore, exposure pathways were considered incomplete for both human and ecological receptors. In areas where analytical data were collected, constituent concentrations were representative of background concentrations or were within acceptable risk levels for residential (unrestricted) use. Similarly, no ecological risks were predicted based on either the absence of suitable habitat (therefore, exposure pathway incomplete), or if habitat was present, then exposure concentrations were below levels posing potential adverse effects to ecological receptors.

5.2 Aircraft Bombing Area - Area D

This subsection presents a summary of site risks associated with Aircraft Bombing Area - Area D.

5.2.1 Nature and Extent of Contamination

A total of two MEC items (fuzed 81mm mortars) and 40 MD items have been identified on the surface and in the subsurface within and adjacent to the Aircraft Bombing Area - Area D. All MRS-related MEC and MD were recovered within the top 24 inches of soil at the Aircraft Bombing Area - Area D. The MD items consisted primarily of bomb fragments but also included fragments of mortar rounds and expended projectiles. Munitions items were found within, directly east, and directly west of the area addressed by the RA (Cape/EODT 2009). While items identified as fragments were found during the EE/CA (Parsons 2006) in the non-cultivated, low-lying area in the eastern portion of the MRS, similar items were not found during the RI (URS 2014). Based on the RI findings (**Figure 8**), the probability of MEC being present in the eastern non-cultivated portion or southwestern corner of the MRS is low. However, the potential for MEC remains, although no MEC was found, for the area not addressed by the RA (Cape/EODT 2009).

Areas of high munitions anomaly density were not identified during the RI (URS 2014); therefore, soil samples were not collected. Based on limited past operational use, previously completed response actions, and limited MEC and MD found, significant MC is not suspected.

5.2.2 Contaminant Fate and Transport

Potential MEC in subsurface soil may migrate to the surface due to natural physical processes (soil erosion and frost heave) or be uncovered by certain activities (tilling and digging) creating a potential for interaction with human receptors. Significant migration of potential MEC is not anticipated.

5.2.3 Risk Characterization

Based on previous investigations and the RI (URS 2014) findings, a potential exposure pathway exists for MEC in surface and subsurface soils. The MEC HA enables an evaluation of potential explosive hazards at an MRS. There are four Hazard Level Categories, with 1 being the highest level of hazard and 4 being the lowest level. The Aircraft Bombing Area - Area D was assigned a MEC HA score of 895, which corresponds to a MEC Hazard Level of 1. Potential unacceptable human health and ecological risk due to MC have not been identified because significant MC was not found and is not suspected.

It is USACE's current judgment that the preferred alternative identified in this PP or one of the other active

measures considered for the Aircraft Bombing Area - Area D, is necessary to protect public health, welfare, or the environment from actual or threatened release of MEC into the environment.

5.2.4 MRSPP

In 2005, DoD published the MRSPP as a Federal Rule (32 Code of Federal Regulations [CFR] Part 179) to assign a relative priority to each defense site in the Military Munitions Response Program Inventory for response activities. MRSs are assigned an MRSPP Priority ranging from 1 to 8. Priority 1 indicates the highest potential hazard and Priority 8 indicates the lowest potential hazard.

The overall MRSPP score for the Aircraft Bombing Area - Area D is 3 based on historical documentation of the site being used as a bombing area and on the identification of MEC (81mm mortars) during the EE/CA (Parsons 2006).

5.3 Obstacle Area - Area M

This subsection presents a summary of site risks associated with Obstacle Area - Area M.

5.3.1 Nature and Extent of Contamination

A total of eight MEC items were identified on the surface and in the subsurface during previous investigations; two during the EE/CA (Parsons 2006), three during the RA (Cape/EODT 2009), and three during the RI (URS 2014) (**Figure 9**). All MRS-related MEC and MD were recovered within the top 36 inches of soil at the Obstacle Area - Area M. The MEC was not localized in one area of the MRS. During the RI, subsurface soil samples were collected at identified MEC locations; all explosives results were nondetect, and copper, lead, and zinc were below human health screening levels. Based on limited past operational use, previously completed response actions, and limited MEC and MD found, significant MC is not suspected.

5.3.2 Contaminant Fate and Transport

Potential MEC in subsurface soil may migrate to the surface due to natural physical processes (soil erosion and frost heave) or be uncovered by certain activities (tilling and digging) creating a potential for interaction with human receptors. Significant migration of potential MEC is not anticipated.

5.3.3 Risk Characterization

Based on previous investigations and the RI (URS 2014) findings, a potential exposure pathway exists for MEC in surface and subsurface soils. The Obstacle Area - Area

M was assigned a MEC HA score of 535, which corresponds to a MEC Hazard Level of 3. Potential unacceptable human health and ecological risk due to MC have not been identified because significant MC was not found and is not suspected.

It is USACE's current judgment that the preferred alternative identified in this PP or one of the other active measures considered for the Obstacle Area - Area M, is necessary to protect public health, welfare, or the environment from actual or threatened release of MEC into the environment.

5.3.4 MRSPP

The overall MRSPP score for the Obstacle Area - Area M is 3 based on historical documentation of the site being used as a mine training area with active fuzes and on the identification of MEC during the EE/CA (Parsons 2006), RA (Cape/EODT 2009), and RI (URS 2014).

5.4 East Landfill - Area R

This subsection presents a summary of site risks associated with East Landfill - Area R.

5.4.1 Nature and Extent of Contamination

Debris was encountered in test pits during the RI Addendum (URS 2015a) between 0 and 11 feet bgs. The extent of the debris is shown on **Figure 10** with test pits shown in white (minimal debris), yellow (moderate debris), or orange (significant debris). The highest contaminant concentrations in soil at the East Landfill - Area R coincide with samples collected from soil intervals with moderate or significant debris (**Figure 11**). Concentrations of PAHs in soil exceeded residential screening levels at locations extending to less than 100 feet from the test pits with moderate to significant debris. PAH exceedances in surface soil at Test Pits #30 and #32 could be related to anthropogenic activities (e.g., vehicle exhaust) from North Camp Road. Mercury concentrations did not exceed residential screening levels (10 mg/kg); however, screening levels for the construction worker (inhalation; 0.1 mg/kg) are more conservative than those for a residential scenario. Exceedances for the construction worker (inhalation) coincide with areas of moderate to significant debris; however, there are a few low level exceedances outside the areas of debris. Groundwater at all five temporary wells had total metals exceedances above the Illinois Class I groundwater standards. Groundwater from the permanent monitoring well did not exceed the Illinois Class I or Class II groundwater standard.

5.4.2 Contaminant Fate and Transport

PAH and metals contamination above the residential human health screening levels were in areas with moderate to significant debris. PAH and metals contamination appears to be localized with areas of moderate to significant debris. Groundwater within the area of debris contains metals (e.g., arsenic, cadmium, lead, and mercury) above residential human health screening levels, but the totals versus dissolved metals results indicate that most of the contamination is in the solids. Typically, metals in soil form reaction products that become incorporated into soil minerals, precipitate as oxides or hydroxides, or form coatings on minerals (ORNL 1989). These forms of metals have low mobility in soils. The inherent insolubility of metals coupled with their related high soil/water partition coefficients, indicate that the metals would be relatively immobile in soil.

5.4.3 Risk Characterization

Recreational users and site workers were evaluated for exposure to surface soils. COPCs identified in surface soils of the East Landfill - Area R were carcinogenic PAHs (cPAHs) and arsenic. The maximum arsenic detection was marginally above the site-specific background concentration for soils from 0-0.5 feet bgs, but below the site-specific background concentrations for soils from 0-2 feet bgs. Arsenic was not recommended for further evaluation because it appears generally consistent with site-specific background concentrations. Maximum potential risks associated with cPAHs were $3E-06$ for recreational users, which is within the acceptable lifetime incremental cancer risk range of $1E-06$ to $1E-04$. Risks calculated for site workers were less than $1E-06$.

Resident and construction (intrusive) workers were assumed to be exposed to both surface and subsurface soils. Therefore, surface and subsurface soils were grouped together to evaluate residents and construction workers. cPAHs, naphthalene, arsenic, and lead were identified as COPCs (**Figure 12**). For the resident scenario, East Landfill - Area R was divided into three exposure areas (northern exposure area, southern exposure area, and the area outside the northern and southern exposure areas). In the southern and northern exposure areas, the maximum cumulative carcinogenic risks were estimated at $2E-05$ (taking background arsenic into consideration). A hazard index of 0.4 was calculated. Lead is a **chemical of concern (COC)** for the southern exposure area. Outside the southern and northern exposure areas, arsenic, lead, and naphthalene were below residential screening levels. cPAHs marginally exceeded the Illinois TACO Tier 1 residential

RO with a relative risk level of $1E-06$. Furthermore, only one of the fifty-six samples exceeded the residential screening levels for cPAHs (as represented by benzo[a]pyrene equivalents).

Mercury in the East Landfill - Area R exceeded the screening level (inhalation) for the construction worker. The screening level is a TACO Tier 1 RO based on the presence of elemental mercury. However, most of the mercury encountered in water/soil/sediments/biota (all environmental media except the atmosphere) is in the form of inorganic mercuric salts and organomercurics (USEPA 1997). Renneberg and Dudas (2001) found that decades after a spill of elemental mercury, the mercury had transformed and was predominantly associated with soil organic matter and, to a lesser extent, the mineral fraction of soil. As a result, it is unlikely that mercury detected at the East Landfill - Area R is elemental mercury; therefore, mercury is not considered a COC.

In groundwater from temporary wells, total arsenic, total cadmium, total lead, and total mercury exceeded Illinois Class I groundwater standards. In temporary well samples, total lead also exceeded the Illinois Class II groundwater standard. Historically, samples collected from permanent wells at CEMR have similar total metals and dissolved metals concentrations (CH2M Hill 2009). However, it is apparent from the dissolved metals analyses that the total metals results from the temporary wells are highly influenced by suspended particulates (URS 2015a). Given the findings at another CEMR site (URS 2016) and the similar lithology encountered, the groundwater encountered in the vicinity of East Landfill - Area R should be classified as Class II, General Resource. Lead in groundwater from the permanent well did not exceed either the Illinois Class I or Class II groundwater standard. Thus, lead is not a concern in groundwater at the East Landfill - Area R (URS 2015a).

East Landfill - Area R was evaluated for the presence or absence of potential ecological habitat. The site is in a cultivated area which is not considered viable habitat and was not evaluated further for ecological risk (URS 2015a).

It is USACE's current judgment that the preferred alternative identified in this PP for the East Landfill - Area R, is necessary to protect public health, welfare, or the environment from actual or threatened release of hazardous substances into the environment.

5.5 Wastewater Treatment Plant-Sludge Digesters

This subsection presents a summary of site risks associated with WWTP - Sludge Digesters.

5.5.1 Nature and Extent of Contamination

Except for the sludge digesters, no contamination is suspected (**Figure 13**) at the WWTP. During the SI (Law 2002), metals were detected in sediment/sludge samples collected at the bottom of each of two former sludge digesters. Arsenic, lead, and mercury concentrations in the sediment/sludge were above background and TACO Tier 1 residential soil ROs. Mercury concentrations were also above TACO Tier 1 industrial and commercial ROs. Based on TCLP metals results, the sediment/sludge within the digesters is not characteristically hazardous.

5.5.2 Contaminant Fate and Transport

Metals in sediment/sludge within the concrete digester structures would not be expected to migrate to deeper subsurface soil or groundwater due to the concrete bottom. There is threat of release of hazardous substances associated with deterioration and integrity of concrete, weather-related events such as precipitation, and freeze/thaw. The current land use is agricultural with potential interaction with site worker or trespasser receptors.

5.5.3 Risk Characterization

While metals in residual sediment/sludge samples collected inside the digesters exceeded default risk-based screening levels, the inherent assumptions on which the screening levels are based do not apply to the media evaluated (i.e., below-grade residual sludge, not surface or subsurface soil). A reasonable exposure scenario would include a very short duration with low frequency. This type of scenario is not applicable to the standard risk assessment protocols. However, the sediment/sludge should still be addressed as part of a risk management approach because metals concentrations support the presence of hazardous substances above CERCLA reportable quantities.

An ecological risk assessment was not completed because there is no viable habitat for ecological receptors (URS 2014). No species on the state or federal threatened and endangered species list have been reported as present on or near the former CEMR.

It is USACE's current judgment that the preferred alternative identified in this PP for the WWTP - Sludge Digesters, is necessary to protect public health, welfare, or the environment from actual or threatened release of hazardous substances into the environment.

6 Remedial Action Objectives

Remedial Action Objectives (RAOs) are site-specific goals for protecting human health and the environment that specify contaminants and media of interest, exposure pathways, and Preliminary Remediation Goals (PRGs). The MEC RAOs are also site-specific goals for addressing explosive safety hazards. PRGs are developed on the basis of chemical-specific risk factors and are typically refined at the conclusion of the alternative selection process, becoming remediation goals.

6.1 NFA Areas

Analytical data generated during historical investigations reported maximum sample concentrations below human health and ecological screening criteria, indicating that risk was acceptable, and RAOs were not required for protection of human and ecological receptors. Based on these findings, RAOs were not developed for the NFA Areas.

6.2 Aircraft Bombing Area - Area D

Development of RAOs focused on addressing the physical hazards of the presence of MEC. In order to identify RAOs, the following risk management principles were considered:

- Reducing the quantity of MEC lowers risk.
- Reducing the number of receptors lowers risk.
- Reducing the potential for interaction between receptors and MEC lowers risk.
- Modifying or controlling the behavior of receptors lowers risk.

The RAO for the Aircraft Bombing Area - Area D is:

- Reduce potential explosive safety hazards by preventing interaction between receptors and MEC on the surface and in the subsurface (to a minimum depth of 36 inches bgs) during residential, recreational, and agricultural activities.

The MEC hazard can be mitigated by reducing the potential for direct contact through land use controls (LUCs) or the removal of MEC items.

6.3 Obstacle Area - Area M

Development of RAOs focused on addressing the physical hazards of the presence of MEC. In order to identify RAOs, the following risk management principles were considered:

- Reducing the quantity of MEC lowers risk.
- Reducing the number of receptors lowers risk.
- Reducing the potential for interaction between receptors and MEC lowers risk.
- Modifying or controlling the behavior of receptors lowers risk.

The RAO for the Obstacle Area - Area M is:

- Reduce potential explosive safety hazards by preventing interaction between receptors and MEC on the surface and in the subsurface (to a minimum depth of 48 inches bgs) during residential, recreational, and agricultural activities.

The MEC hazard can be mitigated by reducing the potential for direct contact through LUCs or the removal of MEC items.

6.4 East Landfill - Area R

Development of RAOs focused on addressing the lead- and naphthalene-contaminated subsurface soil. The RAOs for the East Landfill – Area R are:

- Minimize human ingestion of, or contact with, subsurface soil having a concentration of lead exceeding 400 mg/kg, in representative exposure areas.
- Minimize human ingestion of, or contact with, subsurface soil having a concentration of naphthalene exceeding 1.8 mg/kg, in representative exposure areas.

The HTRW hazard to nearby soil can be eliminated by removing the source.

6.5 Wastewater Treatment Plant - Sludge Digesters

Development of RAOs focused on addressing the contaminated sediment/sludge. The RAO for the WWTP - Sludge Digesters is:

- Eliminate potential unacceptable release of hazardous substances (lead, arsenic, and mercury) from the digesters to nearby soil and groundwater resources that may be contacted or ingested by humans.

The HTRW hazard to nearby soil and groundwater can be eliminated by removing the source.

7 Summary of Aircraft Bombing Area - Area D Remedial Alternatives

This section presents the four remedial action alternatives developed to address MEC at the Aircraft Bombing Area - Area D.

7.1 Alternative 1 - No Action

Estimated Capital Cost: \$0

Estimated Operation & Maintenance (O&M)/Periodic Cost: \$0

Estimated Alternative Cost: \$0

Estimated Present Value: \$0

Estimated Time to Achieve RAOs: None

Alternative 1 is the No Action alternative and carried forward to represent the current existing condition at the site. This alternative is required by the NCP for baseline comparison purposes (40 CFR 300.430[e][6]). Under this alternative, no action would be taken to reduce the potential MEC risk to a potential receptor. No administrative or physical LUCs would be implemented. This alternative has no capital or O&M/Periodic costs.

7.2 Alternative 2 - Land Use Controls

Estimated Capital Cost: \$137,350

Estimated O&M/Periodic Cost: \$200,983

Estimated Alternative Cost: \$338,333

Estimated Present Value: \$288,139

Estimated Time to Achieve RAOs: Indefinite

Alternative 2 develops and maintains LUCs. LUCs would consist of an educational awareness program, signage, and regular inspections to protect human health by reducing the exposure to MEC. This remedial action alternative would not allow unlimited use/unrestricted exposure (UU/UE).

The educational awareness program would be primarily concerned with **unexploded ordnance (UXO)** safety and will be designed to educate the affected landowners about the potential hazards associated with UXO. The affected landowners would be provided educational and outreach resources as well as guidance on what to do if UXO is encountered. The Army's UXO Safety program would be used as a supplement to the educational awareness program.

Signage would be placed around the entire perimeter of the Aircraft Bombing Area - Area D to prevent inadvertent site access and to warn site receptors of the potential MEC risks. The perimeter of the Aircraft Bombing Area - Area D is approximately 12,189 linear feet. Signs would be installed on access roads and every 500 feet around the entire perimeter. Signs would be installed by construction workers supported by UXO personnel providing escort and anomaly avoidance.

Regular inspections would occur every five years and would be scheduled to occur prior to the five-year review. While not part of the alternative, five-year reviews would be required to evaluate the continued effectiveness and permanence of this alternative and will continue as long as MEC remains in place. The total estimated duration of this alternative is indefinite, for as long as MEC remains in place and precludes UU/UE. The duration of 30 years was used to develop the cost estimate and to support the alternatives cost comparison.

7.3 Alternative 3 - MEC Surface Clearance and Land Use Controls

Estimated Capital Cost: \$568,248

Estimated O&M/Periodic Cost: \$200,983

Estimated Alternative Cost: \$769,232

Estimated Present Value: \$719,037

Estimated Time to Achieve RAOs: Indefinite

Alternative 3 includes a complete MEC surface clearance of the Aircraft Bombing Area - Area D, in addition to the LUCs and signage components in Alternative 2. The MEC surface clearance would involve removal and disposal of MEC and **material potentially presenting an explosive hazard** (MPPEH) located on the surface of the MRS. The RI (URS 2014) concluded a potential exists for MEC to be present at the MRS. This alternative would reduce the risk of a casual receptor encountering MEC by significantly reducing explosives safety hazards associated with potential MEC located on the surface, but Alternative 3 would not address subsurface MEC or the potential for MEC to migrate from the subsurface to the surface through erosion, agricultural tilling, and/or frost heave. Farming cultivates soil to a typical depth of about 12 inches bgs. According to the RI, the depth of the frost line for the former CEMR is 25 to 30 inches. Significant movement of MEC is not anticipated; however, with the potential for subsurface MEC, LUCs described in Alternative 2 are included in this alternative in conjunction with the MEC surface clearance activities.

A MEC surface clearance would be conducted at the MRS by qualified UXO technicians using hand-held detection technology (e.g., magnetometer or all metals detector). A typical MEC surface clearance would involve partitioning the MRS into 100-foot by 100-foot grids and placing survey grid stakes at each grid corner. A systematic surface sweep of each grid would be conducted to remove all MEC and MPPEH from the grids. The surface clearance would be completed around existing vegetation. The UXO team composition would include a Senior UXO Supervisor (SUXOS) responsible for planning and directing removal operations, a UXO Quality Control Specialist (UXOQCS) and a UXO Safety Officer (UXOSO) to ensure the action is safely conducted with industry standard quality, and a UXO Technician III to lead and supervise the clearance team comprised of UXO Technician IIs and Is. It was assumed that a minimum of one MPPEH item per acre will be identified during the surface clearance at the MRS. A total of 130 MPPEH items are estimated for the Aircraft Bombing Area - Area D, which is approximately 130 acres.

Recovered MPPEH items would be subjected to an MPPEH inspection process in accordance with an approved Explosives Safety Submission (ESS), USACE Engineer Manual (EM) 385-1-97 (USACE 2008),

Department of Defense Instruction (DoDI) 4140.62 (DoD 2014), and USACE EM 1110-1- 4009 (USACE 2007), or other relevant and timely guidance. MPPEH would be inspected by a UXO Technician III and SUXOS to determine the explosive hazard and appropriate demolition method. MEC that is unacceptable to move would be blown-in-place (BIP) and MEC that is determined acceptable to move would be consolidated by qualified UXO personnel for later disposal in a consolidated shot. MPPEH certified as material documented as safe (MDAS) would be reclassified and segregated into MD, RRD, or other debris and disposed of at a local landfill or recycler, as appropriate. The total estimated duration of this alternative is indefinite, for as long as MEC remains in place and precludes UU/UE. The duration of 30 years was used to develop the cost estimate and to support the alternatives cost comparison.

7.4 Alternative 4 - MEC Surface Clearance and MEC Subsurface Clearance to Depth of Contamination

Estimated Capital Cost: \$2,114,891

Estimated O&M/Periodic Cost: \$0

Estimated Alternative Cost: \$2,114,891

Estimated Present Value: \$2,114,891

Estimated Time to Achieve RAOs: 1 year

Alternative 4 includes a MEC subsurface clearance to depth of contamination, in addition to the MEC surface clearance described in Alternative 3. The alternative would include removal and disposal of subsurface MEC and MPPEH located from the surface to the depth of contamination plus a safety buffer. All MRS-related MEC and MD identified to date were recovered within the top 24 inches of soil at the Aircraft Bombing Area - Area D. The MEC subsurface clearance at the Aircraft Bombing Area - Area D would proceed to a depth of 24 inches plus a 12 inch safety buffer for a total of 36 inches bgs. This alternative represents the most significant reduction of explosives safety hazards associated with MEC at the MRS. The MEC subsurface clearance to the depth of MEC contamination would be conducted following the completion of the MEC surface clearance, as described in Alternative 3. This alternative would achieve UU/UE and would not require five-year reviews.

A MEC subsurface clearance would be completed at the MRS by qualified UXO technicians. A typical MEC clearance involves acquiring targets, removing targets, and resolving target locations. Similar to a MEC surface clearance, completing a MEC subsurface clearance typically requires a SUXOS responsible for planning and directing MEC operations; a UXOSO to ensure that work is performed safely; a UXOQCS to ensure the work is performed in accordance with rules, regulations, and

planning documents; and UXO technicians. Based on the DGM data collected during the RI (URS 2014), it was estimated that 4,550 subsurface anomalies would be intrusively investigated at the Aircraft Bombing Area - Area D.

As for the MEC surface and subsurface clearance, recovered MPPEH items would be subjected to an MPPEH inspection process in accordance with an approved ESS, USACE EM 385-1-97 (USACE 2008), DoDI 4140.62 (DoD 2014), and USACE EM 1110-1-4009 (USACE 2007), or other relevant and timely guidance. MPPEH would be inspected by a UXO Technician III and SUXOS to determine the explosive hazard and appropriate demolition method. MEC that is unacceptable to move would be BIP and MEC that is determined acceptable to move would be consolidated by qualified UXO personnel for later disposal in a consolidated shot. MPPEH certified as MDAS would be reclassified and segregated into MD, RRD, or other debris and disposed of at a local landfill or recycler, as appropriate. The total estimated duration of this alternative is one year.

8 Summary of Obstacle Area - Area M Remedial Alternatives

This section presents the four remedial action alternatives developed to address MEC at the Obstacle Area - Area M.

8.1 Alternative 1 - No Action

Estimated Capital Cost: \$0
Estimated O&M/Periodic Cost: \$0
Estimated Alternative Cost: \$0
Estimated Present Value: \$0
Estimated Time to Achieve RAOs: None

Alternative 1 is the No Action alternative and carried forward to represent the current existing condition at the site. This alternative is required by the NCP for baseline comparison purposes (40 CFR 300.430[e][6]). Under this alternative, no action would be taken to reduce the potential MEC risk to a potential receptor. No administrative or physical LUCs would be implemented. This alternative has no capital or O&M/Periodic costs.

8.2 Alternative 2 - Land Use Controls

Estimated Capital Cost: \$133,004
Estimated O&M/Periodic Cost: \$200,983
Estimated Alternative Cost: \$333,987
Estimated Present Value: \$283,793
Estimated Time to Achieve RAOs: Indefinite

Alternative 2 develops and maintains LUCs. LUCs would consist of an educational awareness program,

signage, and regular inspections to protect human health by reducing the exposure to MEC. This remedial action alternative would not allow UU/UE.

The educational awareness program would be primarily concerned with UXO safety and will be designed to educate the affected landowners about the potential hazards associated with UXO. The affected landowners would be provided educational and outreach resources as well as guidance on what to do if UXO is encountered. The Army's UXO Safety program would be used as a supplement to the educational awareness program.

Signage would be placed around the entire perimeter of the Obstacle Area - Area M to prevent inadvertent site access and to warn site receptors of the potential MEC risks. The perimeter of the Obstacle Area - Area M is 8,377 linear feet. Signs would be installed on access roads and every 500 feet around the entire perimeter. Signs would be installed by construction workers supported by UXO personnel providing escort and anomaly avoidance.

Regular inspections would occur every five years and would be scheduled to occur prior to the five-year review. While not part of the alternative, five-year reviews would be required to evaluate the continued effectiveness and permanence of this alternative and will continue as long as MEC remains in place. The total estimated duration of this alternative is indefinite, for as long as MEC remains in place and precludes UU/UE. The duration of 30 years was used to develop the cost estimate and to support the alternatives cost comparison.

8.3 Alternative 3 - MEC Surface Clearance and Land Use Controls

Estimated Capital Cost: \$514,741
Estimated O&M/Periodic Cost: \$200,983
Estimated Alternative Cost: \$715,725
Estimated Present Value: \$665,530
Estimated Time to Achieve RAOs: Indefinite

Alternative 3 includes a complete MEC surface clearance of the Obstacle Area - Area M, in addition to the LUCs and signage components in Alternative 2. The MEC surface clearance would involve removal and disposal of MEC and MPPEH located on the surface of the MRS. The RI (URS 2014) concluded a potential exists for MEC to be present at the MRS. This alternative would reduce the risk of a casual receptor encountering MEC by significantly reducing explosives safety hazards associated with potential MEC located on the surface, but Alternative 3 would not address subsurface MEC or the potential for MEC to migrate from the subsurface to the surface through erosion, agricultural tilling, and/or frost heave. Farming cultivates soil to a typical depth of about

12 inches bgs. According to the RI, the depth of the frost line for former CEMR is 25 to 30 inches. Significant movement of MEC is not anticipated; however, with the potential for subsurface MEC, LUCs described in Alternative 2 are included in this alternative in conjunction with the MEC surface clearance activities.

A MEC surface clearance would be conducted at the MRS by qualified UXO technicians using hand-held detection technology (e.g., magnetometer or all metals detector). A typical MEC surface clearance would involve partitioning the MRS into 100-foot by 100-foot grids and placing survey grid stakes at each grid corner. A systematic surface sweep of each grid would be conducted to remove all MEC and MPPEH from the grids. The surface clearance would be completed around existing vegetation. The UXO team composition would include a SUXOS responsible for planning and directing removal operations, a UXOQCS and a UXOSO to ensure the action is safely conducted with industry standard quality, and a UXO Technician III to lead and supervise the clearance team comprised of UXO Technician IIs and Is. It was assumed that a minimum of one MPPEH item per acre will be identified during the surface clearance at the MRS. A total of 108 MPPEH items are estimated for the Obstacle Area - Area M, which is approximately 108 acres.

Recovered MPPEH items would be subjected to an MPPEH inspection process in accordance with an approved ESS, USACE EM 385-1-97 (USACE 2008), DoDI 4140.62 (DoD 2014), and USACE EM 1110-1-4009 (USACE 2007), or other relevant and timely guidance. MPPEH would be inspected by a UXO Technician III and SUXOS to determine the explosive hazard and appropriate demolition method. MEC that is unacceptable to move would be BIP and MEC that is determined acceptable to move would be consolidated by qualified UXO personnel for later disposal in a consolidated shot. MPPEH certified as MDAS would be reclassified and segregated into MD, RRD, or other debris and disposed of at a local landfill or recycler, as appropriate. The total estimated duration of this alternative is indefinite, for as long as MEC remains in place and precludes UU/UE. The duration of 30 years was used to develop the cost estimate and to support the alternatives cost comparison.

8.4 Alternative 4 - MEC Surface Clearance and MEC Subsurface Clearance to Depth of Contamination

Estimated Capital Cost: \$1,871,458

Estimated O&M/Periodic Cost: \$0

Estimated Alternative Cost: \$1,871,458

Estimated Present Value: \$1,871,458

Estimated Time to Achieve RAOs: 1 year

Alternative 4 includes a MEC subsurface clearance to depth of contamination, in addition to the MEC surface clearance described in Alternative 3. The alternative would include removal and disposal of subsurface MEC and MPPEH located from the surface to the depth of contamination plus a safety buffer. All MRS-related MEC and MD identified to date were recovered within the top 36 inches of soil at the Obstacle Area - Area M. The MEC subsurface clearance at the Obstacle Area - Area M would proceed to a depth of 36 inches plus a 12 inch safety buffer for a total of 48 inches bgs. This alternative represents the most significant reduction of explosives safety hazards associated with MEC at the MRS. The MEC subsurface clearance to the depth of MEC contamination would be conducted following the completion of the MEC surface clearance, as described in Alternative 3. This alternative would achieve UU/UE and would not require five-year reviews.

A MEC subsurface clearance would be completed at the MRS by qualified UXO technicians. A typical MEC clearance involves acquiring targets, removing targets, and resolving target locations. Similar to a MEC surface clearance, completing a MEC subsurface clearance typically requires a SUXOS responsible for planning and directing MEC operations; a UXOSO to ensure that work is performed safely; a UXOQCS to ensure the work is performed in accordance with rules, regulations, and planning documents; and UXO technicians. Based on the DGM data collected during the RI (URS 2014), a total of 4,110 subsurface anomalies were estimated at the Obstacle Area - Area M.

As for the MEC surface and subsurface clearance, recovered MPPEH items would be subjected to an MPPEH inspection process in accordance with an approved ESS, USACE EM 385-1-97 (USACE 2008), DoDI 4140.62 (DoD 2014), and USACE EM 1110-1-4009 (USACE 2007), or other relevant and timely guidance. MPPEH would be inspected by a UXO Technician III and SUXOS to determine the explosive hazard and appropriate demolition method. MEC that is unacceptable to move would be BIP and MEC that is determined acceptable to move would be consolidated by qualified UXO personnel for later disposal in a consolidated shot. MPPEH certified as MDAS would be reclassified and segregated into MD, RRD, or other debris and disposed of at a local landfill or recycler, as appropriate. The total estimated duration of this alternative is one year.

9 Summary of East Landfill - Area R Remedial Alternatives

This section presents the three remedial action alternatives developed to address lead- and naphthalene-contaminated subsurface soil at the East Landfill - Area R.

9.1 Alternative 1 - No Action

Estimated Capital Cost: \$0

Estimated O&M/Periodic Cost: \$0

Estimated Present Value: \$0

Estimated Alternative Cost: \$0

Estimated Time to Achieve RAOs: None

Alternative 1 is the No Action alternative and carried forward to represent the current existing condition at the site. This alternative is required by the NCP for baseline comparison purposes (40 CFR 300.430[e][6]). Under this alternative, no action would be taken at the site. No administrative or physical LUCs would be implemented. This alternative has no capital or O&M/Periodic costs.

9.2 Alternative 2 - Land Use Controls

Estimated Capital Cost: \$42,049

Estimated O&M/Periodic Cost: \$552,611

Estimated Alternative Cost: \$594,661

Estimated Present Value: \$486,497

Estimated Time to Achieve RAOs : Indefinite

Alternative 2 would involve (with the property owner's agreement) the development and maintenance of LUCs for the East Landfill - Area R. LUCs would consist of legal mechanisms, signage, and regular inspections to protect human health and limit exposure to contaminants. LUCs could be adopted for these properties using Illinois' Uniform Environmental Covenants Act (UECA). Use of UECA would afford IEPA a durable mechanism to enforce LUC provisions. This remedial action alternative would not allow UU/UE.

Legal mechanisms would include implementing restrictions on land use in the contaminated areas and preventing displacement or use of contaminated soil to minimize access and exposure to contaminants by site receptors. Controls would be maintained, as needed. Based on the RI Addendum (URS 2015a) and prior investigations, migration of contaminants from soil to groundwater is not anticipated, and groundwater COPCs have not been identified; therefore, LUCs for groundwater use are not expected.

Signage would be placed around the entire perimeter of the East Landfill - Area R to inform site receptors of the potential environmental risks. Signs would be installed

on access roads and every 500 feet around the entire perimeter of the site.

Regular inspections would occur every five years and would be scheduled to occur prior to the five-year review. While not part of the alternative, five-year reviews would be required to evaluate the continued effectiveness and permanence of this alternative and will continue as long as hazardous substances, pollutants, or contaminants remain in place above levels that allow for UU/UE. The total estimated duration of this alternative is indefinite, for as long as contamination remains in place and precludes UU/UE. The duration of 30 years was used to develop the cost estimate and to support the alternatives cost comparison..

9.3 Alternative 3 - Excavation/Off-Site Disposal

Estimated Capital Cost: \$3,981,014

Estimated O&M/Periodic Cost: \$0

Estimated Alternative Cost: \$3,981,014

Estimated Present Value: \$3,981,014

Estimated Time to Achieve RAOs: 1 year

Alternative 3 includes excavation and off-site disposal of lead- and naphthalene-contaminated subsurface soil with chemical concentrations above the RAO remediation goals. This alternative would achieve UU/UE.

Based on the lateral and vertical extent of concentrations exceeding the RAO remediation goals during the RI Addendum (URS 2015a), the initial estimate of contaminated soil to be stabilized and removed (minus any overlap) is 9,678 bank cubic yards (BCY). The excavation areas address Test Pits 7, 9, 10, 16, and 33, which are shown on **Figure 14**. The initial estimate used 1/4-acre excavation areas centered on each test pit (minus areas that overlap) with lead and naphthalene contamination in subsurface soil that exceeded RI Addendum (URS 2015a) screening levels. The vertical extent is based on the interval between sample depth locations at each test pit that vertically delineated lead and naphthalene contamination above RI Addendum (URS 2015a) screening levels. The vertical extent includes the following intervals:

- Test Pit 7: 0.5 – 5.0 feet bgs
- Test Pit 9: 0.5 – 6.5 feet bgs
- Test Pit 10: 0.5 – 4.5 feet bgs
- Test Pit 16: 0.5 – 7.5 feet bgs
- Test Pit 33: 0.0 – 7.5 feet bgs

Pre-design sampling would be completed at each excavation area at the surface, within the debris, and below the debris prior to determine if risks to human receptors exist. The final estimate of contaminated soil to

be stabilized and removed would be determined after completion of the pre-design sampling.

Following pre-design sampling, waste characterization samples for each excavation area would be collected prior to excavation and analyzed for TCLP lead. Proposed site activities would comply with Federal Land Disposal Restrictions found in 40 CFR 268. If the material to be excavated fails TCLP lead, then the material would be treated in an iterative process. Soil requiring treatment for lead would be stabilized with an in situ reagent (e.g., cement). Waste determined to be nonhazardous would be excavated and disposed of at an approved, licensed RCRA Subtitle D landfill. Waste that cannot be stabilized by the iterative treatment process and determined to be hazardous would be excavated and disposed of at a licensed RCRA Subtitle C facility.

Soil would be excavated by heavy equipment within the proposed excavation boundaries and placed onto trucks for transportation to an off-site disposal location. Field screening techniques for lead would utilize an X-ray fluorescence (XRF) analyzer to assist with identifying the lateral and vertical extent of lead-contaminated soil. Once XRF results indicate the lead concentrations in remaining soil are below the cleanup level for lead, then a confirmation soil sample would be collected and submitted to an off-site analytical laboratory and analyzed for lead and naphthalene. If laboratory results indicate lead and naphthalene concentrations are above their respective RAO remediation goals, then additional soil would be excavated and the area would again be evaluated before collecting and submitting additional confirmation samples. Soil excavation would be extended laterally and vertically until confirmation results are below the respective RAO remediation goals for lead and naphthalene in soil.

Backfill sources, if required, would be sampled and submitted for approval prior to use. Excavated areas would be backfilled and graded, as needed. Conditions of ROE with the landowner would also be followed. Closure documentation would be completed to document the remedial action.

10 Summary of Wastewater Treatment Plant - Sludge Digesters Remedial Alternatives

This section presents the two remedial action alternatives developed to address the contaminated sediment/sludge in the WWTP - Sludge Digesters.

10.1 Alternative 1 - No Action

Estimated Capital Cost: \$0

Estimated O&M/Periodic Cost: \$0

Estimated Present Value: \$0

Estimated Alternative Cost: \$0

Estimated Time to Achieve RAOs: None

Alternative 1 is the No Action alternative and carried forward to represent the current existing condition at the site. This alternative is required by the NCP for baseline comparison purposes (40 CFR 300.430[e][6]). Under this alternative, no action would be taken at the site. No administrative or physical LUCs would be implemented. This alternative has no capital or O&M/Periodic costs.

10.2 Alternative 2 - Excavation/Off-Site Disposal

Estimated Capital Cost: \$371,610

Estimated O&M/Periodic Cost: \$0

Estimated Alternative Cost: \$371,610

Estimated Present Value: \$371,610

Estimated Time to Achieve RAOs : 1 year

Alternative 2 involves excavation and off-site disposal of sediment/sludge containing CERCLA hazardous substances (metals). This alternative would achieve UU/UE. Results from a recent field investigation estimated the sediment/sludge in the East digester was 5 feet thick in the center sloping up to one foot thick on the edges of the cone-bottom digester. An estimated 0.5 feet of water was accumulated above the sediment/sludge. The West digester results indicated that the sediment/sludge was an estimated 6 feet thick in the center sloping up to 2 feet thick on the edges of the cone-bottom digester. An estimated 1.5 feet of water was accumulated above the sediment/sludge. The East digester is estimated to have 175 BCY of sediment/sludge and 7,300 gallons of water. The West digester is estimated to have 250 BCY of sediment/sludge and 22,000 gallons of water. An estimated 425 BCY of sediment/sludge would require excavation and transportation to an approved offsite RCRA Subtitle D permitted landfill. The sediment/sludge would be transported in accordance with the most current Department of Transportation shipping requirements

An estimated 29,300 gallons of water would require sampling and analysis, pumping, and if necessary transportation to an approved off-site treatment or disposal facility. The water would be pumped from the digesters with a vacuum truck. The sediment/sludge would then be allowed to dry prior to excavation. The sediment/sludge would be excavated down to the concrete bottom within each digester.

A crane would place a mini-excavator inside the digester. The mini-excavator would load a 6 cubic yard crane dump box and the crane will remove the contaminated sediment/sludge from within the digester and place it

directly onto trucks for transportation to an off-site disposal location. Alternate management methods for the water and sediment may be considered, and will be detailed during remedial action design and/or work plan development. The excavation would start in the middle of the digester and proceed toward the edges. This alternative is estimated to take 2 weeks, one week for the water removal and one week for the sediment/sludge excavation.

Partial removal of the digester walls was considered for cost effectiveness and in the interest of safety. The landowner was contacted about his willingness to have the digesters partially or completely removed. The landowner would only accept full removal of the digesters. Full removal of the digesters was removed from the alternatives because it was neither cost effective in comparison to the other alternative nor justifiable to address risks posed by the contamination. Partial removal of the walls followed by complete infill of the tank may be an acceptable solution to the land owner and will be evaluated as part of remedial design.

11 Evaluation of Remedial Alternatives

Unacceptable risks to human health and the environment have not been identified for the NFA Areas. Therefore, remedial alternatives were not developed for them and NFA is recommended. If this recommendation is selected no additional investigation or remediation will be performed at NFA Areas. For those sites where remedial alternatives were developed, nine evaluation criteria are required by the NCP (40 CFR 300) and described in the *Guidance for Conducting Remedial Investigations and Feasibility Studies under the Comprehensive Environmental Response, Compensation, and Liability Act (USEPA 1988)*. The nine criteria were used to evaluate the different alternatives individually and against each other in order to select a remedy. These nine criteria are segregated into three groups and are briefly described below.

Threshold criteria are requirements that each alternative must meet in order to be selected. There are two threshold criteria, as listed below:

- *Overall Protection of Human Health and the Environment* determines whether an alternative eliminates, reduces, or controls threats to public health and the environment.
- *Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)* evaluates whether the alternative meets cleanup standards, standards of control, or other requirements related to the contaminant, remedial action or remedial location

that are found in federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

Primary balancing criteria form the basis for comparison of alternatives that meet the threshold criteria. There are five balancing criteria, as listed below:

- *Short-Term Effectiveness* considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
- *Long-Term Effectiveness and Permanence* considers the ability of an alternative to maintain protection of human health and the environment over time.
- *Reduction of Volume, Toxicity, and Mobility through Treatment* evaluates an alternative's use of treatment to reduce the harmful effects of contaminants, their ability to move in the environment, and the amount of contamination present.
- *Implementability* considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
- *Cost* includes estimated capital and annual operations and maintenance costs. Cost estimates are expected to be accurate within a range of +50% to -30%.

Modifying criteria may be considered to the extent that information is available during the FS, but can be fully considered only after public comment is received on the PP. They are considered in remedy selection. There are two modifying criteria, as listed below:

- *State Acceptance* considers whether the state accepts USACE analyses and recommendations, as described in the RI, FS, and this PP. It reflects the state's preferences among or concerns about the alternatives.
- *Community Acceptance* considers whether the local community accepts USACE analyses and Preferred Alternative. Comments received on the PP are an important indicator of community acceptance. It reflects the community's apparent preferences or concerns about the alternatives.

An evaluation of the six alternatives requiring detailed analysis was conducted against the nine criteria identified above. In addition, an analysis was conducted to compare the alternatives against each other in order to determine the preferred alternative. The detailed analysis summaries of the Remedial Action Alternatives are presented in **Table 2** for the Aircraft Bombing Area - Area D and Obstacle Area - Area M, **Table 3** for the East

Landfill - Area R, and **Table 4** for the WWTP - Sludge Digesters.

12 Preferred Alternatives

The sections below present the preferred alternatives for the MRSs and PAOIs. However, the choice of preferred alternative can change in response to public comments or new information.

12.1 NFA Areas

Unacceptable risks to human health and the environment have not been identified for the NFA Areas. Therefore, remedial alternatives were not developed for them, and NFA is recommended.

12.2 Aircraft Bombing Area - Area D

Based on the evaluation of the alternatives with respect to the threshold and balancing criteria, and a comparison to each other, the preferred alternative for the Aircraft Bombing Area - Area D is Alternative 4 – MEC Surface Clearance and MEC Subsurface Clearance to Depth of Contamination. USACE believes that Alternative 4 provides greater protection to human health and a significant reduction in explosive hazards at the MRS. Implementation of Alternative 4 would limit the residual explosives safety hazards at the MRS. A subsurface clearance to depth of contamination will reduce risk of interaction between receptors and MEC. The depth of clearance also addresses the largest depth that MEC has been found in any previous investigations. This clearance will minimize the risk that may occur to a receptor based on anticipated land use. Alternative 4 is permanent and provides the greatest long-term effectiveness. USACE expects the preferred alternative to satisfy the following statutory requirements of CERCLA §121(b): (1) be protective of human health and the environment; (2) comply with ARARs (**Table 5**) (or justify a waiver); (3) be cost-effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element, or explain why the preference for treatment will not be met. Alternative 4 would not satisfy the statutory preference for treatment as a principal element but would significantly reduce the volume of MEC at the MRS. Under Alternative 4, MEC identified during the surface and subsurface clearance would be destroyed in place or removed from the MRS and would allow for UU/UE.

12.3 Obstacle Area - Area M

Based on the evaluation of the alternatives with respect to the threshold and balancing criteria, and a comparison to each other, the preferred alternative for the Obstacle Area - Area M is Alternative 4 – MEC Surface Clearance and

MEC Subsurface Clearance to Depth of Contamination. USACE believes that Alternative 4 provides greater protection to human health and a significant reduction in explosive hazards at the MRS. Implementation of Alternative 4 would limit the residual explosives safety hazards at the MRS. A subsurface clearance to depth of contamination will reduce risk of interaction between receptors and MEC. The depth of clearance also addresses the largest depth that MEC has been found in any previous investigations. This clearance will minimize the risk that may occur to a receptor based on anticipated land use. Alternative 4 is permanent and provides the greatest long-term effectiveness. USACE expects the preferred alternative to satisfy the following statutory requirements of CERCLA §121(b): (1) be protective of human health and the environment; (2) comply with ARARs (**Table 5**) (or justify a waiver); (3) be cost-effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element, or explain why the preference for treatment will not be met. Alternative 4 would not satisfy the statutory preference for treatment as a principal element but would significantly reduce the volume of MEC at the MRS. Under Alternative 4, MEC identified during the surface and subsurface clearance would be destroyed in place or removed from the MRS and would allow for UU/UE.

12.4 East Landfill - Area R

Based on the evaluation of the alternatives with respect to the threshold and balancing criteria and in comparison with each other, the preferred alternative for the East Landfill – Area R is Alternative 3 – Excavation with Off-Site Disposal. USACE believes that Alternative 3 provides protection to human health and eliminates the potential threatened release of hazardous substance. Implementation of Alternative 3 is permanent and provides long-term effectiveness through the excavation of the lead- and naphthalene-contaminated subsurface soil. USACE expects the preferred alternative to satisfy the following statutory requirements of CERCLA §121(b): (1) be protective of human health and the environment, (2) comply with ARARs (**Table 5**) (or justify a waiver), (3) be cost effective, (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable, and (5) satisfy the preference for treatment as a principal element, or explain why the preference for treatment will not be met. USACE expects this alternative to meet the CERCLA requirements for remedies. Alternative 3 would not satisfy the statutory preference for treatment as a principal element, but there will be no risks remaining to current or future receptors.

12.5 Wastewater Treatment Plant - Sludge Digesters

Based on the evaluation of the alternatives with respect to the threshold and balancing criteria and in comparison with each other, the preferred alternative for the WWTP - Sludge Digesters is Alternative 2 – Excavation with Off-Site Disposal. USACE believes that Alternative 2 provides protection to human health and eliminates the potential threatened release of hazardous substance. Implementation of Alternative 2 is permanent and provides long-term effectiveness through the excavation of the metals in contaminated sediment. USACE expects the preferred alternative to satisfy the following statutory requirements of CERCLA §121(b): (1) be protective of human health and the environment, (2) comply with ARARs (**Table 5**) (or justify a waiver), (3) be cost effective, (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable, and (5) satisfy the preference for treatment as a principal element, or explain why the preference for treatment will not be met. USACE expects this alternative to meet the CERCLA requirements for remedies. Alternative 2 would not satisfy the statutory preference for treatment as a principal element but there will be no risks remaining to current or future receptors.

13 Community Participation

The public is encouraged to participate in the decision-making process. In order to facilitate public involvement, USACE has established an information repository of documents and will host a public meeting on this PP.

13.1 Information Repository

In accordance with the NCP, an **Administrative Record** file has been established for CEMR. The Information Repositories include documentation supporting development of this PP. The Information Repositories are located at:

Western Illinois University Library – Special Collections Department
1 University Circle
Macomb, IL 61455
Phone: (309) 298-2717
<http://www.wiu.edu/libraries>
Library Hours:
Monday-Friday: 8:00 a.m. to 4:30 p.m.
Saturday/Sunday: Closed

Easley Museum
210 W. Broadway
Ipava, IL 61441
Phone: (309) 254-3207

EasleyPioneerMuseum@gmail.com

Museum Hours:

Tuesday and Friday: 10:00 a.m. to 4:00 p.m.
Saturday/Sunday: Closed (Opened on Special Occasions)

USACE-Louisville District Office
600 Dr. Martin Luther King Jr. Place
Louisville, KY 40202
Phone: (502) 315-6108
E-mail: Valerie.J.Doss@usace.army.mil
Office Hours: Monday-Friday: 8:00 a.m. to 4:30 p.m.
(By appointment only.)

13.2 Public Meeting

USACE will host a public meeting to discuss the PP. The public meeting date, time, and location are listed below.

Date: April 26, 2016
Time: 7:00 p.m.
Location: Easley Museum

13.3 Public Comment Period

The public is invited to review all alternatives and comment on this PP from April 13, 2016, through May 16, 2016. Written comments should be sent to the USACE-Louisville District Project Manager, Ms. Valerie Doss at the following address.

USACE-Louisville District
Attn: CELRL-PM-M-E (Valerie Doss)
600 Dr. Martin Luther King Jr. Place
Louisville, KY 40202

Comments received at the public meeting and during the comment period will be considered in the selection of the final remedial action. These comments will be addressed in the responsiveness summary section of the upcoming DD.

13.4 Contact for More Information

Ms. Valerie Doss
USACE-Louisville District Project Manager
600 Dr. Martin Luther King Jr. Place
Louisville, KY 40202
Phone: (502) 315-6108
Fax: (502) 315-6793
E-mail: Valerie.J.Doss@usace.army.mil

14 References

Cape, Inc. and EOD Technology, Inc. (Cape/EODT). 2009. Site Specific Final Report for the Munitions Removal Action at former Camp Ellis. Table Grove, Illinois. October.

CH2M Hill. 2009. Final Limited Site Investigation Report. Former Camp Ellis Military Range. Table Grove, Illinois. September.

DoD. 2014. DoDI 4140.62, Material Potentially Presenting an Explosive Hazard. November.

Ecology and Environment, Inc. (E&E). 1990. Engineering Report for Contamination Evaluation. Former Camp Ellis. Fulton County, Illinois. June.

Law Engineering and Environmental Services, Inc. (Law). 2002. Report of Site Investigation, Former Camp Ellis Military Reservation. Table Grove, Illinois. June.

Oak Ridge National Laboratory (ORNL). 1989. The Installation and Restoration Program Toxicology Guide. Harry G. Armstrong Aerospace Medical Research Laboratory. Air Force Systems Command. Volumes I through IV.

Parsons. 2004. Final Preliminary Assessment Report. Former Camp Ellis. Table Grove, Illinois. November.

Parsons. 2006. Final Engineering Evaluation/Cost Analysis. Former Camp Ellis Military Reservation. Table Grove, Illinois. 12 January.

Renneberg A.J. and M.J. Dudas. 2001. Transformations of elemental mercury to inorganic and organic forms in mercury and hydrocarbon co-contaminated soils. *Chemosphere*. 45 (6-7):1103-9. SCS Engineers. 2011. Engineering Evaluation/Cost Analysis. Former Camp Ellis Military Reservation. Table Grove, Illinois. V1.1. 28 January.

USACE. 1996. CENCB-PE-EE Memorandum for Record. Former Camp Ellis Military Reservation site visit: Ipava, Illinois. 19 December.

USACE. 1998. Final. Archives Search Report for the former Camp Ellis Military Reservation. September.

USACE. 2007. EM 1110-1-4009. Engineering and Design – Military Munitions Response Actions. 15 June. (Errata Sheet No. 2 dated November 2007.)

USACE. 2008. Explosives Safety and Health Requirements. Engineer Manual 385-1-97. 15 September, reissued 17 May 2013.

USEPA. 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies under the Comprehensive Environmental Response, Compensation, and Liability Act.

USEPA. 1997. Mercury Study Report to Congress Volume III: Fate and Transport of Mercury in the Environment. EPA-452/R-97-005.

URS Group, Inc (URS). 2012. Final, Public Involvement Plan, Former Camp Ellis Military Reserve Fulton County, Illinois, FUDS # E05IL000701. October.

URS. 2014. Final Report, Remedial Investigation, Former Camp Ellis Military Reservation, Fulton County, Illinois, FUDS #E05IL000701. September.

URS. 2015a. Final, Remedial Investigation Addendum, Former Camp Ellis Military Reservation Fulton County, Illinois, FUDS #E05IL000701. October.

URS. 2015b. Final, Feasibility Study, Former Camp Ellis Military Reservation, Fulton County, Illinois, FUDS #E05IL000701. September.

URS. 2015c. Draft, Feasibility Study Addendum, Former Camp Ellis Military Reservation, Fulton County, Illinois, FUDS #E05IL000701. October.

URS. 2016. Facility Cluster Area 2, Site Investigation Completion Report, Former Camp Ellis Military Reservation, Fulton County, Illinois, FUDS # E05IL000701. January.

15 Glossary of Terms

Administrative Record: A compilation of all documents relied upon to select an alternative for a remedial action.

Applicable or Relevant and Appropriate Requirements (ARARs): ARARs are cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable.

Chemicals of Concern (COC): COCs are a subset of COPCs that were evaluated and identified as needing to be addressed by a response action.

Chemical of Potential Concern (COPC): A COPC is a chemical which exceeds a screening level and requires further evaluation.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, otherwise known as Superfund): A federal law that addresses the funding for and cleanup of abandoned or uncontrolled hazardous waste sites. This law also establishes criteria for the creation of DDs.

Decision Document (DD): The DD is the document used to record the remedial response decisions at non-National Priorities List (NPL) FUDS properties. The DD will be

maintained in the project Administrative Record file and permanent Project File. The responsiveness summary from the public comment period is included as an attachment to the DD.

Defense Environmental Restoration Program (DERP): The DERP is a program established under federal law 10 U.S.C. § 2701 *et seq.* which provides for the identification, investigation, and cleanup of contamination and military munitions associated with past DoD facilities to ensure potential threats to public health and the environment are appropriately assessed and addressed.

Ecological Receptor: A plant, animal, or ecosystem exposed to an adverse condition.

Feasibility Study (FS): A FS evaluates possible remedies using the information generated from the RI. The FS becomes the basis for selection of a remedy that effectively eliminates the threat posed by contaminants at the site.

Formerly Used Defense Sites (FUDS): A FUDS is defined as a facility or site (property) that was under the jurisdiction of the Secretary of Defense and owned by, leased to, or otherwise possessed by the United States at the time of actions leading to contamination by hazardous substances. By the DERP policy, the FUDS program is limited to those real properties that were transferred from DoD control prior to 17 October 1986. FUDS properties can be located within the 50 States, District of Columbia, Territories, Commonwealths, and possessions of the United States.

Human Receptor: A hypothetical person, based on current or potential future land use that may be exposed to an adverse condition.

Material Potentially Presenting an Explosive Hazard (MPPEH): Material that, prior to determination of its explosives safety status, potentially contains explosives or munitions or potentially contains a high enough concentration of explosives that the material presents an explosive hazard.

Munitions Constituents (MC): Any materials originating from UXO, discarded military munitions, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.

Munitions Debris (MD): Remnants of munitions (e.g., penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization or disposal. MD is confirmed inert and free of explosive hazards by technically-qualified personnel.

Munitions and Explosives of Concern (MEC): This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, means: (a) UXO; (b) discarded military munitions; or (c) explosive MC (e.g., TNT) present in high enough concentrations to pose an explosive hazard.

National Priorities List (NPL): The NPL is the list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the U.S. and its territories. The NPL is intended primarily to guide the USEPA in determining which sites warrant further investigation.

Preferred Alternative: The alternative that, when compared to other potential alternatives, was determined to best meet the CERCLA evaluation criteria and is proposed for implementation at a site.

Proposed Plan (PP): A plan that identifies the preferred alternative for a site selected by the lead agency that best meets the requirements in 40 CFR §300.430(f)(1), and is made available to the public for comment.

Remedial Action Objective (RAO): Objectives established for remedial actions to guide the development of alternatives and focus the comparison of acceptable remedial action alternatives, if warranted. RAOs also assist in clarifying the goal of minimizing risk and achieving an acceptable level of protection for human health and the environment.

Remedial Investigation (RI): An exploratory inspection conducted at a site to define the nature and extent of contamination present.

Removal Action (RA): The cleanup or removal of released hazardous substances from the environment, the threat of release of hazardous substances into the environment, the disposal of removed material, to prevent, minimize, or mitigate damage to the public health or welfare or to the environment.

Unexploded Ordnance (UXO): Military munitions that: (a) have been primed, fuzed, armed, or otherwise prepared for action; (b) have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and (c) remain unexploded either by malfunction, design, or any other cause.

**TABLE 1
SUMMARY OF RECOMMENDATIONS**

Description	Acres ¹	
No Further Action		
NFA Areas	17205.7	
Skeet Range MRS		
Rocket, Rifle, and Hand Grenades MRS (Area A)		
Aircraft Bombing MRS (Area D)		
Rockets, Rifle Grenades, and Mortars MRS (Areas B Southwest and E)		
Rockets and Rifle Grenades MRS (Area C Southeast)		
Demolition Area MRS (Area G)		
Decontamination Area East MRS (Area P East)		
Demolition Site MRS (Area L)		
Chemical Training Area MRS (Area Q)		
Hand Grenade Court MRS (Area J)		
Gas Obstacle Course MRS (Area O)		
Decontamination Area West MRS (Area P West)		
Range Complex No. 1 <i>German Village (Area I)/Squad Combat Range No. 17</i> <i>Squad Combat Range No. 18 (Area K)</i> <i>Squad Combat Range No. 16</i> <i>Combat Range No. 15</i> <i>Combat Range No. 1</i> <i>1,000-Inch Landscape Range</i> <i>Miniature Anti-Aircraft Range</i> <i>1,000-Inch Rifle Range</i> <i>Pistol Range</i> <i>1,000-Inch Machine Gun Range</i> <i>Known Distance Range North</i>		
Infiltration Range No. 1 (Area H East PAOI)		
Infiltration Range No. 2 (Area H West PAOI)		
Gas Chambers (Area N PAOI)		
West Small Landfill (Area R PAOI)		
West Large Landfill (Area R PAOI)		
HTRW PAOI <i>Potential Spill Area</i> <i>Hospital Area (Surgery Clinic, Dental Clinics [3], X-Ray and Laboratory Clinic, Laboratory Clinic, Morgue)</i> <i>Wastewater Treatment Plant (excluding sludge digesters)</i> <i>Demolition Area</i> <i>Aircraft Hangar</i> <i>Runway</i> <i>Facility Cluster Area 1 (Motor Repair Shop, Maintenance Shop, Oil House, Welding Shop, Grease Storage Facility)</i> <i>Facility Cluster Area 3 (Motor Repair Shop, Maintenance Shop, Gasoline Station, Oil House)</i> <i>Facility Cluster Area 4 (Motor Repair Shop, Maintenance Shop, Gasoline Station, Oil House)</i> <i>Facility Cluster Area 5 (Motor Repair Shop, Gasoline Station, Oil House [2], Utility Shop, Carpenter and Paint Shop, Locomotive Shed, Ordnance Repair Shop, Coal Storage Area, Coal Crusher and Sampling Shed)</i> <i>Facility Cluster Area 6 (Motor Repair Shop, Maintenance Shop, Gasoline Station, Oil House)</i> <i>Facility Cluster Area 7 (Motor Repair Shop, Grease Rack, Gasoline Station, Oil House)</i> <i>Repair Shop</i>		
All Other Lands (Area S PAOI) ²		
Total No Further Action		17,205.7
Feasibility Study		
Aircraft Bombing Area - Area D		130.2
Obstacle Area Area - Area M		108.5

**TABLE 1
SUMMARY OF RECOMMENDATIONS**

Description	Acres ¹
East Landfill - Area R	32.2
Wastewater Treatment Plant - Sludge Digesters	0.1
Total Feasibility Study	271.0
Response Decision To Be Made Outside CERCLA	
Facility Cluster Area 2 (Motor Repair Shop, Maintenance Shop, Gasoline Station, Oil House)	3.3
Total Response Decision To Be Made Outside CERCLA	3.3
ROE Refused/Response Decision Not Possible	
Rockets, Rifle Grenades, and Mortars Area (Area B Northeast)	20.7
Rockets and Rifle Grenades Area (Area C Northeast)	125.3
Rockets and Rifle Grenades Area (Area C West)	118.1
Mines South Area (Area F South)	108.6
Range Complex No. 1 - Transition Range	72.4
Known Distance Range South	69.9
Total ROE Refused/Response Decision Not Possible	515.0
Former Camp Ellis Military Reservation	17,995

¹ Includes all current roads, rights-of-way, and cemetery plots.

² Includes the following areas:

- Warehouses (4)
- Heavy Equipment Parts Storage (2)
- Brick Smoke House
- Latrines
- Fire Stations (6)
- POW Compound
- General Construction Area
- Laundry Facilities
- Grease Racks (12)
- Post Engineering POW Maintenance Office
- Blacksmith Shop
- Alleged Dump
- Magazine Area
- Ammunition Storage
- Boiler Houses (4)
- Water Filtration Plant

**TABLE 2
 DETAILED ANALYSIS OF REMEDIAL ACTION ALTERNATIVES
 AIRCRAFT BOMBING AREA - AREA D AND OBSTACLE AREA - AREA M**

Evaluation Criterion ¹	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	LUCs	MEC Surface Clearance and LUCs	MEC Surface Clearance and MEC Subsurface Clearance to Depth of Contamination
OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT				
Human Health Protection	Does not protect human health.	Protects human health through implementation of LUCs.	Protects human health through implementation of LUCs and removing MEC located on the surface. The risk to receptors is reduced.	Protects human health through removing MEC located on the surface and within the subsurface soil to depth of MEC contamination. Limited residual explosive safety hazards associated with MEC would remain at the MRS due to potential MEC located below the depth of instrument detection. This removal will minimize the risk that may occur to a receptor based on anticipated land use.
Environmental Protection	MEC is not expected to have a negative impact on the ecosystem.	MEC is not expected to have a negative impact on the ecosystem.	MEC is not expected to have a negative impact on the ecosystem.	MEC is not expected to have a negative impact on the ecosystem.
COMPLIANCE WITH ARARs				
Compliance with ARARs	No ARARs for Alternative 1 were identified.	Would meet ARARs.	Would meet ARARs.	Would meet ARARs.
LONG-TERM EFFECTIVENESS AND PERMANENCE				
Magnitude of Residual Risk	Risks to potential future receptors would remain indefinitely.	Risks to potential future receptors would remain indefinitely. Risks would be limited due to LUCs.	Hazards on the surface would be significantly reduced, residual hazards associated with potential migration of subsurface MEC would remain.	Risks to potential receptors would be minimized but would remain for any potentially unidentified MEC. Hazards on the surface and subsurface would be significantly reduced.

TABLE 2
DETAILED ANALYSIS OF REMEDIAL ACTION ALTERNATIVES
AIRCRAFT BOMBING AREA - AREA D AND OBSTACLE AREA - AREA M

Evaluation Criterion ¹	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	LUCs	MEC Surface Clearance and LUCs	MEC Surface Clearance and MEC Subsurface Clearance to Depth of Contamination
Adequacy and Reliability of Controls	Not applicable.	Administrative measures would educate and ensure adequate warning to those who enter the MRSs.	LUCs would limit human exposure if maintained indefinitely.	This alternative would achieve UU/UE and would not require LUCs.
REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT				
Reduction of TMV	None.	None.	Low. Total volume of MEC would be reduced by the amount removed from the surface.	Very High. Removes MEC located on the surface and the subsurface to depth of contamination.
SHORT-TERM EFFECTIVENESS				
Time Required to Achieve Remedial Action Objectives	Indefinite.	RAO would be met upon installation of LUCs.	RAO would be met upon installation of LUCs and completion of MEC surface clearance.	RAO would be met upon completion of MEC surface and subsurface removal activities.
Protection of Community During Remedial Action	Not applicable.	Risk to community would be limited and reduced with proper safety precautions.	Risk to community would be limited and would be reduced with proper safety precautions.	Risk to community would be limited and would be reduced with proper safety precautions.
Protection of Workers During Remedial Action	Not applicable.	Workers would need to take proper safety precautions during installation of signage.	Workers would need to take proper safety precautions during installation of signage and MEC surface clearance.	Workers would need to take proper safety precautions during MEC surface clearance and MEC subsurface removal.

**TABLE 2
 DETAILED ANALYSIS OF REMEDIAL ACTION ALTERNATIVES
 AIRCRAFT BOMBING AREA - AREA D AND OBSTACLE AREA - AREA M**

Evaluation Criterion ¹	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	LUCs	MEC Surface Clearance and LUCs	MEC Surface Clearance and MEC Subsurface Clearance to Depth of Contamination
IMPLEMENTABILITY				
Technical Feasibility	Not applicable.	Technology is reliable and equipment and materials are available.	Technology is reliable and equipment and materials are available. Technical challenges associated with removing MEC located on the surface increases technical difficulty.	Technology is reliable and equipment and materials are available. Technical challenges associated with removing MEC on surface and in subsurface soil to depth of contamination increases technical difficulty.
Administrative Feasibility	Not applicable.	Easy to implement.	Administratively reliable to operate and maintain. Added challenges associated with operation of MEC surface clearance.	Administratively reliable to operate and maintain. Added challenges associated with operation of MEC surface clearance and subsurface removal to depth of contamination.

Notes:

¹Modifying criteria will be evaluated in the Decision Document following public comments on the Proposed Plan

ARAR = applicable or relevant and appropriate requirement

LUC = land use control

MEC = munitions and explosives of concern

MRS = Munitions Response Site

RAO = remedial action objective

TMV = toxicity, mobility, or volume

UU/UE = unlimited use/unrestricted exposure

**TABLE 3
DETAILED ANALYSIS OF REMEDIAL ACTION ALTERNATIVES
EAST LANDFILL - AREA R**

Evaluation Criterion ¹	Alternative 1	Alternative 2	Alternative 3
	No Action	Land Use Controls	Excavation with Off-Site Disposal
OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT			
Human Health Protection	Would not protect human health.	Protects human health through implementation of LUCs.	Protects human health by removing lead- and naphthalene-contaminated subsurface soil.
Environmental Protection	No ecological risks exist.	No ecological risks exist.	No ecological risks exist.
COMPLIANCE WITH ARARs			
Compliance with ARARs	No ARARs identified.	No ARARs identified.	No ARARs identified.
LONG-TERM EFFECTIVENESS AND PERMANENCE			
Magnitude of Residual Risk	Risks to potential future receptors would remain indefinitely.	Risks to potential future receptors would remain indefinitely. Human exposure would be limited by LUCs.	Upon achieving the RAO, residual contamination would pose no unacceptable human health risk.
Adequacy and Reliability of Controls	Not applicable.	LUCs would limit human exposure if maintained indefinitely. Reliability of controls would depend on landowner(s) and site receptors.	This alternative would achieve UU/UE and would not require LUCs.
REDUCTION OF TOXICITY, MOBILITY, OR VOLUME			
Reduction of TMV	No reduction in TMV through treatment.	No reduction in TMV through treatment.	No reduction in TMV through treatment.
SHORT-TERM EFFECTIVENESS			
Time Required to Achieve RAOs	Indefinite.	RAO would be met upon installation of LUCs. The estimated time to complete construction activities is two weeks.	RAOs would be achieved upon removal of contaminated soil. The estimated time to complete soil removal activities is three months.
Protection of Community During Remedial Action	No action taken.	Potential short-term impacts to the community are expected to be minimal and would not require extensive planning. Risks to the community would be limited or reduced with proper planning and safety precautions.	Potential short-term impacts to the community are expected to be minimal and would not require extensive planning. Risks to the community would be limited or reduced with proper planning and safety precautions.

**TABLE 3
DETAILED ANALYSIS OF REMEDIAL ACTION ALTERNATIVES
EAST LANDFILL - AREA R**

Evaluation Criterion ¹	Alternative 1	Alternative 2	Alternative 3
	No Action	Land Use Controls	Excavation with Off-Site Disposal
Protection of Workers During Remedial Action	No action taken.	Installation of warning signs along the perimeter of the site poses minimal risk for construction workers to potential exposures of lead- and naphthalene-contaminated soil during construction activities. Appropriately trained personnel, safety procedures, protective equipment, and approved planning documents would be used to reduce impacts to the workers.	Short-term risks to construction workers would include hazards associated with construction equipment use and potential exposure to lead- and naphthalene-contaminated soil during soil removal activities. Appropriately trained personnel, safety procedures, protective equipment, and approved planning documents would be used to reduce impacts to the workers.
IMPLEMENTABILITY			
Technical Feasibility	Not applicable.	Alternative uses well-established processes that are technically feasible.	Alternative uses well-established processes that are technically feasible.
Administrative Feasibility	Not applicable.	Administratively, implementation of Alternative 2 could be difficult. The Area R - East Landfill is privately owned. Any ROE agreements or LUCs would require negotiation with the current landowner(s). The current landowner was contacted and is not willing to consider legal mechanisms or signage.	Administratively, implementation of Alternative 3 could be difficult. The Area R - East Landfill is privately owned. Any ROE agreements would require negotiation with the current landowner(s).
Availability of services and materials	Not applicable.	Services and materials are readily available.	Services and materials are readily available.

Notes:

¹Modifying criteria will be evaluated in the Decision Document following public comments on the Proposed Plan

ARAR = Applicable or Relevant and Appropriate Requirement

LUCs = land use controls

RAO = Remedial Action Objective

ROE = right of entry

TMV = Toxicity, Mobility, or Volume

UU/UE = unlimited use/unrestricted exposure

**TABLE 4
DETAILED ANALYSIS OF REMEDIAL ACTION ALTERNATIVES
WASTEWATER TREATMENT PLANT - SLUDGE DIGESTERS**

Evaluation Criterion ¹	Alternative 1	Alternative 2
	No Action	Excavation with Off-Site Disposal
OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT		
Human Health Protection	Not protective.	Would remove long-term risk to human receptors from exposure to metals contaminants in sediment. Short-term risks to workers would include hazards associated with crane and construction equipment use and potential exposure to metals contamination during sediment removal events.
Environmental Protection	Not protective.	Would eliminate risk to potential ecological receptors from a threatened release of a CERCLA hazardous substance.
COMPLIANCE WITH ARARs		
Compliance with ARARs	No ARARs were identified.	No ARARs were identified.
Appropriateness of Waivers	Not applicable.	None should be required.
LONG-TERM EFFECTIVENESS AND PERMANENCE		
Magnitude of Residual Risk	Risks to potential future receptors would remain indefinitely.	Upon achieving objectives, residual contamination would pose no unacceptable human health or ecological risk. This alternative would eliminate the potential threatened release of a CERCLA hazardous substance.
Adequacy and Reliability of Controls	Not applicable.	All metals-contaminated sediment would be removed.
REDUCTION OF TOXICITY, MOBILITY, OR VOLUME		
Treatment Process Used	No active treatment.	No active treatment.
Reduction of TMV	Provides no reduction in TMV.	This alternative would not involve treatment.
SHORT-TERM EFFECTIVENESS		
Time Required to Achieve RAOs	Indefinite.	RAOs would be achieved upon removal of contaminated sediment. The estimated time to complete this alternative from the start of construction is two weeks.
Protection of Community During Remedial Action	No action taken.	Risk to community would be limited and would be reduced with proper safety precautions.
Protection of Workers During Remedial Action	No action taken.	Short-term risks to workers would include hazards associated with crane and construction equipment use and potential exposure to metals contamination during sediment removal events. Workers would need to take the proper health and safety precautions during remedial action activities.
Environmental Impacts	No action taken.	Minimal impacts from the sediment removal activities.

**TABLE 4
 DETAILED ANALYSIS OF REMEDIAL ACTION ALTERNATIVES
 WASTEWATER TREATMENT PLANT - SLUDGE DIGESTERS**

Evaluation Criterion ¹	Alternative 1	Alternative 2
	No Action	Excavation with Off-Site Disposal
IMPLEMENTABILITY		
Ability to Construct and Operate	Not applicable.	Readily implemented. Equipment and materials are available.
Technical Feasibility	Not applicable.	Technology is reliable. Equipment and materials are available.
Administrative Feasibility	Not applicable.	All field activities will be coordinated with the appropriate offices and agencies.

Notes:

¹Modifying criteria will be evaluated in the Decision Document following public comments on the Proposed Plan

ARAR = Applicable or Relevant and Appropriate Requirement

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act

RAO = Remedial Action Objective

TMV = Toxicity, Mobility, or Volume

**TABLE 5
POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED**

Citation	Description	Comment
FEDERAL		
Environmental Performance Standards 40 CFR 264.601 (Subpart X)	The requirements in this subpart apply to owners and operators of facilities that treat, store, or dispose of hazardous waste in miscellaneous units.	Action/Chemical Specific Relevant and appropriate for remedial alternatives where MEC is consolidated on site for destruction.
STATE		
Illinois' Tiered Approach to Corrective Action Objectives (TACO, 35 IAC Part 742)	Establishes standards for the adequate protection of human health and the environment based on the risks to human health posed by environmental conditions while incorporating site related information.	Chemical Specific TBC as cleanup objectives for any post-detonation sampling that may occur.

Notes:

Off-site activities specific to the remedial action at the Area R-East Landfill will comply with applicable Federal and State laws and regulations. Compliance with applicable regulations (non-ARARs) will be addressed during remedial action work plan development.

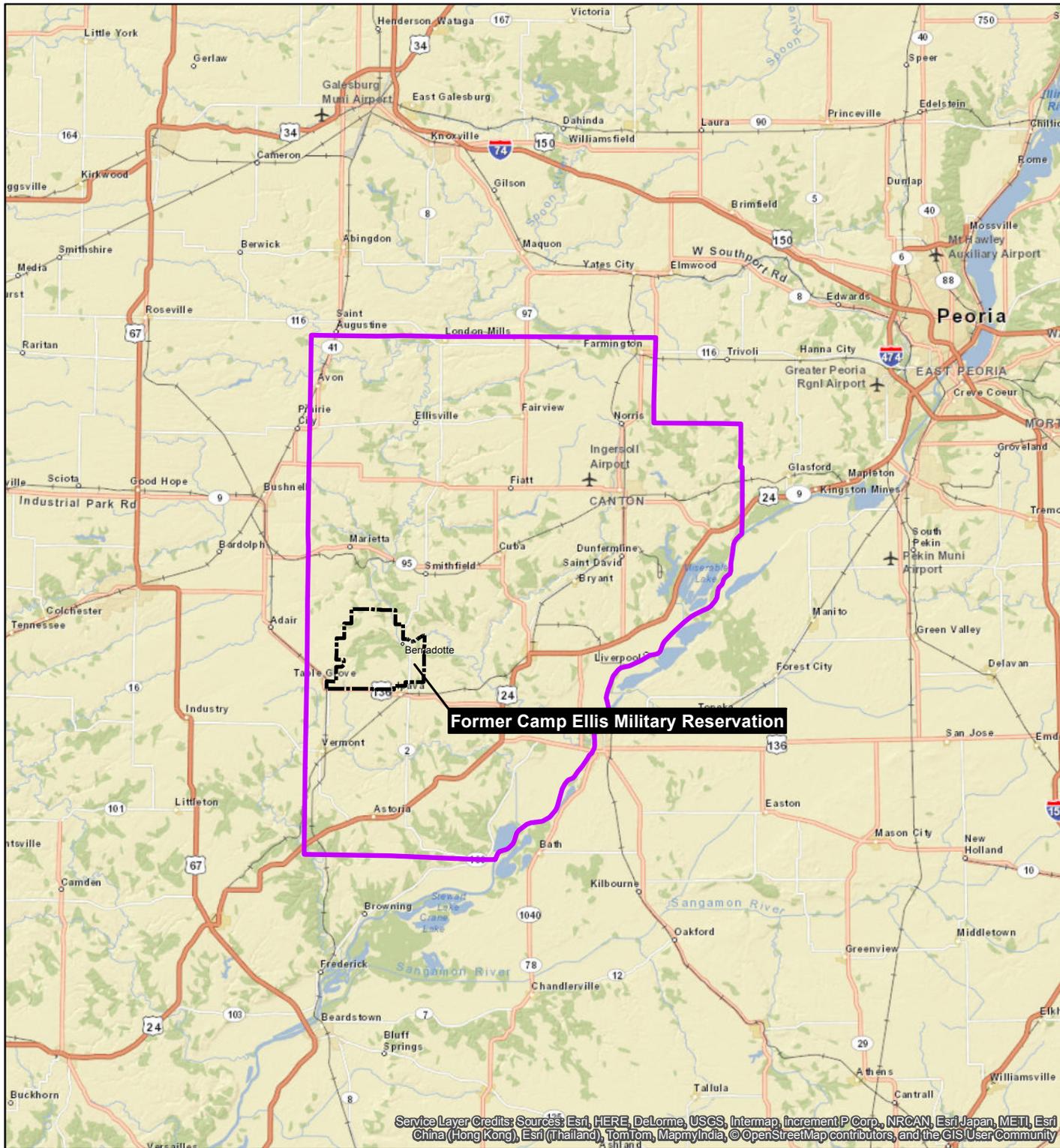
CFR = Code of Federal Regulations

IAC = Illinois Administrative Code

MEC = munitions and explosives of concern

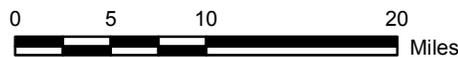
TACO = Tiered Approach to Corrective Action Objectives

TBC = To Be Considered



- Legend**
- Fulton County
 - Installation Boundary

Notes:
 1. Projection: NAD 1983 State Plane Illinois West Feet

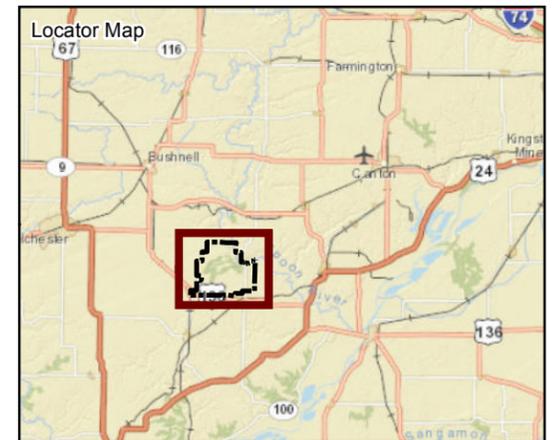
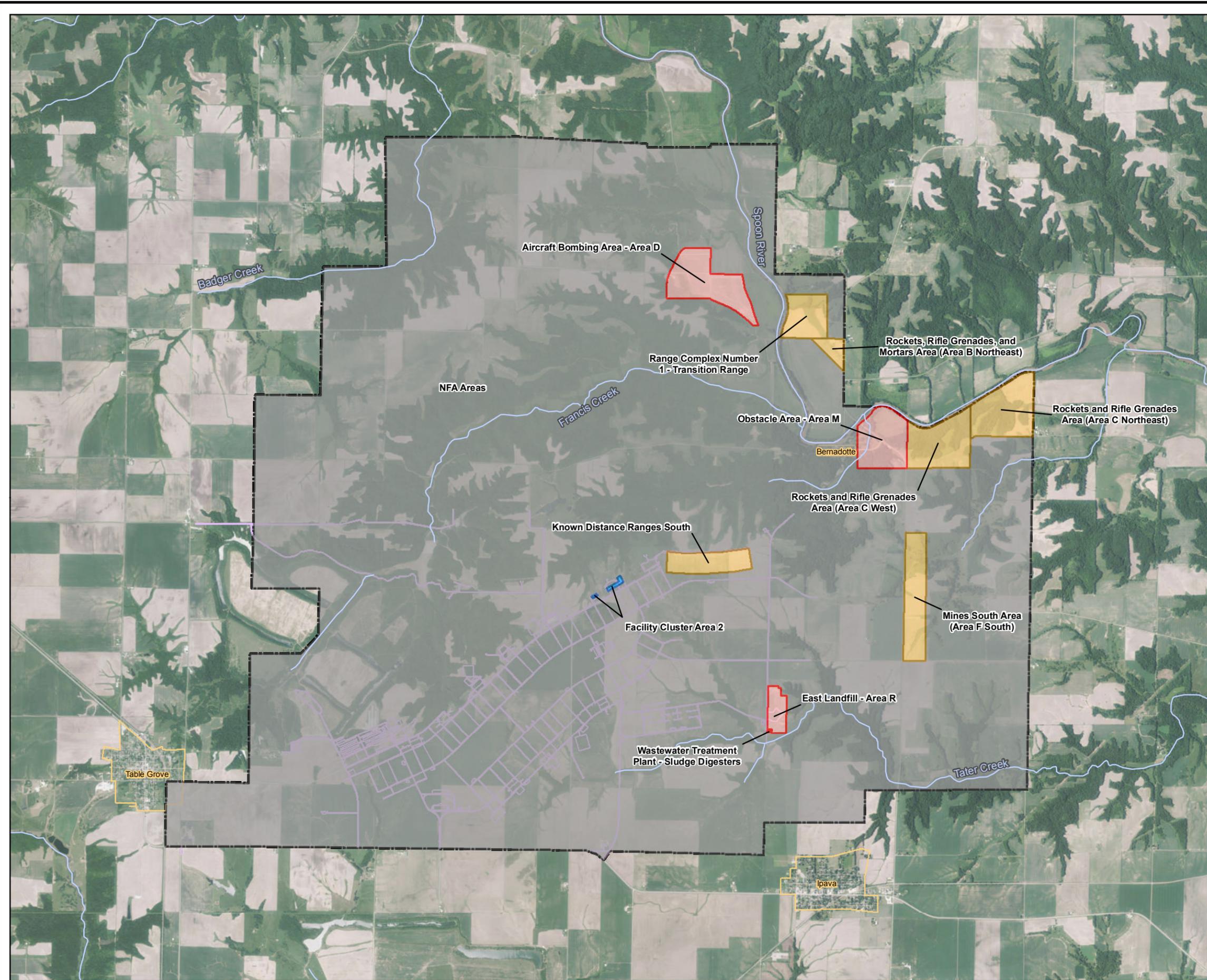


Installation Location Map
 Former Camp Ellis Military Reservation
 Fulton County, Illinois

Drawn By: JZ	Date: 2/25/2016
Checked By: JH	Project No. 60416745

Figure 1

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Legend

- Installation Boundary
- MRS/PAOI - Feasibility Study
- MRS/PAOI - ROE Refused
- MRS/PAOI - Response Decision to be Made Outside of CERCLA
- MRS/PAOI - No Further Action
- Towns
- Former CEMR Roads and Features
- Stream or River

Notes:

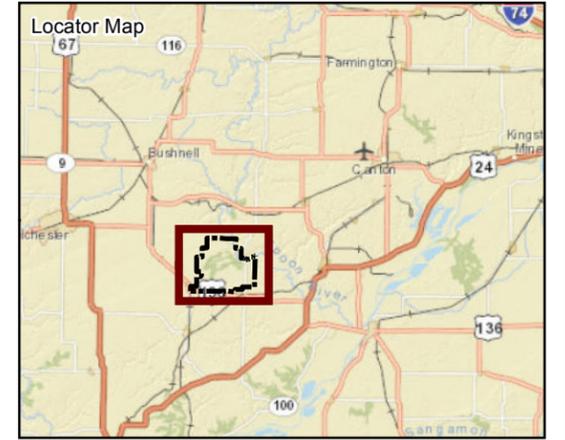
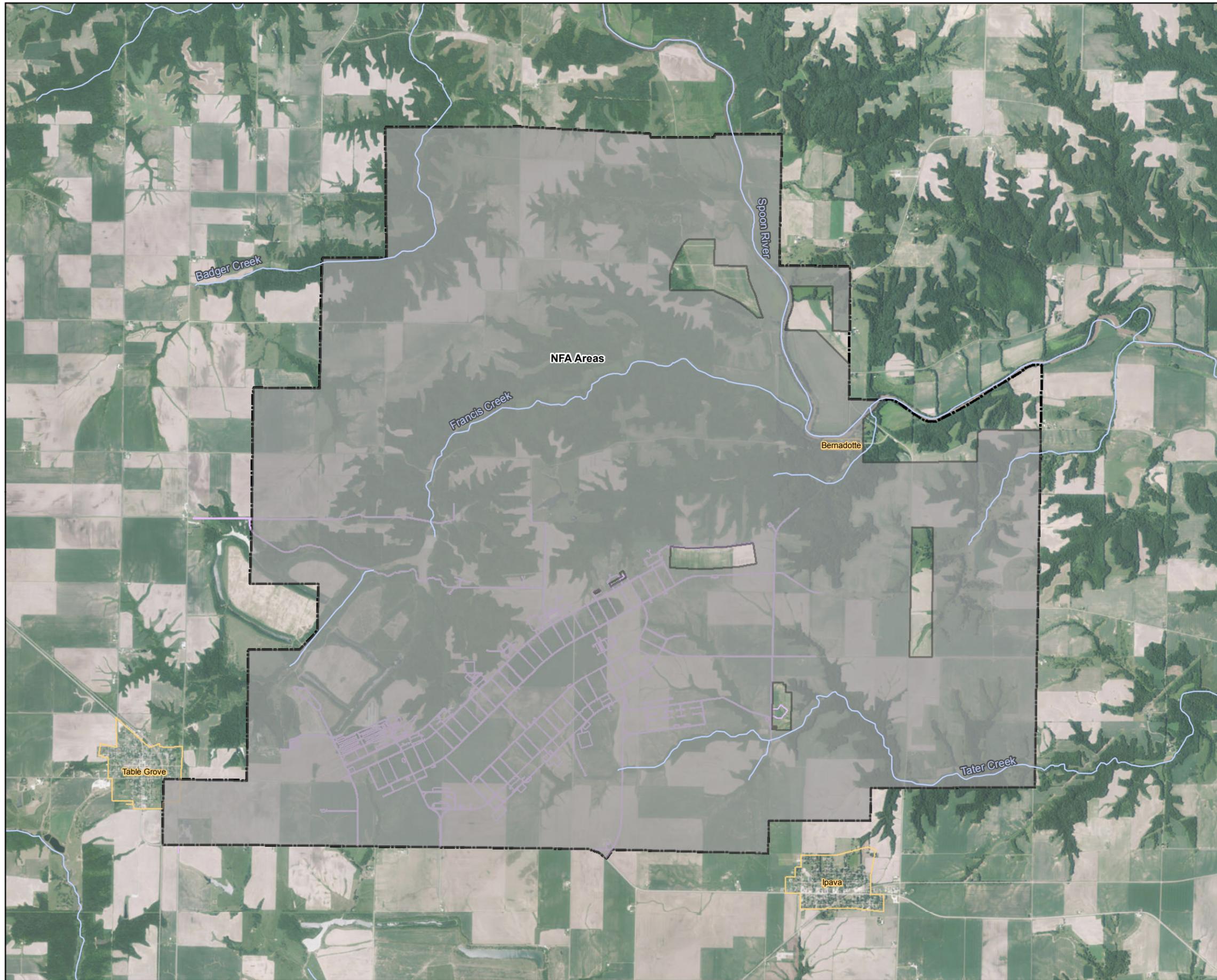
1. Projection: NAD 1983 State Plane Illinois West Feet
2. Image Source: USDA FSA, NAIP 2014



Site Location Map
Former Camp Ellis Military Reservation
Fulton County, Illinois

Drawn By: JZ	Date: 3/11/2016
Checked By: JH	Project No. 60416745

Figure 2

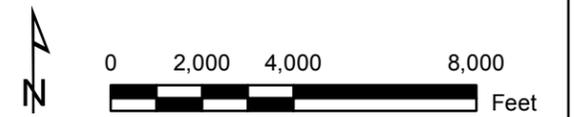


Legend

- Installation Boundary
- MRS/PAOI - No Further Action
- Towns
- Former CEMR Roads and Features
- Stream or River

Notes:

1. Projection: NAD 1983 State Plane Illinois West Feet
2. Image Source: USDA FSA, NAIP 2014

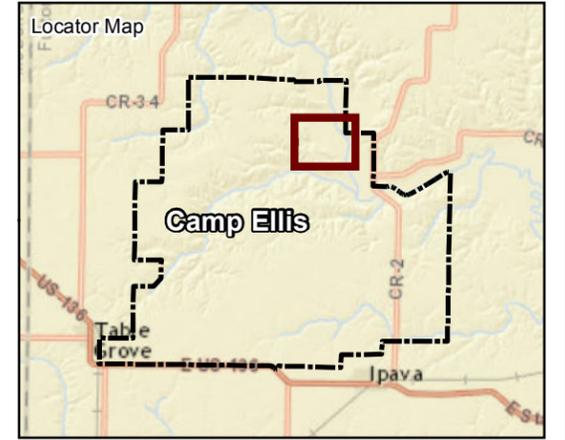


NFA Areas
Former Camp Ellis Military Reservation
Fulton County, Illinois

Drawn By: JZ	Date: 3/11/2016
Checked By: JH	Project No. 60416745

Figure 3

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Legend

-  Installation Boundary
-  MRS
-  Stream or River

Notes:

1. Projection: NAD 1983 State Plane Illinois West Feet
2. Image Source: USDA FSA, NAIP 2014



Aircraft Bombing Area - Area D
 Former Camp Ellis Military Reservation
 Fulton County, Illinois

Drawn By: JZ	Date: 3/11/2016
Checked By: JH	Project No. 60416745

Figure 4

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Legend

-  Installation Boundary
-  MRS
-  Stream or River

Notes:

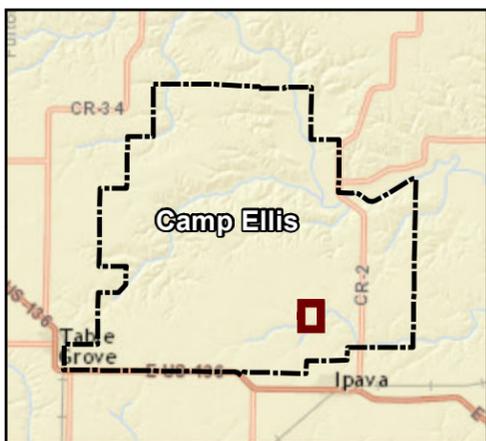
1. Projection: NAD 1983 State Plane Illinois West Feet
2. Image Source: USDA FSA, NAIP 2014



Obstacle Area - Area M
 Former Camp Ellis Military Reservation
 Fulton County, Illinois

Drawn By: JZ	Date: 3/11/2016
Checked By: JH	Project No. 60416745

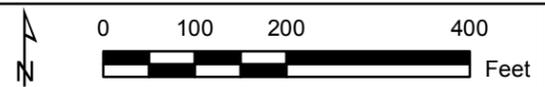
Figure 5



Legend

-  Installation Boundary
-  East Landfill - Area R
-  Towns
-  Former CEMR Roads and Features
-  Stream or River

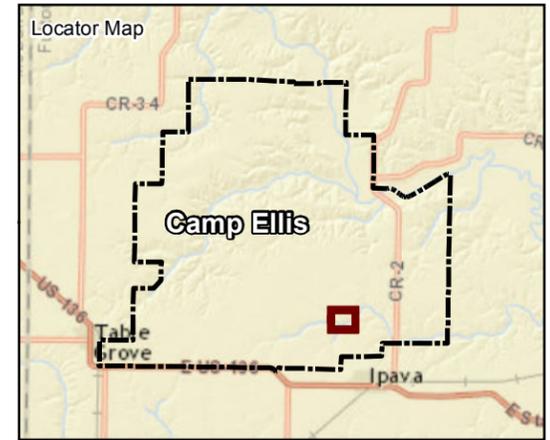
Notes:
 1. Projection: NAD 1983 State Plane Illinois West Feet
 2. Image Source: USDA FSA, NAIP 2014



East Landfill - Area R
 Former Camp Ellis Military Reservation
 Fulton County, Illinois

Drawn By: JM	Date: 3/11/2016
Checked By: CA	Project No. 16170667

Figure 6



Legend

-  Installation Boundary
-  Wastewater Treatment Plant - Sludge Digesters
-  Stream or River

Notes:

1. Projection: NAD 1983 State Plane Illinois West Feet
2. Image Source: USDA FSA, NAIP 2014

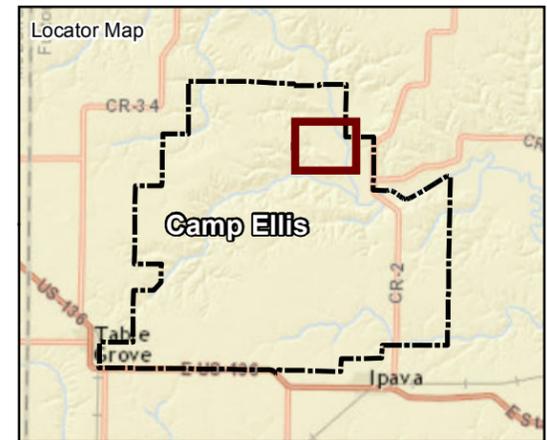
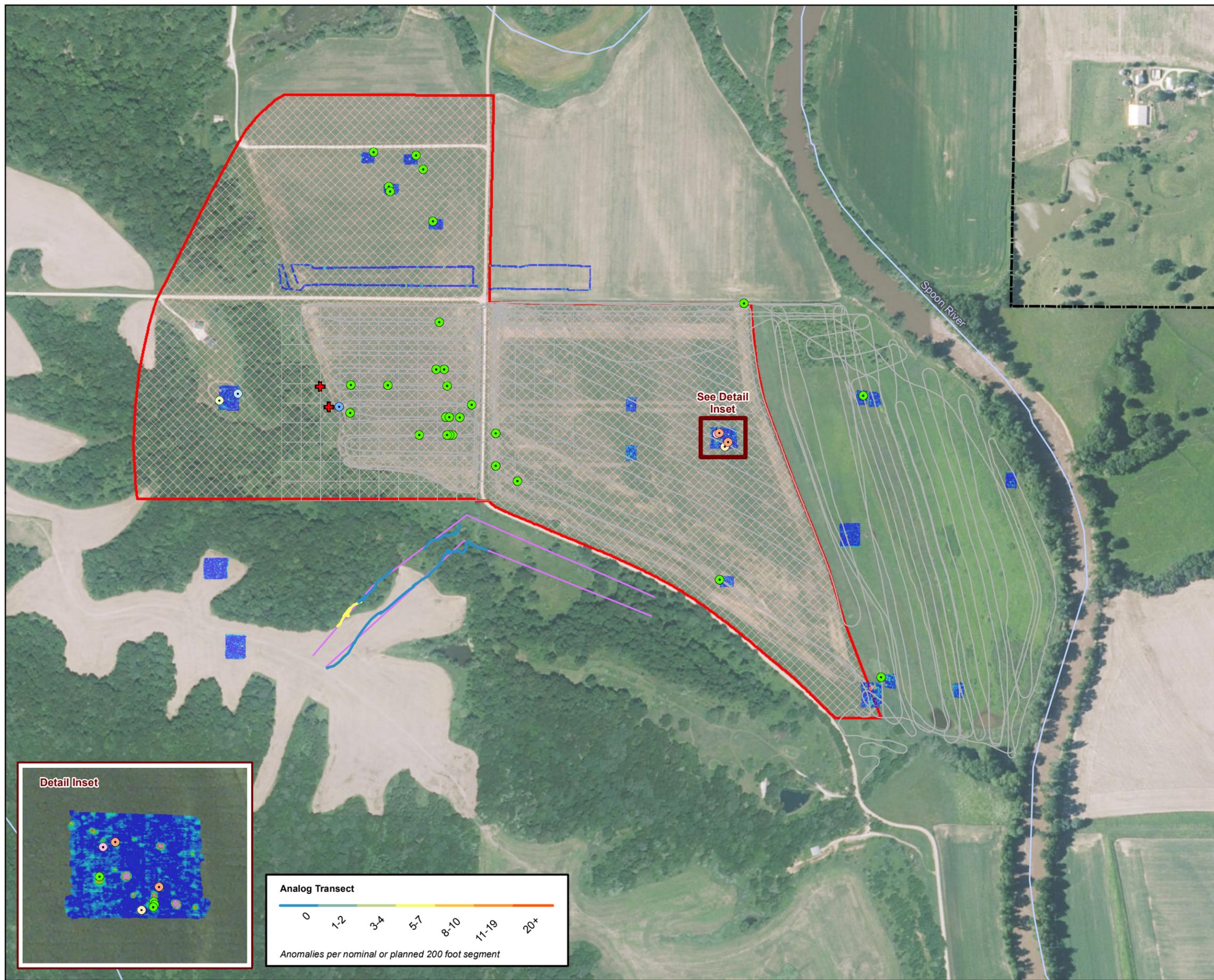


**Wastewater Treatment Plant -
Sludge Digesters**
Former Camp Ellis Military Reservation
Fulton County, Illinois

Drawn By: JZ	Date: 3/11/2016
Checked By: JH	Project No. 60416745

Figure 7

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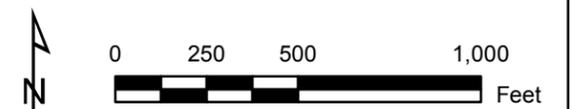


Legend

- Installation Boundary
- MRS
- Previous Geophysical Survey Grid (EODT)
- EE/CA Geophysics
- Stream or River
- Planned Analog Transect
- MEC-81mm mortar
- MD-.50 cal projectile
- MD-37mm piece
- MD-expanded 37mm projectile
- MD-mortar tail fins
- MD-projectile fuze M52
- MD-frag
- MD-mortar fins; nail ring

Notes:

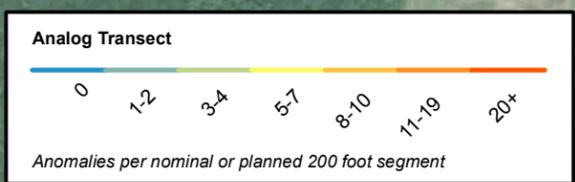
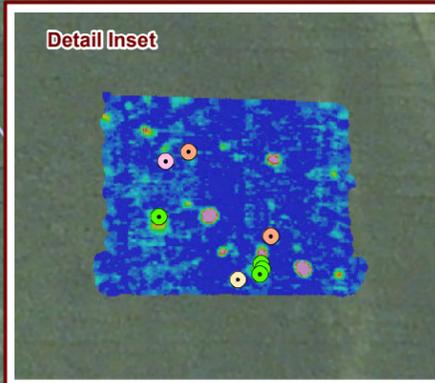
1. Projection: NAD 1983 State Plane Illinois West Feet
2. Image Source: USDA FSA, NAIP 2014



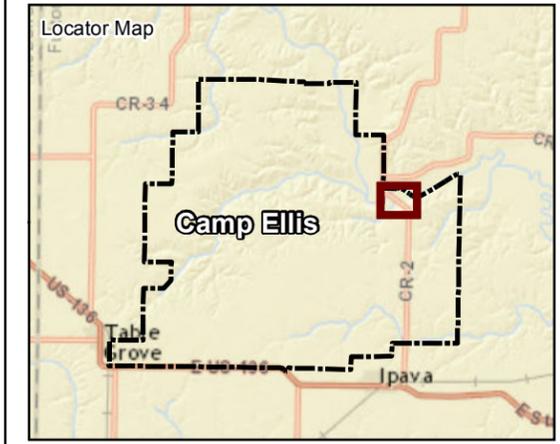
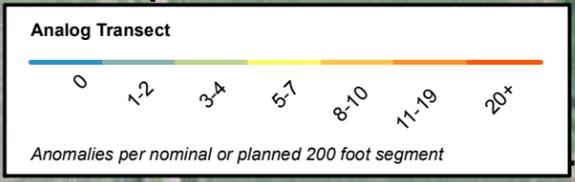
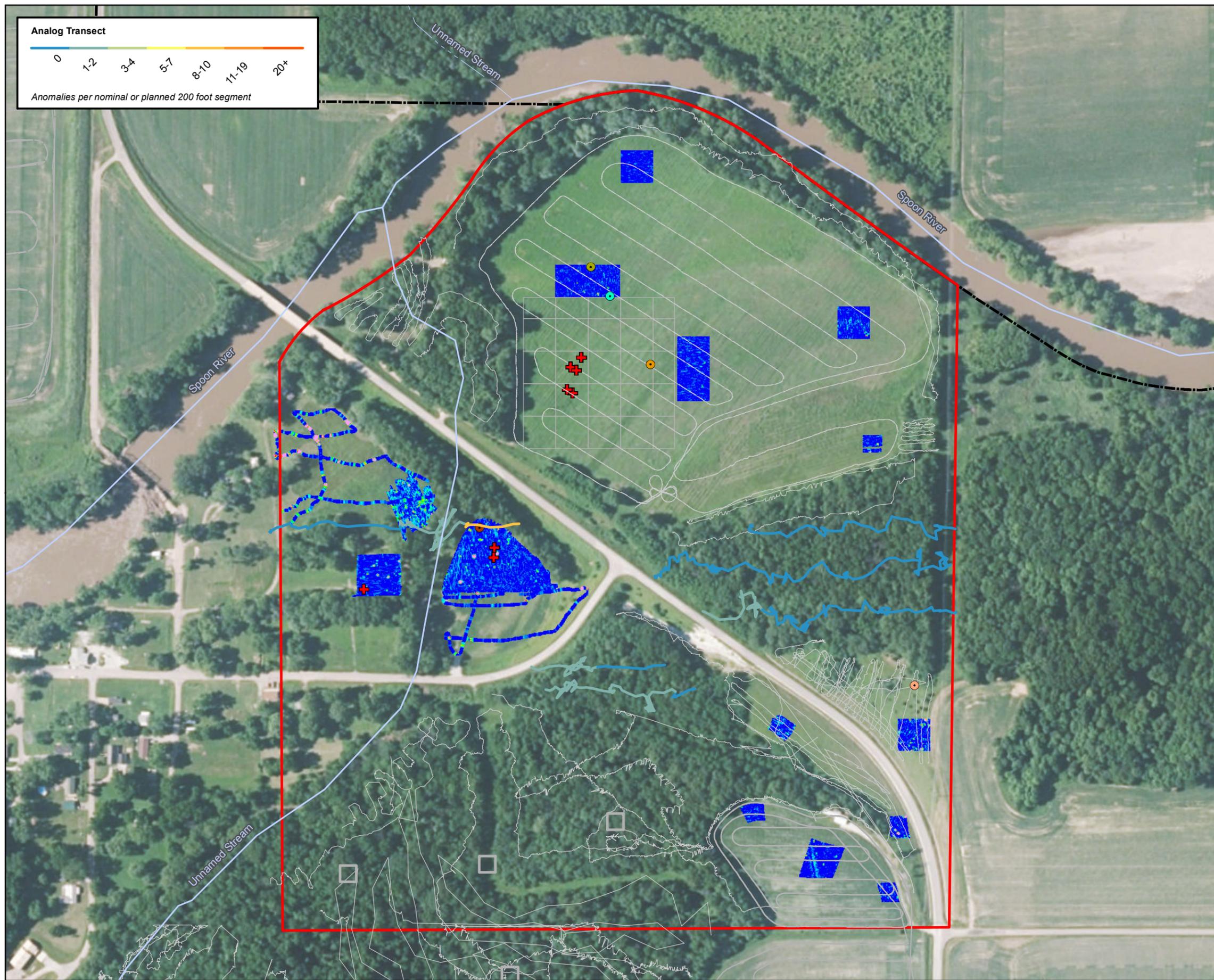
**MEC and MD Recovered
Aircraft Bombing Area - Area D
Former Camp Ellis Military Reservation
Fulton County, Illinois**

Drawn By: JZ	Date: 3/11/2016
Checked By: JH	Project No.: 60416745

Figure 8

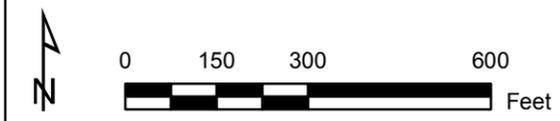


Z:\camp_ellis\figures\PP\Fig9_area_m_mec_md.mxd



- Legend**
- Installation Boundary
 - MRS
 - RA Geophysical Survey Grid
 - EE/CA Geophysics
 - Analog Grid
 - Stream or River
 - Intermittent Stream
 - DGM Transect
 - MEC-practice mines
 - MD-AT training mine pressure plate
 - MD-M1 series landmine pressure plate
 - MD-training mine fuze
 - MD-fuze from M1 mine
 - MD-practice M1 mine

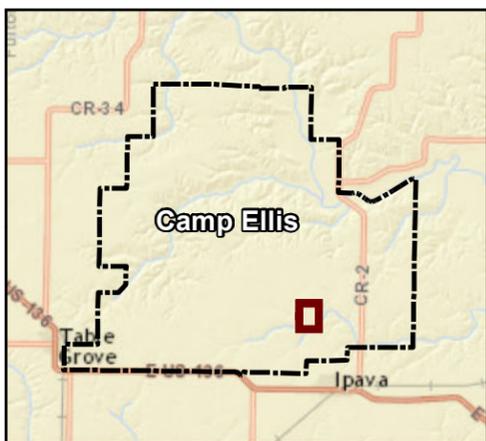
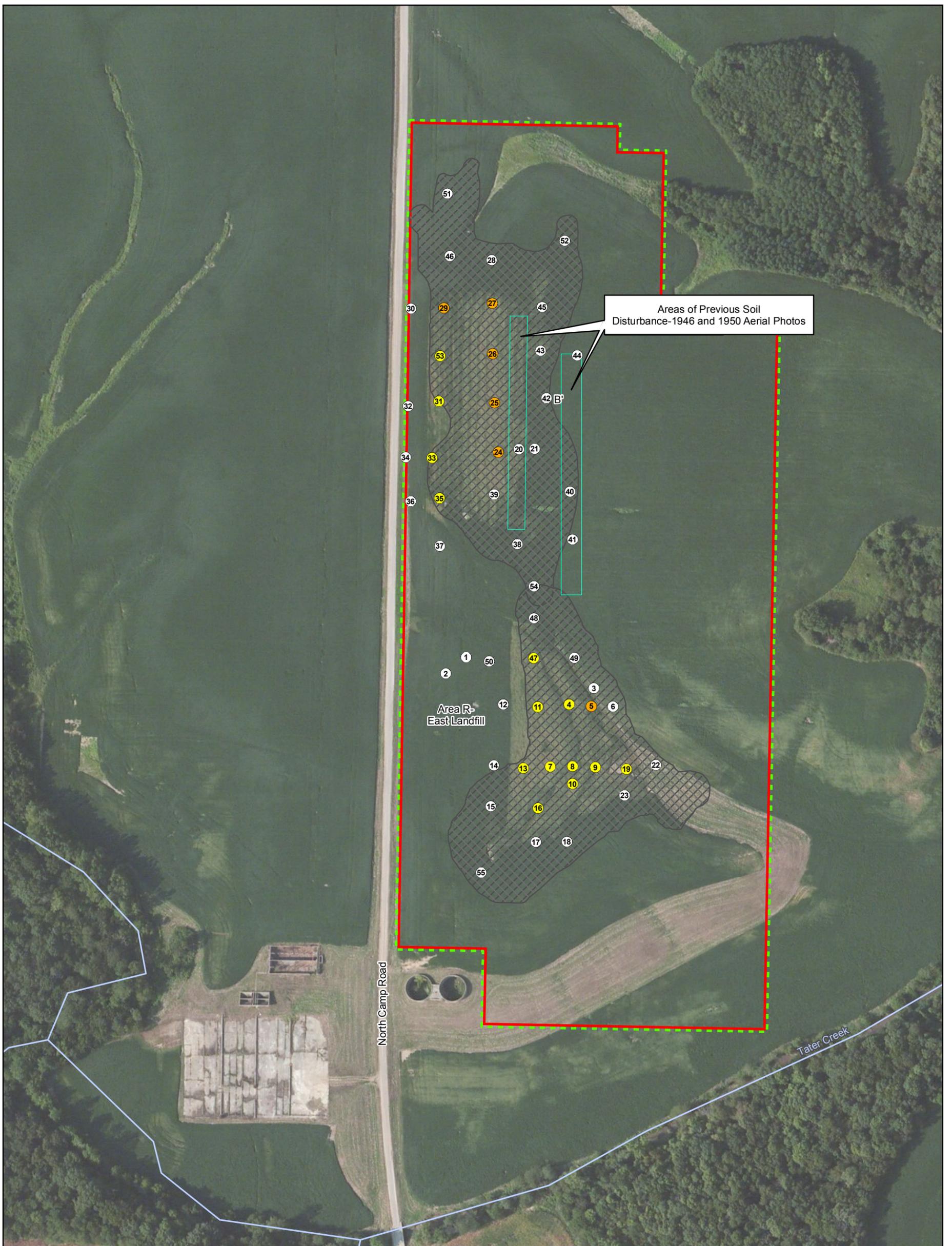
Notes:
 1. Projection: NAD 1983 State Plane Illinois West Feet
 2. Image Source: USDA FSA, NAIP 2014



**MEC and MD Recovered
Obstacle Area - Area M**
Former Camp Ellis Military Reservation
Fulton County, Illinois

Drawn By: JZ	Date: 3/11/2016
Checked By: JH	Project No. 60416745

Figure 9



Legend

- Installation Boundary
- Area R - East Landfill
- SI Interpreted Landfill Area
- Visual Survey Area
- Stream or River
- Test Pit with Minimal Debris
- Test Pit with Moderate Debris
- Test Pit with Significant Debris

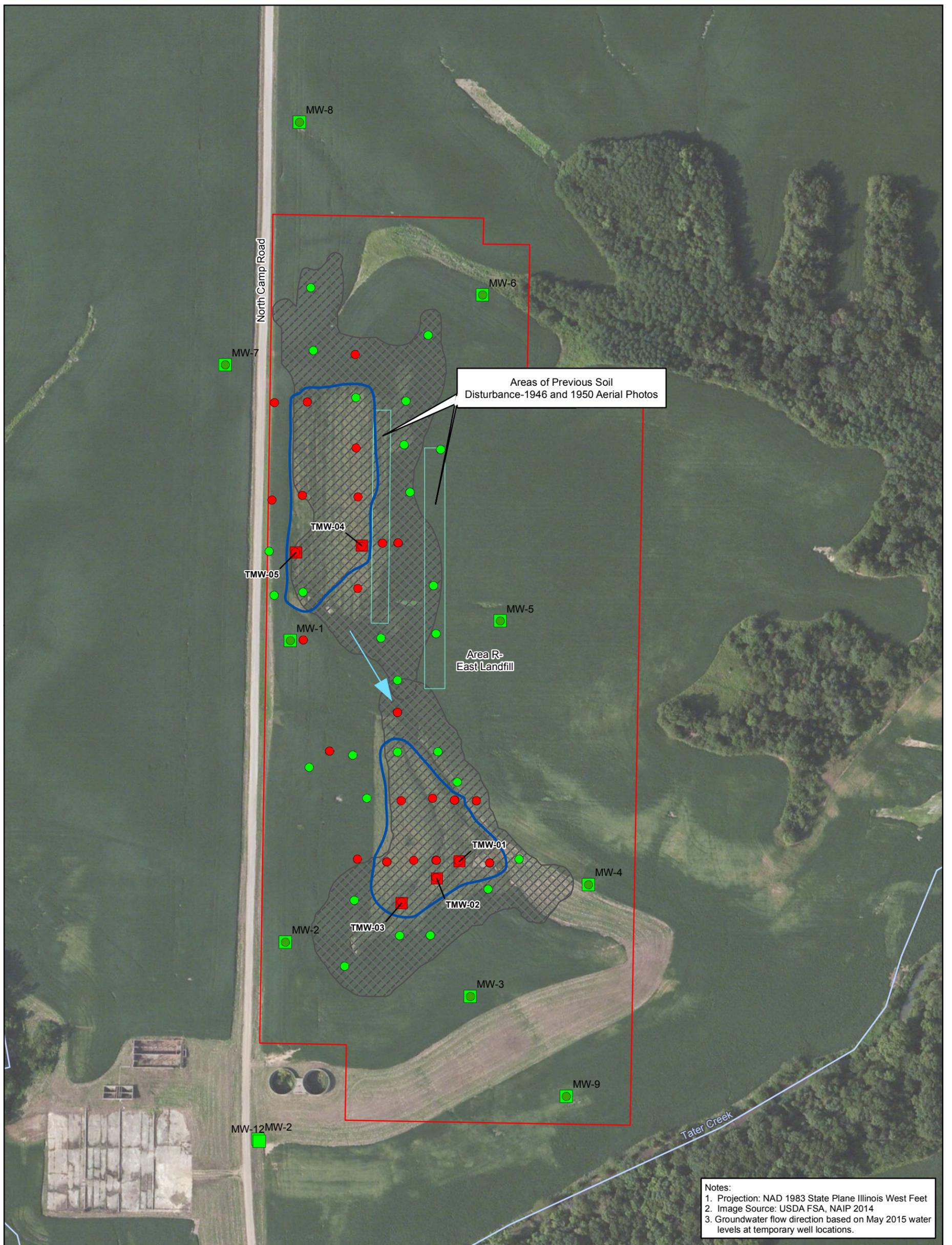
Notes:
 1. Projection: NAD 1983 State Plane Illinois West Feet
 2. Image Source: USDA FSA, NAIP 2014



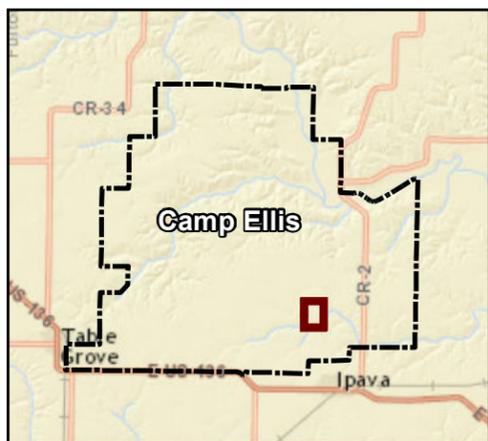
Test Pit Debris
East Landfill - Area R
 Former Camp Ellis Military Reservation
 Fulton County, Illinois

Drawn By: JM	Date: 3/11/2016
Checked By: CTA	Project No. 16170667

Figure 10

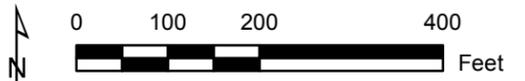


Notes:
 1. Projection: NAD 1983 State Plane Illinois West Feet
 2. Image Source: USDA FSA, NAIP 2014
 3. Groundwater flow direction based on May 2015 water levels at temporary well locations.



Legend

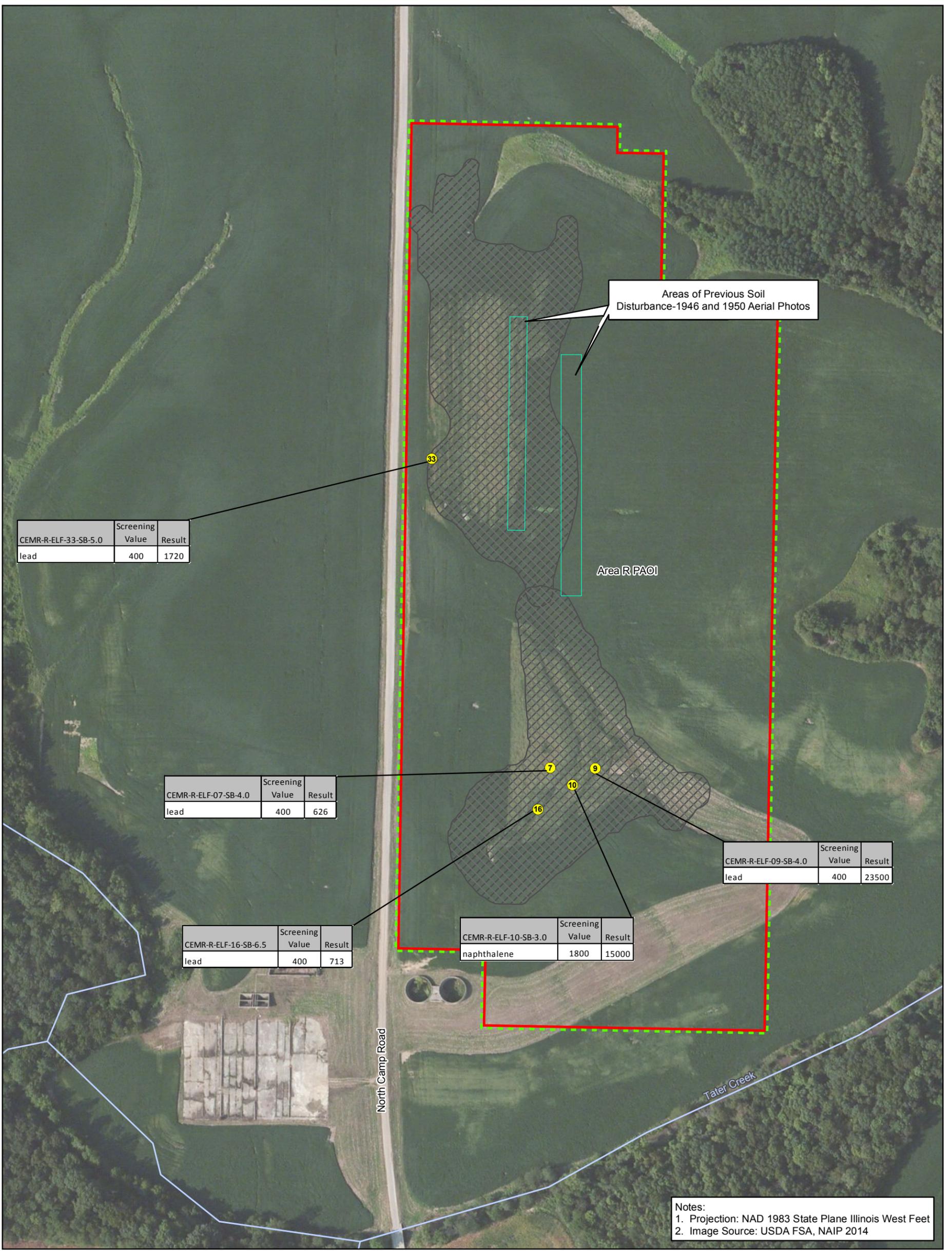
- Installation Boundary
- Area R - East Landfill
- SI Interpreted Landfill Area
- Stream or River
- Lateral Extent of Moderate to Significant Buried Debris
- Groundwater Flow Direction
- Soil Above Applicable Screening Levels
- Groundwater Above Applicable Screening Levels
- Soil At or Below Applicable Screening Levels
- Groundwater At or Below Applicable Screening Levels



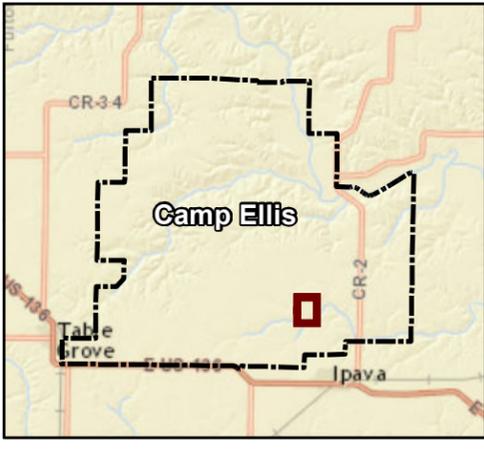
Nature and Extent of Contamination at East Landfill - Area R
 Former Camp Ellis Military Reservation
 Fulton County, Illinois

Drawn By: JM	Date: 3/11/2016
Checked By: JB	Project No. 16170667

Figure 11



Notes:
 1. Projection: NAD 1983 State Plane Illinois West Feet
 2. Image Source: USDA FSA, NAIP 2014

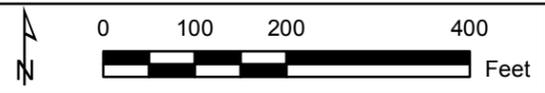


Legend

- Installation Boundary
- Area R - East Landfill
- SI Interpreted Landfill Area
- Visual Survey Area
- Stream or River
- Test Pit with Minimal Debris
- Test Pit with Moderate Debris
- Test Pit with Significant Debris

Metals reported in milligrams per kilogram.
 PAHs reported in micrograms per kilogram.

Screening value is the most stringent of Illinois TACO, non-TACO, or USEPA RSL for residential soil. Arsenic screening value is based on site-specific background calculations. Mercury screening value is based on the TACO construction worker (inhalation).



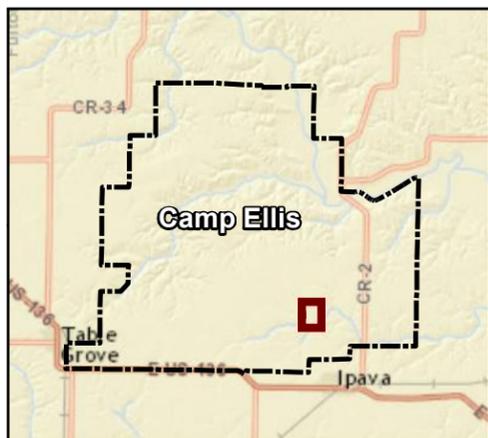


US Army Corps of Engineers®

**Contaminants of Concern
(Lead and Naphthalene) Exceedances at
East Landfill - Area R**

Former Camp Ellis Military Reservation
Fulton County, Illinois

Drawn By: JM	Date: 3/11/2016	Figure 12
Checked By: BB	Project No. 16170667	



Legend

- Installation Boundary
- Wastewater Treatment Plant
- Waste Water Treatment Plant Sludge Digesters
- Stream or River
- 2012 Ground Surface Contour
- ▲ SI Sediment Sample Location (in Sludge Digesters) Above Applicable Screening Levels
- Groundwater At or Below Applicable Screening Levels
- Soil At or Below Applicable Screening Levels
- ▲ Sediment At or Below Applicable Screening Levels

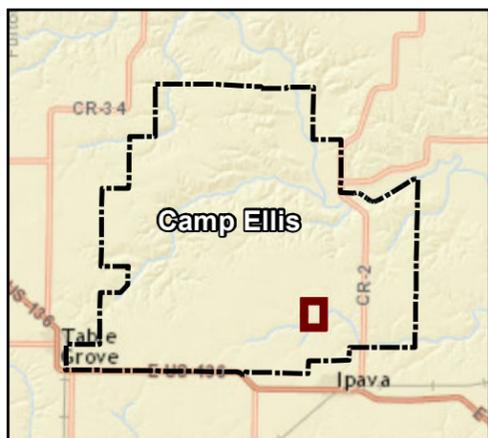
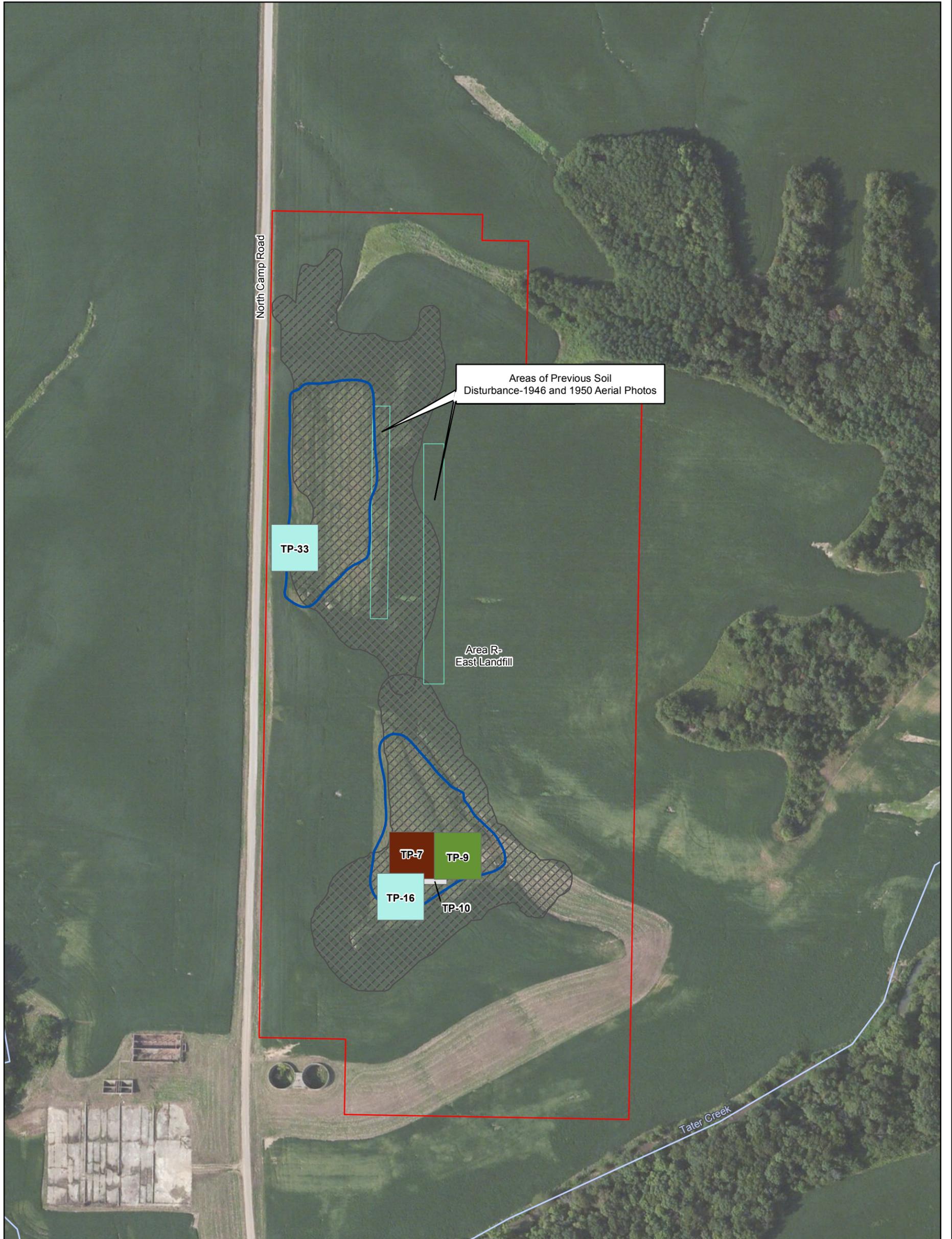
Notes:

1. Projection: NAD 1983 State Plane Illinois West Feet
2. Image Source: USDA FSA, NAIP 2014
3. 2012 National Elevation Dataset

0 100 200 400
Feet

Nature and Extent of Contamination at WWTP
Former Camp Ellis Military Reservation
Fulton County, Illinois

Drawn By: JZ	Date: 3/11/2016	Figure 13
Checked By: JH	Project No. 60416745	



Legend

- Installation Boundary
- Area R - East Landfill
- SI Interpreted Landfill Area
- Stream or River
- Lateral Extent of Moderate to Significant Buried Debris

Estimated Excavation Depths

- 0-4.5
- 0-5
- 0-6.5
- 0-7.5

- Notes:
1. Projection: NAD 1983 State Plane Illinois West Feet
 2. Image Source: USDA FSA, NAIP 2014



Estimated Soil Removal Areas at East Landfill - Area R
Former Camp Ellis Military Reservation
Fulton County, Illinois

Drawn By: JM	Date: 3/11/2016
Checked By: JB	Project No. 16170667

Figure 14