F I N A L

FEASIBILITY STUDY

FORMER MANEUVER AREA A
FORT BLISS
EL PASO, TEXAS

Prepared for:

United States Army Corps of Engineers – Tulsa District

1645 S 101st East Avenue

Tulsa, Oklahoma 74128

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Former Maneuver Area A

Fort Bliss
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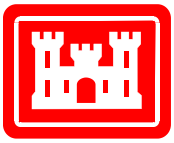

U.S. Department of the Army
Corps of Engineers –

Tulsa District
1645 S 101st East Avenue
Tulsa, Oklahoma 74128-4609

Prepared by:

URS

12120 Shamrock Plaza, Suite 300
Omaha, Nebraska 68154

16170698

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List of Acronyms

°F	degrees Fahrenheit
AEC	Army Environmental Command
APP	Accident Prevention Plan
ARAR	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
BIP	blown-in-place
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DD	Decision Document
DDESB	Department of Defense Explosives Safety Board
DGM	Digital Geophysical Mapping
DoD	Department of Defense
DoDI	Department of Defense Instruction
EM	Engineering Manual
EOD	explosives ordnance disposal
ESS	Explosives Safety Submission
FUDS	Formerly Used Defense Site
FS	Feasibility Study
GRA	general response action
$^{GW}Soil_{Ing}$	Soil to Groundwater Protection
HA	Hazard Assessment
HE	high explosive
HRR	Historical Records Review
IS	incremental sample
LTM	long-term management
LUC	land use control
MC	munitions constituents
MD	munitions debris
MDAS	material documented as safe
MEC	Munitions and Explosives of Concern
mm	millimeter
MMRP	Military Munitions Response Program
MPPEH	Material Potentially Presenting an Explosive Hazard
MRA	Munitions Response Area

MRS	Munitions Response Site
MRSPP	Munitions Response Site Prioritization Protocol
NCP	National Contingency Plan
NFA	No Further Action
O&M	Operations and Maintenance
PA	Preliminary Assessment
PCL	protective concentration level
PP	Proposed Plan
RAO	Remedial Action Objective
RI	Remedial Investigation
ROE	rights of entry
RRD	range-related debris
SI	Site Inspection
SU	sampling units
SUXOS	Senior Unexploded Ordnance Supervisor
TBC	to be considered
TCEQ	Texas Commission of Environmental Quality
TMV	toxicity, mobility, or volume
$^{Tot}Soil_{Comb}$	Total Soil Combined Exposures
UFP-QAPP	Uniform Federal Policy – Quality Assurance Project Plan
U.S.	United States
URS	URS Group, Inc.
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
UXO	unexploded ordnance
UXOQCS	Unexploded Ordnance Quality Control Specialist
UXOSO	Unexploded Ordnance Safety Officer
VSP	Visual Sampling Plan

This document presents the Feasibility Study (FS) for the Former Maneuver Area A Munitions Response Sites (MRSs) FTBLS-002-R-01, FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 near Fort Bliss and the City of El Paso, Texas (**Figure 1-1**).

1.1 INTRODUCTION

This FS report has been prepared by URS Group, Inc. (URS) in accordance with the Performance Work Statement for the United States (U.S.) Army Corps of Engineers (USACE) Tulsa District Contract Number W912BV-11-D-0016.

The FS was prepared pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986, U.S. Army Military Munitions Response Program (MMRP) Munitions Response Remedial Investigation (RI)/FS Guidance (U.S. Army 2009), and the U.S. Environmental Protection Agency (USEPA) Guidance 540/G-89/004 (USEPA 1988), and is part of the overall remedial action process.

1.2 PURPOSE AND OBJECTIVES

The RI investigated the Former Maneuver Area A MRS to characterize the site for the purpose of developing and evaluating remedial alternatives. Based on the results of the RI, the Former Maneuver Area A MRS was recommended to be subdivided into two MRSs to allow for a more accurate depiction of the conditions and risks associated with the former use of each area. The subdivided MRSs recommended in the RI were as follows:

- Former Maneuver Area A (FTBLS-002-R-01) MRS
- Uncontaminated Former Maneuver Area A (FTBLS-002-R-01A) MRS

The RI recommended an FS be completed for munitions and explosives of concern (MEC)/munitions debris (MD) at the aforementioned MRSs.

During the development of this FS, the subdivision and naming of the MRSs was discussed with the Army Environmental Command (AEC). Based on the results of the discussion, in order to better facilitate any potential future remedial actions, the boundaries and names of the recommended MRSs in the RI have been revised. The Former Maneuver Area A MRS will be subdivided into four MRSs (see **Figure 1-2**) rather than the two MRSs originally recommended in the RI. All four MRSs will be named the Former Maneuver Area A and will be distinguished by their new MRS identification numbers. The revision of the naming and the boundaries of the MRSs did not impact the conclusions and recommendations of the RI. The revised subdivision of the Former Maneuver Area A is as follows:

The MRS identified in the RI report as the Uncontaminated Former Maneuver Area A (FTBLS-002-R-01A) will be redesignated as Former Maneuver Area A(FTBLS-002-R-01). The MRS encompasses 23,356.99 acres and is divided into numerous parcels of varying size with

approximately 2,514 landowners, although 83 percent of the MRS is owned by 21 landowners. The majority of the area is undeveloped, but portions of the MRS are currently developed with residential homes, commercial businesses, ranching, and light industry. Only the name of this MRS has been changed from the RI. The MRS boundary, land parcels included in the MRS, current/historical uses, total acreage, etc. remained unchanged from the RI.

The MRS identified in the RI report as the Former Maneuver Area A (FTBLS-002-R-01) encompassed approximately 1,120 acres and consisted of eastern and western areas that were not contiguous. The parcels within the MRS are owned by one of two different landowners, in order to simplify any potential future land use agreements and to allow for the selection of a different remedy for each property owner (if warranted or needed with input from the current landowners), this MRS will be divided into three MRSs designated as follows.

- The portion of the western area (520 acres) that is currently owned by the private individual will be designated as Former Maneuver Area A (FTBLS-002-R-03).
- The portion of the western area (397 acres) that is currently owned by the Texas General Land Office will be designated as Former Maneuver Area A (FTBLS-002-R-04).
- The eastern area (203 acres) that is currently owned by the Texas General Land Office will be designated as Former Maneuver Area A (FTBLS-002-R-05).

All subsequent discussions in this FS will refer to the MRSs by their revised MRS identification numbers (**Figure 1-2**):

- FTBLS-002-R-01
- FTBLS-002-R-03
- FTBLS-002-R-04
- FTBLS-002-R-05

Since the boundaries and parcels included in the MRS changed from the RI, the RI data was reevaluated and a discussion of the RI results reflecting the current MRS boundaries is included in **Section 1.7.6**. Following the reevaluation of the RI data, the conclusions and recommendations from the RI remained unchanged. The recommended subdivision of the MRSs will be finalized by the completion of the Decision Document (DD) following the completion and approval of this FS and the Proposed Plan (PP).

The purpose of this FS is to identify and evaluate remedial action alternatives for those MRSs recommended for further action in the Fort Bliss RI Report (URS 2013b) (**Figure 1-2**). The FS report is the basis for recommending to the public a technically feasible and cost-effective remedial action that is protective of both human health and the environment. The overall objective of the remedial action alternatives proposed for these MRSs is to reduce or eliminate potential contact with MEC by current and/or future site receptors.

The performance objective of the task order is to complete the tasks necessary to gain acceptance of a DD in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), CERCLA, and Department of Defense (DoD), and U.S. Army guidance. This FS is being prepared under the U.S. Army MMRP and is necessary to support the DD.

1.3 FEASIBILITY STUDY PROCESS

This FS report is a companion document to the RI report (URS 2013b) that was submitted under a separate cover. The FS process, per the NCP (Code of Federal Regulations [CFR], Title 40, Part 300.430), consists of the following general steps:

- Develop remedial action objectives (RAOs).
- Develop the general response actions (GRAs) that may be taken to satisfy the RAOs.
- Identify volumes or areas of media to which GRAs may be applied.
- Identify and evaluate technologies and process options based on effectiveness, implementability, and relative cost to select a representative process option for each technology type.
- Assemble the selected representative technologies into alternatives representing a range of GRA combinations, as appropriate.
- Where numerous options have been identified, reduce the number of alternatives to analyze in detail by screening alternatives based on the criteria of effectiveness, implementability, and relative cost.
- For detailed analysis, evaluate retained alternatives based on nine criteria as specified by the NCP (CFR, Title 40, Part 300.430.[e][9]):
    1. Overall protection of human health and the environment
    2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)
    3. Long-term effectiveness and permanence
    4. Reduction of toxicity, mobility, or volume (TMV)
    5. Short-term effectiveness
    6. Implementability
    7. Cost
    8. State acceptance
    9. Community acceptance

The last two criteria, state acceptance and community acceptance, are modifying criteria and will be evaluated following the agency review and public comment period.

1.4 INSTALLATION LOCATION AND DESCRIPTION

Fort Bliss is located in portions of Texas and New Mexico, near the city of El Paso, Texas. Of the approximately 1.12 million acres encompassed by the Fort Bliss installation, 12 percent of the installation's total land area is in El Paso County in west Texas, and the remaining 88 percent is in the New Mexico counties of Dona Ana and Otero. **Figure 1-1** shows the boundaries of the MRSs, the location of Fort Bliss, and the surrounding communities.

The Fort Bliss MRSs included in this FS are FTBLS-002-R-01, FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 (**Figure 1-2**). These MRSs are subdivisions of the original Former Maneuver Area A MRS, which is part of the subdivision of the Former Maneuver Area Munitions Response Area (MRA). Information presented below is for the original Former Maneuver Area A MRS as it was presented in the RI.

1.4.1 Surface Topography

Fort Bliss is located within the Basin and Range physiographic province characterized by narrow, linear faulted mountain chains separated by relatively flat valleys or basins. Eastern portions of the original Former Maneuver Area A MRS are bordered by the Hueco Mountains, a north-south trending mountain range. Within the MRS, the Hueco Mountains reach elevations of between 5,000 and 5,500 feet above sea level. The elevated mountain areas transition to relatively flat basins having elevations typically between about 4,200 to 4,500 feet above sea level. Topographic gradient is generally downward toward the west across the original Former Maneuver Area A MRS, with exception of some isolated, elevated mountains that are separate from the main Hueco Mountain chain.

1.4.2 Climate

Fort Bliss lies within an arid to semi-arid climatic region that receives an average annual precipitation amount of between 9 and 10 inches. Rainfall for the wettest months of the year (July, August, and September) does not typically exceed 2 inches per month. Daily high/low temperature ranges during the coldest months (December and January) are between about 30 degrees Fahrenheit (°F) to 60°F. Daily high/low temperature ranges during the hottest months (June, July, and August) are between about 70°F to 95°F (rssWeather 2011). Prevailing winds are from the south during the summer and from the north during the winter (Weather Explained 2001).

1.4.3 Soils

Soils within and proximal to the original Former Maneuver Area A MRS can be separated into two general categories based on two distinct physiographic environments. One physiographic environment is the intermountain valleys/basins where soils are characteristically silty, sandy, and gravely loams that are shallow to deep, nearly level to very steep, and well-drained to excessively drained having formed from alluvium (originating from nearby mountain ranges)

and eolian material. The second physiographic environment is the Hueco Mountains and their foot slopes where soils are either absent due to direct limestone outcrop exposures or characteristically stony loams that are shallow (typically less than 5 inches) and well-drained. Soils within both physiographic environments are generally alkaline and calcareous having been formed principally from the weathering of limestone derived from the Hueco Mountains (USDA SCS 1971).

1.4.4 Geology

The original Former Maneuver Area A MRS is within the Basin and Range physiographic province of western North America (Seager 1981). Most of the original Former Maneuver Area A MRS is situated over a structural basin filled with Quaternary-aged sediments derived from the Hueco Mountains to the east. The basin is called the Hueco Bolson and consists of a thick sequence of layered fluvial, alluvial fan, evaporite, and eolian sediments (Sheng, et al. 2001). The Hueco Mountains reside along the eastern edge of the original Former Maneuver Area A MRS. Outcrops in the Hueco Mountains are primarily of Pennsylvanian and Permian-aged limestone (U.S. Army 1984). Associated with the Hueco Mountain range are remnants of igneous plutons that intruded into the area later during the late Tertiary Period following Basin and Range formation. The outcrops at Hueco Tanks State Park and to the northwest of the park (within the original Former Maneuver Area A MRS) represent igneous plutons that intruded into the area during that time (Cornet 2005).

1.4.5 Hydrogeology

The Hueco Bolson aquifer is the saturated portion of the Hueco Bolson. The Hueco Bolson aquifer consists of unconsolidated to slightly consolidated deposits composed of fine- to medium-grained sand with interbedded lenses of clay, silt, gravel, and caliche. The sediments have a maximum thickness of 9,000 feet. However, the bottom part of the Hueco Bolson is primarily clay and silt. Therefore, only the top several hundred feet produce good-quality water. Depth to groundwater in the Hueco Bolson in the vicinity of El Paso is reported to be between 250 and 400 feet below ground level. Another similar aquifer located on the west side of the Franklin Mountains and west of Fort Bliss is called the Mesilla Bolson aquifer (Sheng, et al. 2001).

1.4.6 Hydrology

Major surface water bodies do not reside within or proximal to Former Maneuver Area A. Waterways carry surface water generally westward across the intermountain basin where the drainage water evaporates or infiltrates downward into the subsurface before it can reach the Rio Grande River. Playas exist sporadically and will hold surface water for brief periods of time (up to a few weeks) following precipitation events. Playas remain dry for most of the year but are able to briefly hold water without significant downward percolation due to their high silt and clay content (Fort Bliss 2001). The potential presence of a playa is not anticipated to impact the remedy selected in this FS.

1.4.7 Vegetation

Basin areas isolated from topographically elevated mountains are characterized by basin desert shrublands. Common plant varieties found in basin desert shrubland areas are honey mesquite (*Prosopis glandulosa*) and four-winged saltbrush (*Atriplex canescens*) with mesa dropseed (*Sporobolus flexuosus*) existing sparsely as undergrowth. These plants are associated with coppice sand dunes found throughout basin areas. Sandsage (*Artemisia filifolia*) can be common in some basin desert shrublands areas (Fort Bliss 2001).

As topographic elevations increase on alluvial fan toe slopes of mountainous areas, desert shrublands vegetation gives way to species dominated by tarbush (*Flourensia cernua*), creosotebush (*Larrea tridentate*), and bush muhly (*Muhlenbergia porter*). Tobosagrass (*Hilaria mutica*) and burrograss (*Scleropogon brevifolius*) can also be common. The highest elevations within Former Maneuver Area A are characterized by rocky slopes (Hueco Mountains and unnamed mountains) that are dominated by lechugilla (*Agave lechuguilla*) and creosote bush (*Larrea tridentate*). Grasslands are supported on high elevation alluvial deposits where sideoats grama (*Bouteloua curtipendula*) and black grama (*Bouteloua eriopoda*) are common. Other vegetation varieties that can exist at high elevations are curleyleaf muhly (*Muhlenbergia setifolia*), skeletonleaf goldeneye (*Viguiera stenoloba*) ocotillo (*Fouquieria splendens*), common stool (*Dasylirion wheeleri*), and soaptree yucca (*Yucca elata*) (Fort Bliss 2001).

Sneed's pincushion cactus is the only threatened/endangered plant known to exist within El Paso County, Texas. Limestone outcrops within the Hueco Mountains would appear to provide the habitat preferred by this species. However, its El Paso County presence is known only to the Franklin Mountains which are located about 25 miles west of Former Maneuver Area A (Heil and Brack, 1986; Answers.com, 2012). No endangered vegetation species were identified at the Former Maneuver Area A MRS during the completion of the RI.

1.4.8 Wildlife

Invertebrates identified on and near the original Former Maneuver Area A MRS include grasshoppers, beetles, flies, butterflies, ants, and termites. Ants and termites are the most numerous invertebrates and play important roles in affecting soil properties and consuming vegetation. Insect larvae and shrimp-like crustaceans (*Eulimnadia texana*) hatch during rainy seasons in playas and arroyos (Fort Bliss 2001).

Amphibian species on and near Former Maneuver Area A are primarily toads. The most diverse reptile group is lizards. The western marbled whiptail (*Cnemidophorus marmoratus*) and the Texas horned lizard (*Phrynosoma cornutum*) are most common with the leopard lizard (*Gambelia wislizenii*), striped whiptail (*Cnemidophorus inornatus*), side-blotched lizard (*Uta stansburiana*), and marbled whiptail lizard (*Cenmidophorus marmoratus*) being common but more prevalent in desert shrubland habitat. Almost as diverse as lizards are snakes. The western diamondback rattlesnake (*Crotalus atrox*) and bull snake (*Pituophis catenifersayi*) are most

common with the Texas long-nosed snake (*Rhinocheilus lecontei*) common but more prevalent in desert shrubland habitat (Fort Bliss 2001).

Birds provide the highest number of species within an animal group. Over 300 bird species have been recorded for Fort Bliss. Species numbers restricted to Former Maneuver Area A are not known. Most species are observed only during annual migrations or reside at Former Maneuver Area A seasonally, rather than year-long. Indigenous birds most common to desert shrub habitat are the black-throated sparrow (*Amphispiza bilineata*), western kingbird (*Tyrannus erticalis*) Scott's oriole (*Icterus parisorum*), and ash-throated flycatcher (*Myiarchus cinerascens*). The most common indigenous bird species associated with arroyos and upland habitats are the black-throated sparrow, northern mocking bird (*Mimus polyglottos*), verdin (*Auriparus flaviceps*), brown-headed cowbird (*Molothrus ater*), mourning dove (*Zenaida macroura*), and ash-throated flycatcher. The Swainson's hawk (*Buteo swainsonii*) and turkey vulture (*Cathartes aura*) are the most common raptors in the desert shrublands. Other birds of prey (falcons, hawks, eagles) may be seen in conjunction with mountainous areas (Hueco Mountains). Other bird species common to mountainous areas are the cactus wren (*Campylorhynchus brunneicapillus*), canyon towhee (*Pipilo fuscus*), house finch (*Carpodacus mexicanus*), and varieties of quail, in addition to mourning dove and northern mockingbird which also reside in desert shrubland habitat (Fort Bliss 2001).

Rodent species are numerous and widespread in the MRS. The most common rodents are the silky pocket mouse (*Perognathus flavus*) and Merriam's kangaroo rat (*Dipodomys merriami*). Rodent populations are greater in and along arroyos than adjacent upland habitats. The desert cottontail (*Sylvilagus audubonii*) and black-tailed jackrabbit (*Lepus californicus*) are common, particularly in desert shrubland habitat (Fort Bliss 2001).

Predators found at the MRS consist of the coyote (*Canus latrans*), kit fox (*Vulpes macrotis*) badger (*Taxidea taxus*), and bobcat (*Lynx rufus*). Mountain lions (*Puma concolor*) are rare at Former Maneuver Area A. Mountain lions and black bears are more likely to reside in mountainous regions further north (such as the Sacramento Mountains, Organ Mountains, and San Andreas Mountains) (Fort Bliss 2001).

Big game animals occurring at the MRS are mule deer (*Odocoileus hemionus*) and pronghorn antelope (*Antilocapra Americana*). Oryx gazelle (*Oryx gazella*), a native African species, have been introduced into New Mexico and have become common in northern regions of Fort Bliss but are not likely to be seen at Former Maneuver Area A (Fort Bliss 2001).

Information regarding threatened and endangered species with potential to occur in the original Former Maneuver Area A MRS was obtained from the United States Fish and Wildlife Service and Texas Parks and Wildlife Department and is summarized in **Table 1-1**. This table contains threatened/endangered species that are reported to exist or potentially exist in El Paso County and require vegetative habitats that exist at the original Former Maneuver Area A MRS as described in **Section 1.4.7**. No endangered wildlife species were identified at the Former Maneuver Area A MRS during the completion of the RI.

1.4.9 Cultural Resources

The Texas Historical Commission Archeological Sites Atlas was queried to ascertain specific archeological site information for the original Former Maneuver Area A MRS. Twenty archeological sites have been documented as being within the original Former Maneuver Area A MRS based on geographic information system coordinate data (**Table 1-2**). All but three of the 20 sites are documented as prehistoric artifact scatters, camps, or habitation sites. The other three sites are classified as "unknown." Two of the 20 sites have been determined eligible for listing in the National Register of Historic Places and should be avoided or protected.

1.5 MRS DESCRIPTIONS AND BACKGROUND

1.5.1 FTBLS-002-R-01

FTBLS-002-R-01 includes residential homes, commercial businesses, light industry, and undeveloped land, and encompasses approximately 23,356.99 acres (**Figure 1-3**). None of the land included in the MRS boundaries is currently owned or utilized by Fort Bliss. According to the RI, the MRS is currently owned by 2,514 landowners including state entities and private individuals. This MRS is part of the Former Maneuver Area MRA, which was used for various military training exercises from 1939 into the 1970s. Former military training exercises are discussed in **Section 1.7.4**.

1.5.2 FTBLS-002-R-03

FTBLS-002-R-03 encompasses approximately 520 acres of undeveloped land that is primarily used for ranching (**Figure 1-3**). None of the land included in the MRS boundaries is currently owned or utilized by Fort Bliss. This MRS is part of the Former Maneuver Area MRA, which was used for various military training exercises from 1939 into the 1970s. Former military training exercises are discussed in **Section 1.7.4**.

According to the RI, the MRS is part of a larger parcel of land currently owned by a private individual that is reportedly utilized for ranching. However, no cattle were observed on the land when the field work was completed. A large rock formation is located in the northwestern portion of the MRS. The remainder of the MRS was sparsely vegetated with native vegetation.

1.5.3 FTBLS-002-R-04

FTBLS-002-R-04 encompasses approximately 397 acres of undeveloped land that is primarily used for ranching and/or recreational hunting (**Figure 1-3**). None of the land included in the MRS boundaries is currently owned or utilized by Fort Bliss. This MRS is part of the Former Maneuver Area MRA, which was used for various military training exercises from 1939 into the 1970s. Former military training exercises are discussed in **Section 1.7.4**.

According to the RI, the MRS is part of a larger parcel of land currently owned by a State of Texas entity (the Texas General Land Office). This parcel is fenced, gated, and currently leased to a private individual and utilized for ranching and recreational hunting. No cattle were observed at the time the field work was completed, but a corral in the area indicates it has occurred in the past. The MRS was observed to be relatively free of vegetation at the time the RI field work was performed.

1.5.4 FTBLS-002-R-05

FTBLS-002-R-05 encompasses approximately 203 acres of undeveloped land that is primarily used for ranching and/or recreational hunting (**Figure 1-3**). None of the land associated with the MRS is currently owned or utilized by Fort Bliss. This MRS is part of the Former Maneuver Area MRA, which was used for various military training exercises from 1939 into the 1970s. Former military training exercises are discussed in **Section 1.7.4**.

According to the RI, the MRS is part of a larger parcel of land currently owned by a State of Texas entity (the Texas General Land Office). This parcel is fenced, gated, and currently leased to a private individual and utilized for ranching and recreational hunting. No cattle were observed at the time the field work was completed, but a corral in the area indicates it has occurred in the past. Vegetation at the MRS was dense and consisted of thorn bushes, yucca, and cactus.

1.6 CURRENT AND FUTURE LAND USE

FTBLS-002-R-01, FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 have not been part of the Fort Bliss military installation since 1980. Potential future land use is expected to be consistent with current land use.

1.7 PREVIOUS INVESTIGATIONS

Previous MMRP investigations at Fort Bliss include the following:

- Range Inventory Report, issued November 2002 (TechLaw 2002)
- Range Inventory Report, issued January 2003 (e^2M 2003)
- Site Inspection Report, issued April 2007 (e^2M 2007)
- Historical Records Review, issued October 2009 (TLI Solutions 2009)
- MMRP Site Inspection Report, issued March 2011 (TLI Solutions 2011)
- MMRP RI Report, issued December 2013 (URS 2013b)

1.7.1 Range Inventory Report (2002)

This was the first of two Range Inventory Reports. The original Former Maneuver Area A MRS was not investigated as part of this report. This effort was part of the Preliminary Assessment (PA) phase of the CERCLA process.

1.7.2 Range Inventory Report (2003)

According to the 2003 Range Inventory Report, the Former Maneuver Area MRA was identified as one of five potential MMRP eligible sites. The report stated the site was used for various training exercises from about 1939 into the 1970s. Munitions reported to have been used at the site included aerial rockets (smoke and white phosphorous), practice guided missiles, bombs, and small arms. This effort completed the PA phase of the CERCLA process.

1.7.3 Site Inspection Report (2007)

The 2007 Site Inspection (SI) evaluated potential MMRP eligible sites at Fort Bliss that were previously identified in the Range Inventory Reports. Of the potential MMRP eligible sites, one site was determined to be an operational range and four sites were determined to be formerly used defense sites (FUDS). The Former Maneuver Area MRA was one of four sites determined to be a FUDS and was not addressed in the SI report.

1.7.4 Historical Records Review Report (2009)

Further evaluation during the Historical Records Review (HRR) and subsequent to the SI resulted in only a portion of the Former Maneuver Area being FUDS eligible. As a result, the HRR concluded that an SI would need to be completed for the entire Former Maneuver Area MRA under the Active Army MMRP.

The HRR provided details of historic ownership and boundaries of the Former Maneuver Area MRA. The report discussed prior military usage, as documented in historic maps, photographs, aerial photographs, and written documents.

During the early 1940s, infiltration courses were constructed to provide areas where troops could crawl under barbed wire while being subjected to nearby explosions and overhead machine gun fire. Natural ravines and bluffs were used for foot marches of up to 25 miles with full field equipment. Specific locations for these activities were not identified in historical documents.

Beginning in the 1940s, the Former Maneuver Area was used for anti-aircraft artillery maneuvers. No firing of live ammunition was to be allowed so as not to be a hazard to existing air lanes. However, there are indications of using live ammunition at times. It has been suspected that anti-aircraft artillery troops would train by firing at targets being towed by flying aircraft.

Other types of training involved soldiers using M1 .30 caliber rifles and smoke grenades. Mock villages (Little Tokyo and Yokohama Mock Village) were constructed for training troops in tactics of street fighting, but the mock villages were not located in the Former Maneuver Area. Portions of the Former Maneuver Area were designated in a 1951 map as being used for high-level bombing and strafing missions, although specific descriptions of such events occurring within the Former Maneuver Area do not appear in historic documents.

A hand-drawn, unscaled map (1956) depicts a guided missile launch site that appears to reside generally in the southern area of the Former Maneuver Area. Other maps (1951 and 1982) vaguely depict a guided missile launch site in the general area near the Texas-New Mexico border, which may be proximal to the northern part of the Former Maneuver Area. Further information regarding a guided missile launching site(s) as depicted on these maps was not found in other historical documents. Consequently, the exact location of one or more guided missile launch sites is unclear.

1960s vintage documents indicated Maneuver Area No. 2 (which comprised the majority of the Former Maneuver Area) was used for air defense artillery training that included detection, identification, tracking, and simulated engagement of aerial targets. Maneuver Areas No. 1 and No. 2 provided the advantage of having twice the usable tracking azimuth sweep for radar detection of air targets than other maneuver areas at Fort Bliss. The Former Maneuver Area, along with other areas at Fort Bliss, may have also been used for testing and evaluating equipment related to the Nike-Hercules Missile, Air Defense Distribution Systems, Air Defense Communication Systems, and Electronic Countermeasure and Electronic Counter-Countermeasure Systems.

During the 1970s, the Former Maneuver Area was used for a multitude of field maneuver training exercises by many factions of the military. Exercises were described as Operational Readiness Training, Strategic Army Forces and Return of Forces to Germany Battalion exercises, Army Training Tests, Selection and Occupation of Position Training, Adventure Training Exercises, road march training, night training, unit and individual training, map and compass course training, orienteering, Escape and Evasion training, Infantry Small Unit Tactics training, Air Defense battalion training, and other tactical training including training of National Guard and Army Reserve units. Details of how the training was conducted and the equipment/weapons used during the training were not provided in the HRR.

Documents indicate that clearances of maneuver training areas were conducted during the 1970s. Units were to remove all refuse, small arms training ammunition, and training devices following training maneuvers and to ensure that explosive training devices had detonated or were retrieved or marked for later retrieval. Specific clearance actions were also reported. 1,280 acres of the Former Maneuver Area were cleared of duds in 1946. Unexploded ordnance (UXO) and MD were reportedly discovered. Several “hot spots” were cleared in 1992 and 1993 but the clearance areas were found to be north and west of the Former Maneuver Area and within the operational range of Fort Bliss. Discoveries of MEC or MD were not discussed in the HRR for the “hot spot” clearance event.

Munitions items related to military activities were also discovered at Hueco Tanks State Park. Some of the munitions items were found during a survey conducted between 1999 and 2001 by the Texas State Archeologist at the park. Other munitions items were found by park visitors. These items are reported to be related to small arms munitions and are retained as part of an artifacts collection at the park. According to the State Archeologist, the oldest munitions item was a centerfire cartridge case fragment from a 45-70 caliber rifle adopted by the U.S. military for use from 1873 to 1892. Two World War II munitions items were a .50 caliber machine gun case and a 30-06 cartridge. The most recent piece of military ammunition identified by the State Archeologist was an unfired 5.56 millimeter (mm) centerfire cartridge from the early 1970s.

Based on the HRR, potential MEC and MD at the Former Maneuver Area was suspected to be related to small arms munitions, small arms blank munitions, and various types of pyrotechnics devices. Reports of aerial rockets, practice guided missiles, and bombs within the Former Maneuver Area were not confirmed during the HRR. Potential munitions constituents (MC) was suspected to be lead and other various metals, explosives compounds, and a host of compounds used to facilitate combustion and create desired combustion effects.

1.7.5 Site Inspection Report (2011)

Information collected during the HRR was used to provide the basis for SI activities. Sixteen investigative areas were identified within the Former Maneuver Area for conducting visual surveys and collecting soil samples. Rights of entry (ROEs) were acquired for only 12 of the 16 areas.

Visual surveys were conducted for identifying potential MEC, MD, or munitions-related material. For the visual surveys, linear transects were walked by field personnel. Transect paths were determined based on known or suspected points of interest (firing points, target areas, detonation areas, disposal areas, and maneuver areas), terrain, vegetative cover, and site features. Transects provided only representative coverage of each of the 12 areas for which ROEs were obtained. Hand-held electromagnetic metal detectors were used by field personnel during the survey. Groundcover such as leaves, deadfall, grass, and weeds were removed as necessary to expose the ground surface for inspecting metal detector anomalies. Hand-held global position system units were used to record the track of each transect line and to digitally locate munitions-related items.

All anomalies were related to surface finds. No subsurface anomalies were identified during the visual survey. No MEC items were observed during the visual survey. MD, range-related debris (RRD), and small arms ammunition were observed in seven of the 12 surveyed areas (Areas 4, 5, 6, 9, 10, 11, and 14). The MD, RRD, and small arms ammunition consisted of the following:

Munitions Debris:

- Fragments resulting from high explosive (HE) detonations
- Fragments and fuzes from 4.2-inch mortars (Area 4 only)

- A fuze from an expended smoke grenade

Small Arms Ammunition:

- .30-06 blank shell casings
- 5.56 mm blank shell casings
- 7.62 mm blank shell casings
- .30 caliber blank shell casings

Range Related Debris:

- '03 Springfield Stripper Clips
- M104 illuminating flare canister lid
- Machine gun links (.30-06, M60, and .30 caliber)
- Belt starter tabs
- M14 rifle clip
- M1 Garand clips

In addition, evidence of military activity, including military tent stakes, chemical lights communication wire, and a grounding rod for an electrical generator, was identified in Area 14. A summary of finds for respective surveyed areas is presented in Table 1-3 of the RI Report (URS 2013b).

Surface soil samples (zero to six inches below ground surface [bgs]) were collected to evaluate the presence of MC within each of the 12 areas. Samples were collected where MD or evidence of past military activities were observed. If MD or military activity evidence were not observed, samples were collected from locations that generally represented the overall characteristics of the investigation area. Composite soil samples were collected in conjunction with significant MD finds. Composites were formed from seven individual samples collected within ½ meter of the suspected impact area. Incremental sampling (IS) soil samples were collected in areas where MD was scattered over a wide area or where no evidence of military munitions was observed. IS areas ranged in size from one half to one acre and the number of increment samples from each IS area ranged from 40 to 50.

Soil samples were analyzed for a subset of the Target Analyte List metals and explosives, as agreed to by stakeholders at a technical project planning meeting. Screening levels used for comparison to metals concentrations were three times the Texas Commission of Environmental Quality (TCEQ) background concentrations. Analytical results for metals indicated all concentrations were below applicable screening levels. Screening levels used for comparison to explosives concentrations were USEPA Regional Screening Levels; however, there were no detections of explosives compounds in the soil samples.

In summary, the SI did not identify any MEC in conjunction with the 12 areas that underwent visual surveys in the Former Maneuver Area. However, MD was discovered at seven of 12 surveyed areas. For the 12 surveyed areas, no explosives-related compounds were detected in soil samples and the concentrations of metals were below comparative background levels applicable to the SI (three times the TCEQ State background levels). Based on the SI results, the following recommendations were made:

- The Former Maneuver Area MRS is to become a Munitions Response Area consisting of two MRSs; namely Former Maneuver Area A and Former Maneuver Area B.
- Former Maneuver Area A is to undergo additional investigation for MEC because of an identified mortar impact area, firing position, and fighting position and having areas with a high potential of being impacted by military training activities that were not surveyed.
- Former Maneuver Area B is to receive a No Further Action (NFA) status for MEC because no evidence of MEC was observed during the visual survey and there are no areas perceived as having a high potential of being impacted by military training activities.
- Former Maneuver Areas A and B are to receive a NFA status for MC because metal concentrations in soil were below applicable screening criteria and explosives concentrations in soil were not detected. However, should MEC be identified within Former Maneuver Area A during further investigation, additional sampling may be required.

1.7.6 Remedial Investigation (2013)

The investigations performed during the SI resulted in the division of the Former Maneuver Area MRS into the Former Maneuver Area A and Former Maneuver Area B MRSs. The SI utilized information collected from 12 surveyed areas to support the division of the Former Maneuver Area MRS. Following the completion of the SI, the surveyed areas from the SI were not reinvestigated as identified in the SI. A more comprehensive investigation was completed during the RI which included a visual survey for all properties located within the Former Maneuver Area A MRS where an ROE agreement was obtained.

The results of the visual survey completed during the RI were utilized to identify twelve areas within the Former Maneuver Area A MRS for geophysical investigation: Areas A through L. Digital geophysical mapping (DGM) transects and a total of twenty-six (26) 100 percent coverage grids were designated within Areas A through L. Intrusive investigations were subsequently completed for all anomalies identified by DGM along the transects and within the grids.

Following the completion of the intrusive investigations, MC sampling was completed for soils located in representative 100 percent coverage grids and all blown-in-place (BIP) locations. Analytical results for explosives were compared to the Texas Risk Reduction Program (TRRP) Total Soil Combined Exposures ($^{Tot}Soil_{Comb}$) and Soil to Groundwater Protection ($^{GW}Soil_{Ing}$).

In accordance with TCEQ TRRP guidance for metals, the protective concentration level (PCL) was selected using the lower of the $^{Tot}Soil_{Comb}$ and $^{GW}Soil_{Ing}$. This PCL was then compared to the Texas Statewide Background level. The background level was utilized as the PCL if it was higher than the $^{Tot}Soil_{Comb}$, and the $^{GW}Soil_{Ing}$.

The incremental sampling was utilized for human health and ecological risk evaluations because it was considered to be more representative of the constituent concentrations across the entire MRS.

A summary of the information provided in the RI Report (URS 2013b) for each MRS is included in the following sections. The data presented is based on the revised MRS boundaries as discussed in **Section 1.2**.

1.7.6.1 FTBLS-002-R-01

- **Type:** Former Maneuver Area
- **Size:** 23,356.99 acres
- **Site Features:** The MRS is divided into numerous parcels of varying size with approximately 2,514 landowners, although 83 percent of the MRS is owned by 21 landowners. The majority of the area is undeveloped, but portions of the MRS are currently developed with residential homes, commercial businesses, ranching, and light industry.
- **Access:** Access to these areas is limited by locked gates, fences, natural barriers (topography, vegetation, arroyos, etc.). However, the land is owned by state entities and private individuals so access to these areas is not within Army control. Numerous land owners either elected to decline the ROE request to access their property or did not respond to the ROE request. However, the visual and DGM surveys are considered to be representative of the conditions at the MRS and will apply to the properties not accessed during the field work.
- **Visual Survey Results:** 34 MD items were identified in the MRS during the visual survey. The type and quantity were noted and the items were left in place.
- **Geophysical Investigation Results:** DGM identified 478 anomaly targets for investigation in geophysical transects and grids. All anomaly targets were intrusively investigated. The Visual Sampling Plan (VSP) indicates the density of anomalies is low throughout the MRS.
- **Intrusive Investigation Results:** No MEC items were identified at the MRS. However, 25 MD items were identified during the course of the intrusive investigation. All MD items recovered during the intrusive investigation were removed from the site.
- **MC Sampling:** MC sampling was performed for surface soils located in 3 grid sampling units (SUs) deemed representative of the MRS. Grid sampling utilized an incremental sampling method. No subsurface, sediment, or groundwater samples were required at the site. No BIP sample locations were located within this MRS. With the exception of lead, all sample results were below the human health and ecological screening levels. Lead

concentrations were identified in excess of the human health and ecological screening levels, but the concentrations were below the state-wide background concentrations established by the TCEQ. Based on the results of the MC sampling, NFA was recommended for MC at this MRS.

- **MEC Hazard Assessment (HA):** Not Applicable. A MEC HA was not developed for the MRS as no MEC was identified within the MRS during the RI.
- **Munitions Response Site Prioritization Protocol (MRSPP) Priority:** 4

1.7.6.2 FTBLS-002-R-03

- **Type:** Former Maneuver Area
- **Size:** 520 acres
- **Site Features:** The MRS is part of a larger parcel of land currently owned by a private individual that is reportedly utilized for ranching. However, no cattle were observed on the land when the field work was completed. A large rock formation is located in the northwestern portion of the MRS. The remainder of the MRS was sparsely vegetated with native vegetation.
- **Access:** The MRS is located outside of the Fort Bliss installation on land that is owned by a private individual. Fences enclose the larger property owned by the private individual. While access to the larger properties encompassing the MRS is restricted by locked gates, once access is achieved to the larger property no barriers are present to prevent access to the MRS.
- **Visual Survey Results:** 87 MD items were identified during the visual survey. The type and quantity were noted and the items were left in place.
- **Geophysical Investigation Results:** DGM identified 513 anomaly targets for investigation in geophysical transects and grids. All anomaly targets were intrusively investigated. VSP indicated anomaly densities ranging from low to high throughout the MRS.
- **Intrusive Investigation Results:** One MEC item (**Figure 1-3**) and 378 MD items were identified during the course of the intrusive investigation. All MEC items were disposed of in accordance with the work plan. All MD items recovered during the intrusive investigation were removed from the MRS.
- **MC Sampling:** MC sampling was performed for surface soils located in 5 grid SUs and 1 BIP sample location at the MRS. Grid sampling utilized an incremental sampling method while BIP sampling utilized a composite sampling method. With the exception of lead, all incremental sample results were below the human health and ecological screening levels. Lead concentrations were identified in excess of the human health and ecological screening levels, but the concentrations were below the state-wide background concentrations for lead established by the TCEQ.

Lead was identified at concentrations exceeding the soil-to-groundwater human health screening level at the BIP sample location. However, the lead concentration was within the background level for lead established by the TCEQ. Therefore, lead was not considered to represent a human health risk. No additional metals were detected above screening levels in the composite samples collected from the BIP location.

Based on the results of the MC incremental sampling, NFA was recommended for MC at the MRS.

- **MEC HA:** 1
- **MRSPP Priority:** 2

1.7.6.3 FTBLS-002-R-04

- **Type:** Former Maneuver Area
- **Size:** 397 acres
- **Site Features:** The MRS is part of a larger parcel of land currently owned by a State of Texas entity (the Texas General Land Office). This parcel is fenced, gated, and currently leased to a private individual and utilized for ranching and recreational hunting. No cattle were observed at the time the field work was completed, but a corral in the area indicates it has occurred in the past. The MRS was observed to be relatively free of vegetation at the time the RI field work was performed.
- **Access:** The MRS is located outside of the Fort Bliss installation on land that is owned by a State of Texas entity (the Texas General Land Office). Fences enclose the larger property owned by the Texas General Land Office. While access to the larger property encompassing the MRS is restricted by locked gates, once access is achieved to the larger property no barriers are present to prevent access to the MRS.
- **Visual Survey Results:** 78 MD items were identified during the visual survey. The type and quantity were noted and the items were left in place.
- **Geophysical Investigation Results:** DGM identified 544 anomaly targets for investigation in geophysical transects and grids. All anomaly targets were intrusively investigated. VSP indicated anomaly densities ranging from low to high throughout the MRS.
- **Intrusive Investigation Results:** Two MEC items (**Figure 1-3**) and 355 MD items were identified during the course of the intrusive investigation. All MEC items were disposed of in accordance with the work plan. All MD items recovered during the intrusive investigation were removed from the MRS.
- **MC Sampling:** MC sampling was performed for surface soils located in 6 grid SUs and 2 BIP sample locations at the MRS. Grid sampling utilized an incremental sampling method while BIP sampling utilized a composite sampling method. With the exception of lead, all incremental sample results were below the human health and ecological screening levels. Lead concentrations were identified in excess of the human health and ecological screening

levels, but the concentrations were below the state-wide background concentrations established by the TCEQ.

Antimony, copper, and zinc were detected in concentrations that exceeded their respective ecological soil screening levels at the BIP sample locations. Lead was identified at concentrations exceeding the human health and ecological screening levels at the BIP sample locations. No additional metals were detected above screening levels in any of the composite samples collected for analysis.

Antimony detected at the MRS exceeded the ecological screening levels, but was within the background levels established by the TCEQ. Therefore, antimony is not considered to represent an ecological risk.

Concentrations of copper and zinc exceeded the ecological screening and background levels. Concentrations of lead exceeded the human health, ecological, and background levels. The BIP samples with copper, lead, and zinc concentrations that exceeded the state-wide background concentrations were located in grids C1 and C7. The incremental soil samples collected from these same SUs identified these metals at concentrations below the state-wide background concentrations. The IS was utilized for human health and ecological risk evaluation because it was considered to be more representative of the constituent concentrations than the composite sampling at the BIP locations.

Based on the results of the MC incremental sampling, NFA was recommended for MC at the MRS.

- **MEC HA:** 1
- **MRSPP Priority:** 2

1.7.6.4 FTBLS-002-R-05

- **Type:** Former Maneuver Area
- **Size:** 203 acres
- **Site Features:** The MRS is part of a larger parcel of land currently owned by a State of Texas entity (the Texas General Land Office). This parcel is fenced, gated, and currently leased to a private individual and utilized for ranching and recreational hunting. No cattle were observed at the time the field work was completed, but a corral in the area indicates it has occurred in the past. Vegetation at the MRS was dense and consisted of thorn bushes, yucca, and cactus.
- **Access:** The MRS is located outside of the Fort Bliss installation on land that is owned by a State of Texas entity (the Texas General Land Office). Fences enclose the larger property owned by the Texas General Land Office. While access to the larger property encompassing the MRS is restricted by locked gates, once access is achieved to the larger property no barriers are present to prevent access to the MRS.

- **Visual Survey Results:** 4 MD items were identified during the visual survey. The type and quantity were noted and the items were left in place.
- **Geophysical Investigation Results:** One MEC item (**Figure 1-3**) was identified during anomaly reacquisition. This MEC item was disposed of by the Fort Bliss Explosive Ordnance Disposal (EOD). DGM identified 129 anomaly targets for investigation in geophysical transects and grids. All anomaly targets were intrusively investigated. VSP indicated anomaly densities ranging from low to high throughout the MRS.
- **Intrusive Investigation Results:** One MEC item (**Figure 1-3**) and 69 MD items were identified during the course of the intrusive investigation. All MEC items were disposed of in accordance with the work plan. All MD items recovered during the intrusive investigation were removed from the MRS.
- **MC Sampling:** MC sampling was performed for surface soils located in 4 grid SUs and 1 BIP sample location at the MRS. Grid sampling utilized an incremental sampling method while BIP sampling utilized a composite sampling method. With the exception of lead, all incremental sample results were below the human health and ecological screening levels. Lead concentrations were identified in excess of the human health and ecological screening levels, but the concentrations were below the state-wide background concentrations for lead established by the TCEQ.

  Lead was identified at concentrations exceeding the soil-to-groundwater human health screening level at the BIP sample location. However, the lead concentration was within the background level for lead established by the TCEQ. Therefore, lead was not considered to represent a human health risk. No additional metals were detected above screening levels in the composite samples collected from the BIP location.

  Based on the results of the MC incremental sampling, NFA was recommended for MC at the MRS.
- **MEC HA:** 1
- **MRSPP Priority:** 2

1.7.6.5 RI Conclusions and Recommendations

As previously discussed in **Section 1.2**, during the development of this FS, the subdivision of the Former Maneuver Area A MRS recommended in the RI has subsequently been reconsidered. Based on the discussions with the AEC, the boundaries and names of the recommended MRSs have been revised. The Former Maneuver Area A was to be divided into four MRSs (see **Figure 1-2**) rather than the two MRSs originally recommended in the RI.

Since the boundaries and parcels included in MRS changed from the RI, the RI data was reevaluated. Following the reevaluation of the RI data, the conclusions and recommendations from the RI remained unchanged. The conclusions of the original RI have been revised to reflect the recommended subdivision of the Former Maneuver Area A MRS into the four smaller MRSs discussed in this FS.

FTBLS-002-R-01, FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 were adequately characterized by the data collected during the RI. Based on the evaluation of RI data, the pathway for MEC at FTBLS-002-R-01 was deemed incomplete. However, based on the presence of MD, this MRS was carried forward into the FS.

Based on the evaluation of the RI data, there is a potential for exposure to MEC by current and future receptors at FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 MRSs. Current receptors at FTBLS-002-R-03 were identified as ranchers and trespassers. Current receptors at FTBLS-002-R-04 and FTBLS-002-R-05 were identified as hunters, ranchers, and trespassers. Future receptors at FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 were identified as site workers, construction workers, trespassers, hunters, ranchers, and on-site residents.

MC samples were collected in accordance with the RI WP (URS 2013a), based on the results, MC does not pose a human health or ecological risk to site receptors at FTBLS-002-R-01, FTBLS-002-R-03, FTBLS-002-R-04, or FTBLS-002-R-05.

The evaluation of the RI data provided the following recommendations:

- An FS was recommended for FTBLS-002-R-01, FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05.
- NFA was recommended for MC at FTBLS-002-R-01, FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05.

1.8 REPORT ORGANIZATION

This FS is organized as presented below:

Section 1 – Introduction. Presents the authority; purpose and scope; FS process; installation location and description; MRS descriptions and background; previous investigations; and report organization.

Section 2 – Development of Remedial Action Objectives. Presents the development of the RAOs. The RAOs are based on an evaluation of contaminants of concern, media of concern, exposure pathways, and ARARs.

Section 3 – Identification and Screening of Technologies. Presents the GRAs and identification and screening of remedial technologies and process options. Remedial technologies and process options are screened using effectiveness, implementability, and relative cost criteria.

Section 4 – Development and Screening of Alternatives. Presents the development and screening of remedial alternatives that are assembled using the remedial technologies and process options.

Section 5 – Detailed Analysis of Alternatives. Presents the detailed analysis of remedial action alternatives. The detailed analysis includes a description of evaluation criteria and an individual and comparative analysis of alternatives.

Section 6 – Recommendations. Presents the recommendations for the Former Maneuver Area A (FTBLS-002-R-03) MRS and Uncontaminated Former Maneuver Area A (FTBLS-002-R-01) MRS.

Section 7 – References. Provides the references used to develop the FS Report.

TABLE 1-1
STATE AND FEDERAL LISTED THREATENED AND ENDANGERED SPECIES
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Common Name	Scientific Name	Federal Status	State Status	Preferred Habitat
American Peregrine Falcon (bird)	*Falco peregrinus anatum*	Delisted	Threatened	Year-round resident and local breeder in west Texas, nests in tall cliff eyries; also, migrant across state from more northern breeding areas in the U.S. and Canada, winters along coast and farther south; occupies wide range of habits during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands. Tall cliffs are potentially present in parts of the MRSs that extend into the Hueco Mountains. Present or potentially present in El Paso County.
Northern Aplomado Falcon (bird)	*Falco femoralis septentrionalis*	Endangered	Endangered	Open country, especially savanna and open woodland, and sometimes in very barren areas; grassy plains and valleys with scattered mesquite, yucca, and cactus; nests in old stick nests of other bird species. Desert grassland vegetation within the MRSs is consistent with the grassy plains habitat. Present or potentially present in El Paso County.
Black-footed Ferret (mammal)	*Mustela nigripes*	Endangered	Not Listed	Inhabits prarie dog towns. Only expected to occur in the presence of prarie dog towns. It is not known if prarie dog towns are within the MRSs. Present or potentially present in El Paso County.
Gray Wolf (mammal)	*Canis lupus*	Endangered	Endangered	Formerly known throughout the western two-thirds of Texas in forests, brushlands, or grasslands. Present or potentially present in El Paso County.
Chihuahuan Desert Lyre Snake (reptile)	*Trimorphodon vilkinsonii*	Not Listed	Threatened	Mostly crevice-dwelling in predominantly limestone-surfaced desert northwest of the Rio Grande from Big Bend to the Franklin Mountains, especially in areas with jumbled boulders and rock faults/fissures; secretive; egg-bearing; eats mostly lizards. Parts of the Hueco Mountains would likely exhibit features such as crevices and large rock fragments/boulders. Present or potentially present in El Paso County.

TABLE 1-1
STATE AND FEDERAL LISTED THREATENED AND ENDANGERED SPECIES
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Common Name	Scientific Name	Federal Status	State Status	Preferred Habitat
Mountain Short-Horned Lizard (reptile)	*Phrynosoma hernandesi*	Not Listed	Threatened	Diurnal, usually in open, shrubby, or openly wooded areas with sparse vegetation at ground level; soil may vary from rocky to sandy; burrows into soil or occupies rodent burrow when inactive; eats ants, spiders, snails, sowbugs, and other invertebrates; inactive during cold weather. Shrubs and sandy/rocky soil within the MRSs is consistent with the habitat preferred by this lizard. Present or potentially present in El Paso County.
Texas Horned Lizard (reptile)	*Phrynosoma cornutum*	Not Listed	Threatened	Lives in open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush, or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rocks when inactive. Desert Grassland and Chihuahuan Desert Scrub vegetation are consistent with this lizard's preferred habitat. Present or potentially present in El Paso County.

Sources:

U.S. Fish & Wildlife Service website http://www.fws.gov/southwest/es/EndangeredSpecies/EndangeredSpecies_Lists/EndangeredSpecies_Lists_Main.cfm

Texas Parks & Wildlife Department website
http://gis2.tpwd.state.tx.us/ReportServer$GIS_EPASDE_SQL/Pages/ReportViewer.aspx?%2fReport+Project2%2fReport5&rs:Command=Render&county=El%20Paso

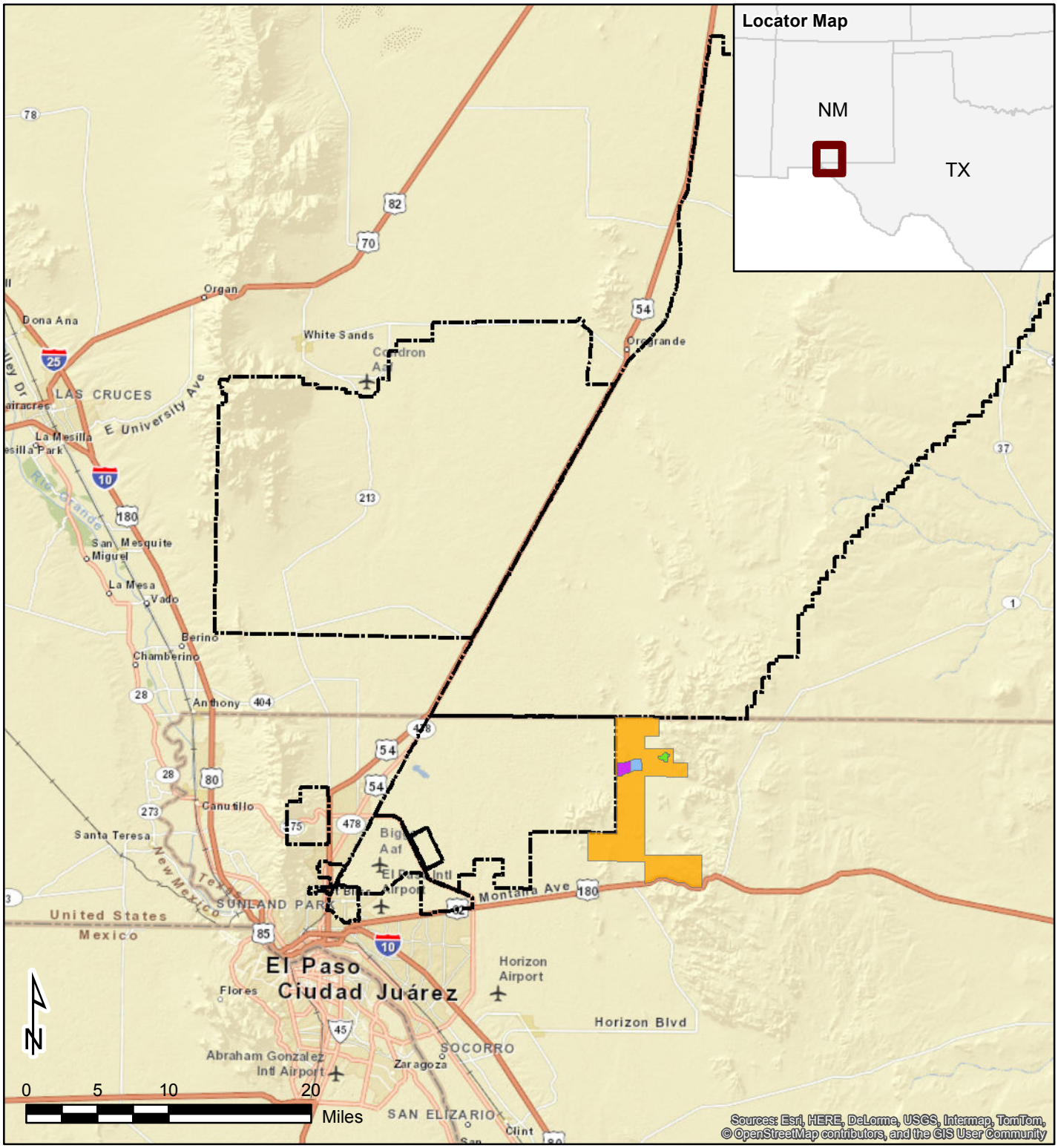
Notes:

Species included in the above table are those listed as either threatened or endangered with either the U.S. Fish & Wildlife Service or Texas Parks & Wildlife Department and have a potential to be present within the MRSs based on the species' preferred habitat and reported presence or potential presence in El Paso County.

TABLE 1-2
ARCHEOLOGICAL SITES RESIDING IN FORMER MANEUVER AREA A
REMEDIAL INVESTIGATION FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Site Number	Date Recorded	Age	Description	NRHP Eligibility	Recommendations
41EP10	12/17/1965	Prehistoric	camp, rock art	Unevaluated	Testing
41EP32	1963, 1965	Prehistoric	Midden circles	Unevaluated	None
41EP503	1975-1976	Prehistoric	Hamlet (pottery and hearths)	Unevaluated	None
41EP504	Unknown	Unknown	Unknown	Unknown	Unknown
41EP515	1975	Prehistoric	Camp	Not Eligible	No excavation potential
41EP526	1975-1976	Prehistoric	Camp (artifacts and hearths)	Not Eligible	Further investigations
41EP2563	1975-1976	Prehistoric	Lithic scatter	Not Eligible	No further work
41EP2565	1975-1976	Prehistoric	Small camp (sherds)	Not Eligible	No further work
41EP2609	9/5/1985	Prehistoric	Artifact scatter (lithics, ceramics)	Not Eligible	No further work
41EP2628	11/25/1987	Prehistoric	Artifact scatter (lithics, ceramics)	Not Eligible	No further work
41EP2630	11/25/1987	Prehistoric	Artifact scatter (lithics, ceramics)	Not Eligible	No further work
41EP2632	12/2/1987	Prehistoric	Artifact scatter (lithics, ceramics)	Not Eligible	No further work
41EP2634	12/5/1987	Prehistoric	Ceramic scatter, hearth	Not Eligible	No further work
41EP4682	Unknown	Unknown	Unknown	Unknown	Unknown
41EP4683	Unknown	Unknown	Unknown	Unknown	Unknown
41EP4684	5/3/1995	Prehistoric	Hearth	Not Eligible	No further work
41EP4861	11/7/1994	Prehistoric	concentration of burned caliche	Not Eligible	No further work
41EP4865	11/8/1994	Prehistoric	Camp (artifacts and hearths)	Not Eligible	No further work
41EP4871	1/21/1995	Prehistoric	Camp (artifacts and hearths)	Eligible	Avoid or protect
41EP5562	7/13/2002	Prehistoric	Habitation	Eligible	Avoid or protect

Notes:
Information for this table was obtained from the Texas Historical Commission Archeological Sites Atlas
NRHP = National Register of Historic Places



Legend

- Installation Boundary
- Former Maneuver Area A MRS (FTBLS-002-R-01)
- Former Maneuver Area A MRS (FTBLS-002-R-03)
- Former Maneuver Area A MRS (FTBLS-002-R-04)
- Former Maneuver Area A MRS (FTBLS-002-R-05)

URS

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Site Vicinity Map
Fort Bliss
El Paso, Texas

Drawn By:	Date:	
JZ	8/7/2015	**Figure 1-1**
Checked By:	Project No.	
PW	60417030	

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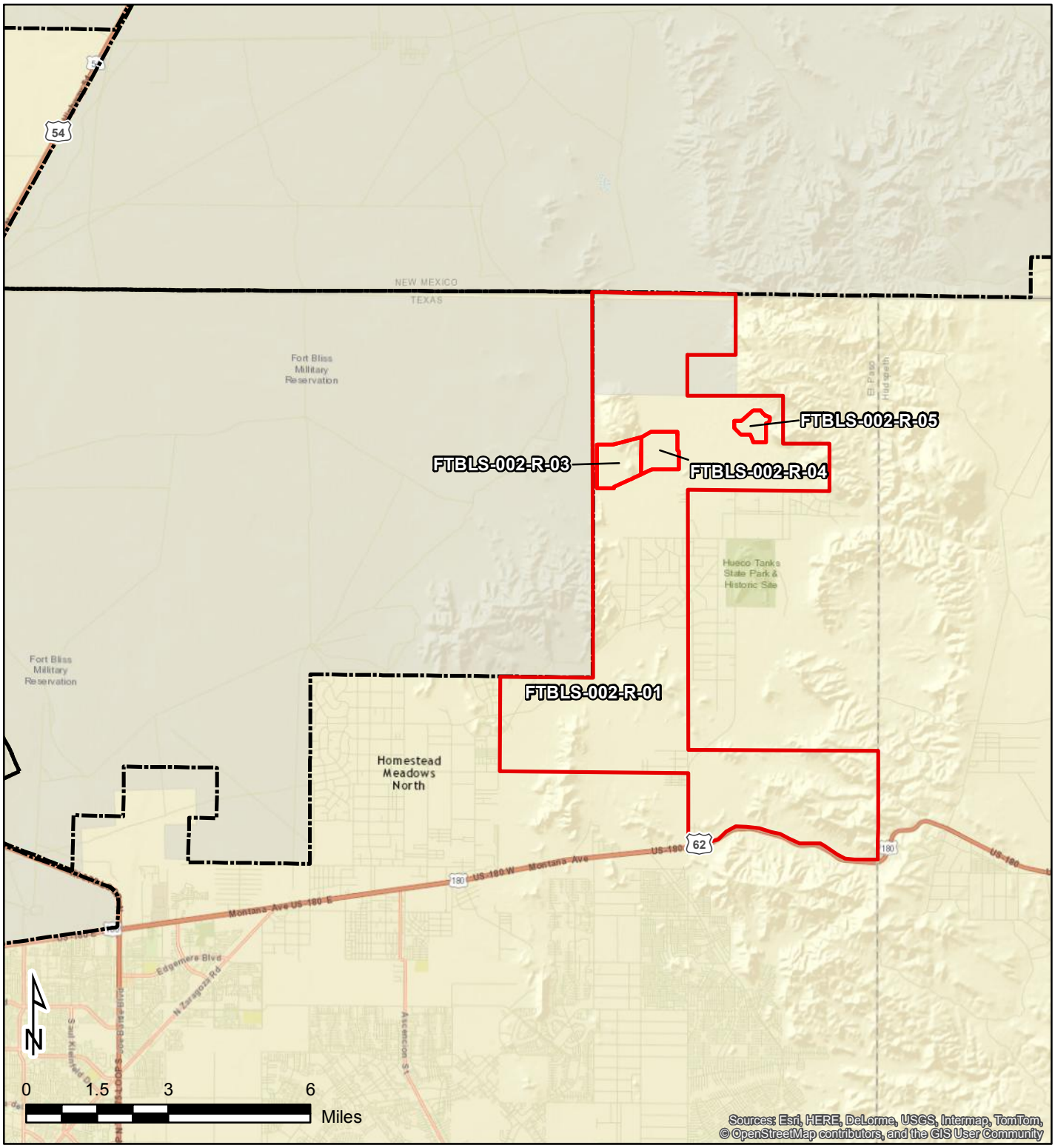

Legend

- Installation Boundary
- MRS Boundary

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US Army Corps of Engineers®

Site Location Map
Former Maneuver Area A
Fort Bliss
El Paso, Texas

Drawn By:	Date:	
JZ	8/31/2015	**Figure 1-2**
Checked By:	Project No.	
PW	60417030	

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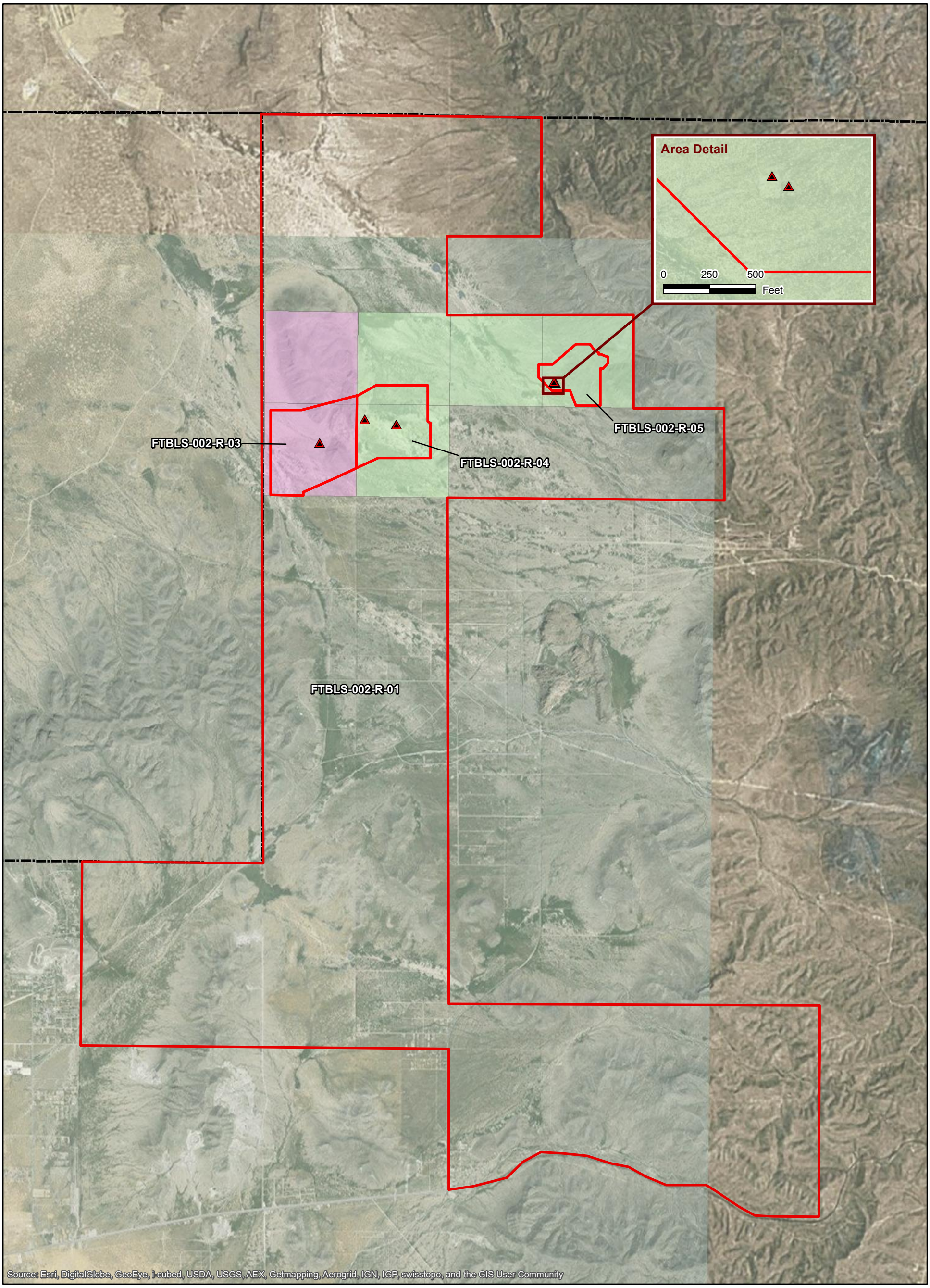
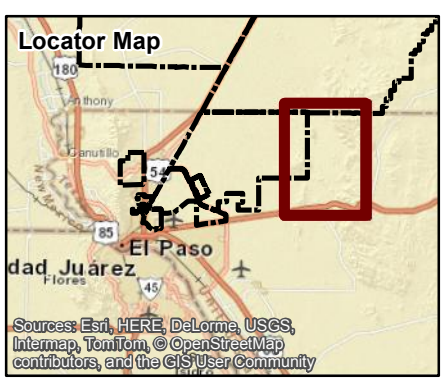
Z:\Fort Bliss\RI\FS\Fig1-3_mrs_loc.mxd





Legend

- Installation Boundary
- MRS Boundary

Parcel Ownership

- Private Individual
- State of Texas

MEC

- 4.2-Inch Mortar

N

0 0.5 1 2 Miles

URS

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MRS Location Map
Former Maneuver Area A
Flort Bliss
El Paso, Texas

Drawn By:	Date:	
JZ	8/31/2015	**Figure 1-3**
Checked By:	Project No.	
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Federal and state environmental statutes and regulations were evaluated to determine whether they were ARARs or 'to be considered' (TBC) criteria. Applicable regulations and guidance documents were utilized to develop RAOs.

2.1 CONTAMINANTS, MEDIA OF CONCERN, AND EXPOSURE PATHWAYS

Potential contaminants of concern include MEC items. During RI field activities, MEC was not identified at FTBLS-002-R-01. Based on the RI data, MEC exposure pathways for current and future receptors at FTBLS-002-R-01 were considered incomplete. MC exposure pathways for current and future receptors at FTBLS-002-R-01 were considered incomplete or insignificant.

Potential contaminants of concern include MEC items. During RI field activities, MEC items, (all 4.2 inch HE mortars) were identified on the ground surface at FTBLS-002-R-05 and in the subsurface soil at FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05. Based on the RI data, potentially complete MEC exposure pathways exist for current and future receptors at FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05. MC exposure pathways for current and future receptors at FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 were considered incomplete or insignificant.

Conceptual site models were updated to reflect the revised subdivision of the Former Maneuver Area A (as discussed in **Sections 1.2, 1.5,** and **1.7.6**) based on the data collected during the RI and are included as **Figures 2-1**, **2-2**, and **2-3**.

2.2 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

As defined in the NCP, "Applicable Requirements" are cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental, 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 (40 CFR 300.5).

"Relevant and Appropriate Requirements" are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site and are well suited to the particular 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 (40 CFR 300.5).

Section 121(d) of CERCLA requires that remedial actions be evaluated to determine if they meet any standard requirement, criteria, or limitation under any federal environmental law; any promulgated standard, requirement, criteria or limitation under a state environmental or facility

siting law that is more stringent than any federal standard, requirement, criteria, or limitation; and any standards, criteria, or limitations that are determined to be ARARs. The NCP requires compliance with ARARs during and upon completion of remedial actions. Under limited circumstances, ARARs for on-site remedial actions may be waived.

ARARs are identified on a site-specific basis using a two-part analysis: (1) determining whether a given requirement is applicable, and (2) determining whether a requirement is relevant and appropriate if it is not applicable (USEPA 1988). To determine whether a requirement is relevant and appropriate, characteristics of the remedial action, the hazardous substances present, and the physical characteristics of the site must be compared to those addressed in the statutory or regulatory requirement. In some cases, a requirement may be relevant but not appropriate. In other cases, only part of a requirement will be considered relevant and appropriate. When it is determined that a requirement is both relevant and appropriate, the requirement must be complied with to the same degree as if it were applicable (USEPA 1988).

Remedial actions may have to comply with three functional groups of ARARs:

- Chemical-specific ARARs are health- or risk-based restrictions on the amount or concentration of a chemical that may be found in or discharged to the environment. The chemical ARARs may be used to set cleanup levels for the chemicals of concern in the designated media, or to set a safe level of discharge (e.g., air emission or wastewater discharge) where a discharge occurs as a part of the remedial action.
- Action-specific ARARs generally set performance, design, or other similar operational controls or restrictions on particular activities related to management of hazardous substances or pollutants. These requirements address specific activities that are used to accomplish a remedy. Action-specific requirements do not in themselves determine the remedial action; rather, they indicate how a selected remedial action alternative must be designed, operated, or managed.
- Location-specific ARARs are restrictions placed on the types of activities that may occur in particular locations. Location-specific ARARs generally prevent damage to unique or sensitive areas, such as flood plains, historic places, wetlands, and fragile ecosystems, and restrict other activities that are potentially harmful because of where they take place.

The statutes and regulations that were considered to be chemical-specific, location-specific, and action-specific ARARs are presented in **Table 2-1, 2-2, and 2-3**. The tables include comments regarding the applicability or relevance and appropriateness of each potential ARAR. Final ARARs (statutes and regulations) will be determined by the Army in consultation with the USEPA, TCEQ, and/or other appropriate federal and state agencies.

In addition to ARARs, guidance and other non-promulgated criteria can be considered in evaluating remedial alternatives. Non-promulgated advisories, proposed rules, criteria, or guidance documents issued by federal or state government that are not legally binding and do not have the status of potential ARARs may be designated as TBC criteria. These items are TBC when determining where ARARs are not sufficiently protective of human health and the

environment. Designation of a TBC is at the discretion of the lead agency, and should be used only when it is scientifically defensible and in the absence of a specific ARAR. No TBC criteria were identified as being applicable to the alternatives stated in this FS.

2.3 REMEDIAL ACTION OBJECTIVES

RAOs are site-specific cleanup objectives that are established based on the nature and extent of contamination, potential for human and environmental exposure, and ARARs. Development of the RAOs for FTBLS-002-R-01, FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 focused on addressing the physical hazards to human receptors based on the potential presence of MEC. The following RAOs are proposed for FTBLS-002-R-01, FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05:

- FTBLS-002-R-01 – Reduce the potential for direct contact of MEC by human receptors considering the current land uses and potential future land uses. Current /future receptors were identified as site workers, construction workers, hunters, ranchers, trespassers, residents, and/or ecological receptors. Current land uses include undeveloped land, residential housing, commercial facilities, light industrial facilities, and roads along with other infrastructure to support the developments. Future land uses are anticipated to be consistent with the current land uses.
- FTBLS-002-R-03 – Reduce the potential for direct contact of MEC by human receptors considering the current land uses and potential future land uses. Current receptors were identified as ranchers. Future receptors were identified as site workers, construction workers, hunters, ranchers, trespassers, residents, and/or ecological receptors. Ranching was identified as the current land use. Future uses are anticipated to be consistent with the current land use.
- FTBLS-002-R-04 – Reduce the potential for direct contact of MEC by human receptors considering the current land uses and potential future land uses. Current receptors were identified as ranchers and recreational users (hunters). Future receptors were identified as site workers, construction workers, hunters, ranchers, trespassers, residents, and/or ecological receptors. Ranching and recreation were identified as current land uses. Future uses are anticipated to be consistent with the current land uses.
- FTBLS-002-R-05 – Reduce the potential for direct contact of MEC by human receptors considering the current land uses and potential future land uses. Current receptors were identified as ranchers and recreational users (hunters). Future receptors were identified as site workers, construction workers, hunters, ranchers, trespassers, residents, and/or ecological receptors. Ranching and recreation were identified as current land uses. Future uses are anticipated to be consistent with the current land uses.

TABLE 2-1
LIST OF POTENTIAL CHEMICAL-SPECIFIC ARARs
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Standard, Requirement, or Criteria	Description	Comment on Chemical-Specific ARARs
FEDERAL		
Protection of Environment Code of Federal Regulations Title 40		
Standards for the Management of Sepcific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (40 CFR 266.03, 266.205, and 266.206)	These regulations identify standards applicable to the transportation, storage, treatment, and disposal of waste military munitions.	These regulations provide standards of control or substantive requirement due to the anticipated presence of MEC and/or MD and are therefore applicable for the MRSs.

TABLE 2-2
LIST OF POTENTIAL LOCATION-SPECIFIC ARARs
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Standard, Requirement, or Criteria	Description	Comment on Location-Specific ARARs
FEDERAL		
Endangered Species Act [16 U.S.C. Sect. 1538(a)(1)(B) and 16 U.S.C. Sect. 1538(a)(2)(B)]	Prohibits any person from taking species from within the United States. Additionally prohibits the removal, digging up, damaging, or destroying any species knowingly or in the process of criminal trespassing.	Applicable if any federal-listed species are present and will be removed from the site by the completion of the remedial action.
Migratory Bird Treaty Act (16 U.S.C. Sect. 703)	Title 16, Subchapter II §703 states that it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess any migratory bird, any part, nest, or egg of any such bird, or any product, whether or not manufactured, which consists, or is composed in whole or part, of any such bird or any part, nest, or egg thereof, included in the Migratory Bird Treaty Act.	Applicable if any state-listed species are present and will be removed from the site by the completion of the remedial action.
STATE		
Environmental Quality (Texas Administrative Code (TAC) Title 31)		
Protection of State-Listed Animal Species (31 TAC §65.171)	Section 65.171 of the TAC states that except as otherwise provided in the subchapter or Parks and Wildlife Code, Chapters 67 or 68, no person may take, possess, propagate, transport, export, sell or offer for sale, or ship any species of fish or wildlife listed by the department as endangered or threatened.	Applicable if any state-listed species are present and will be removed from the site by the completion of the remedial action.
Texas Parks and Wildlife (TPW) Code (Section 68.015)	Section 68.015 of the TPW Code states that no person may capture, trap, take, or kill, or attempt to capture, trap, take, or kill, endangered fish or wildlife."	Applicable if any state-listed species are present and will need to be captured or may be killed by the completion of the remedial action.

TABLE 2-3
LIST OF POTENTIAL ACTION-SPECIFIC ARARs
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Standard, Requirement, or Criteria	Description	Comment on Action-Specific ARARs
FEDERAL		
Protection of Environment Code of Federal Regulations Title 40		
Standards for the Management of Sepcific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (40 CFR 266.03, 266.205, and 266.206)	These regulations identify standards applicable to the transportation, storage, treatment, and disposal of waste military munitions.	These regulations provide standards of control or substantive requirement due to the anticipated presence of MEC and/or MD and are therefore applicable for the MRSs.

FIGURE 2-1
MEC CONCEPTUAL SITE MODEL FOR FTBLS-002-R-01
FORT BLISS, TEXAS

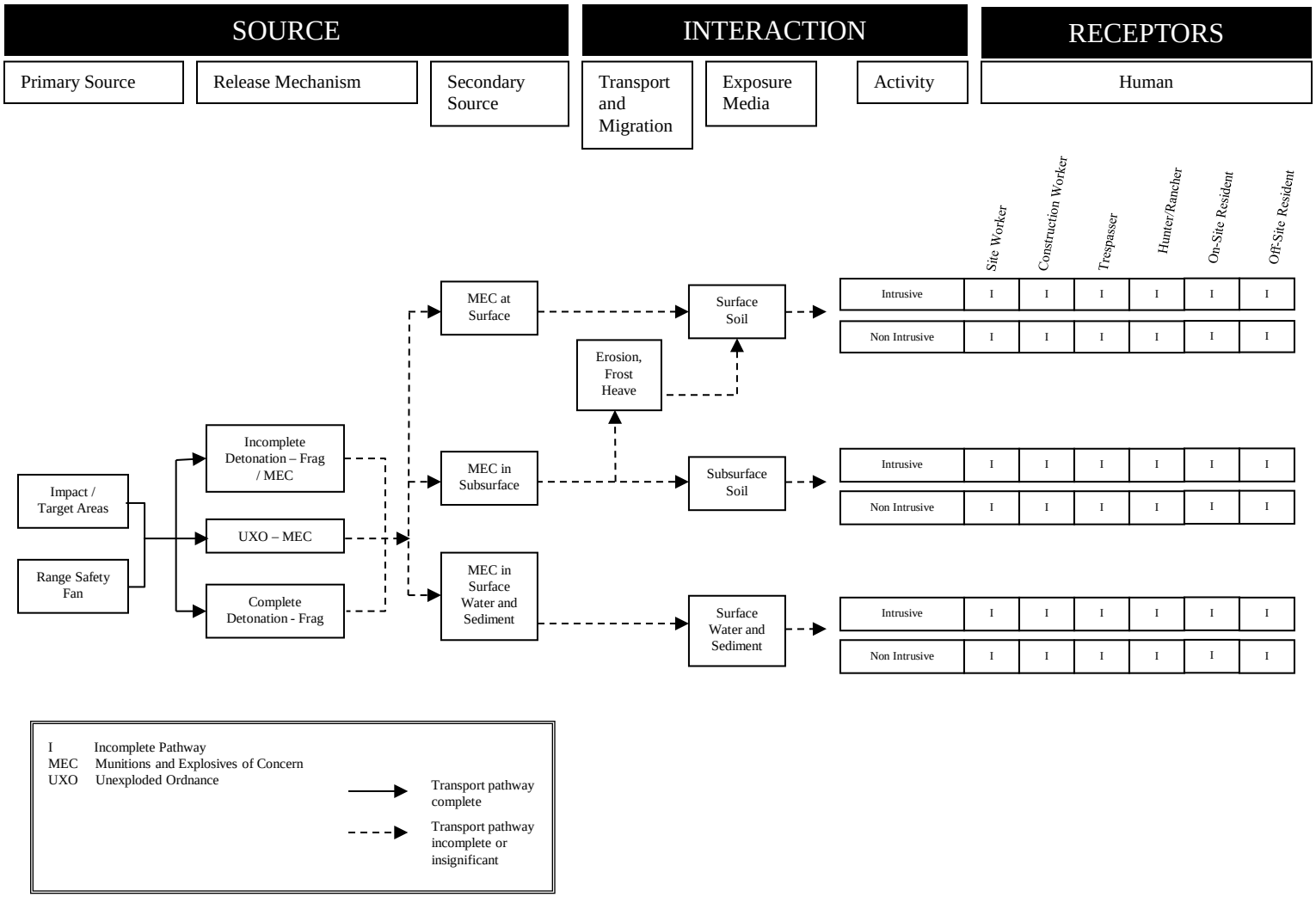


FIGURE 2-2
MEC CONCEPTUAL SITE MODEL FOR FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05
FORT BLISS, TEXAS

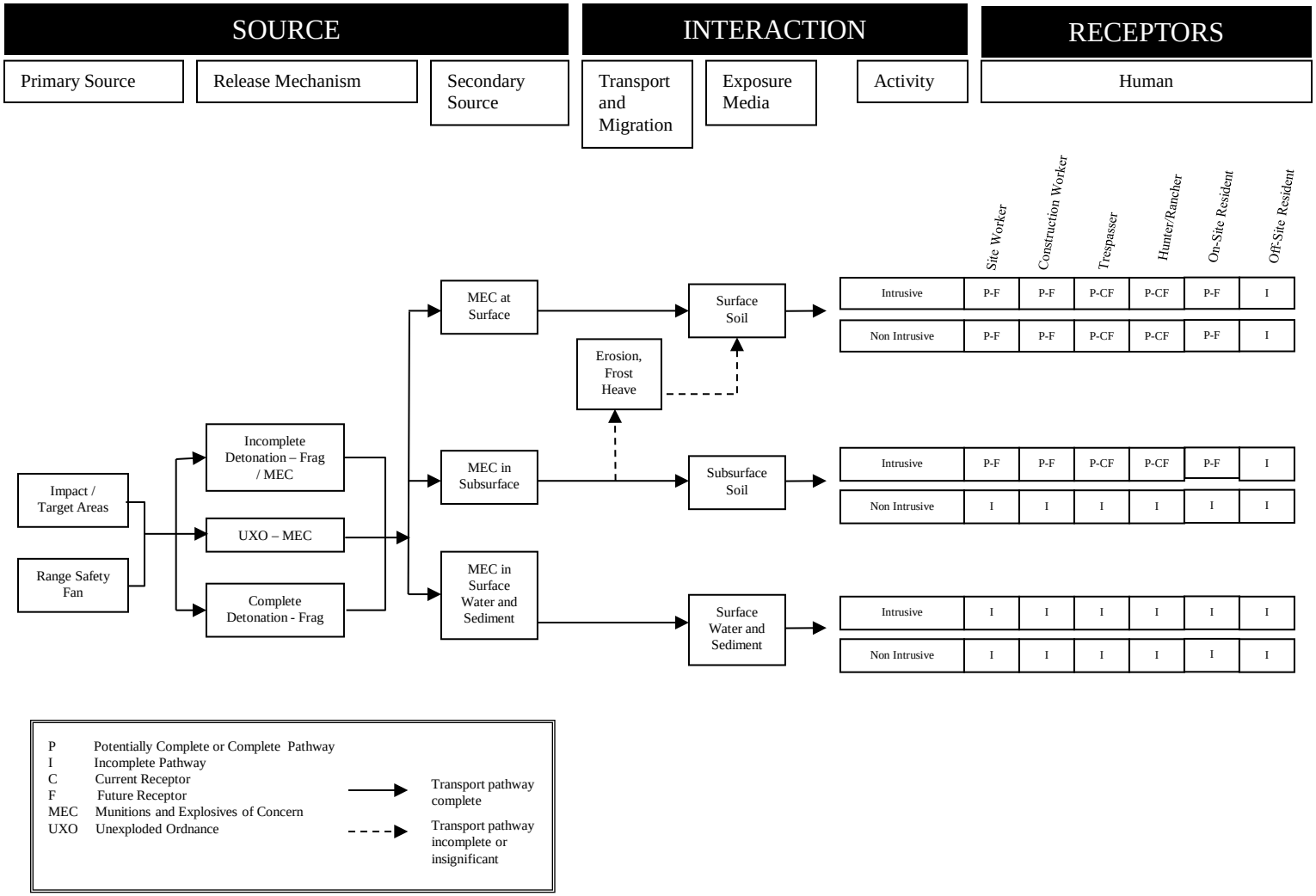
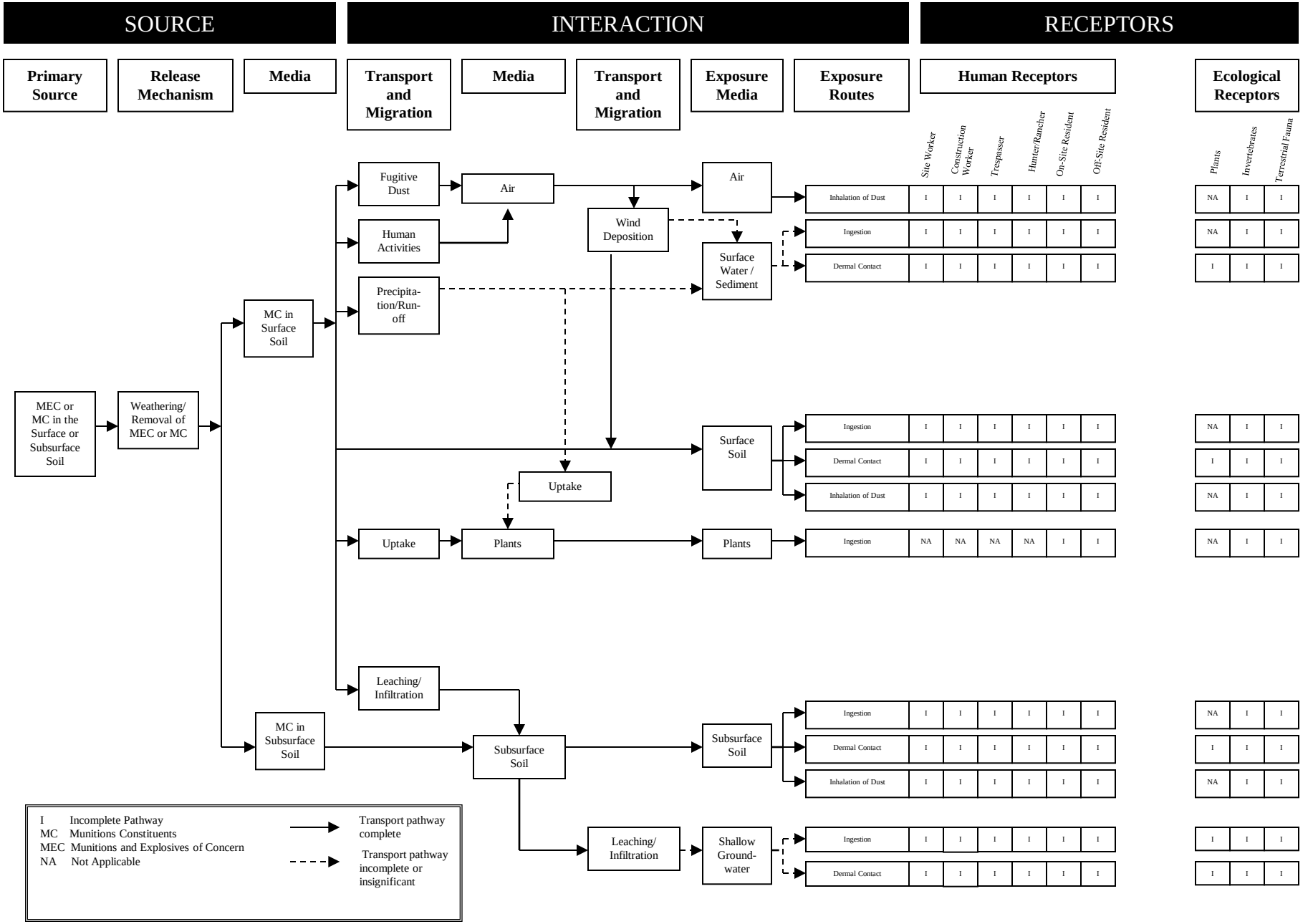


FIGURE 2-3
MC CONCEPTUAL SITE MODEL FOR FTBLS-002-R-01, FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05
FORT BLISS, TEXAS



3.1 GENERAL RESPONSE ACTIONS

GRAs are broad classes of medium-specific actions intended to satisfy the RAOs. The following GRAs are potentially applicable for addressing MEC at FTBLS-002-R-01, FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05:

- No Action
- Land Use Controls (LUCs)
- Construction Support
- MEC Removal
- Containment

These GRAs are described in greater detail in **Table 3-1**.

3.2 IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES

Remedial technologies are the methods by which a GRA may be undertaken. Process options are the specific processes within a remedial technology type by which the technology may be implemented.

3.2.1 Identification and Screening of Technologies

As an initial screening, remedial technologies and process options were evaluated based on their technical implementability and general applicability to the conditions at FTBLS-002-R-01, FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05. All of the remedial technologies and process options identified in **Table 3-1** are technically feasible and applicable to FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 and were retained for further evaluation. All of the remedial technologies and process options identified in **Table 3-1** are also technically feasible and applicable to FTBLS-002-R-01 with the exception of engineering controls, which was not retained for further evaluation.

The engineering control (i.e., fencing and warning signs) remedial technology was not retained for FTBLS-002-R-01 because it is not applicable to the current conditions at the MRS. FTBLS-002-R-01 encompasses 23,356.99 acres divided into numerous parcels of varying size with approximately 2,514 landowners. None of the land associated with the MRS is currently owned or used by Fort Bliss. The engineering controls for Alternative 3 include the installation of fencing to prevent inadvertent access to the MRS and warning signs to inform site receptors of the potential presence of MEC; however, current receptors within the MRS already includes 2,514 landowners and their associated receptors. The engineering controls would not be effective at limiting receptor exposure to MEC, if any.

Land-use restrictions (i.e., restrictive covenants, equitable servitude) were not considered applicable to any of the MRSs. The land associated with FTBLS-002-R-01, FTBLS-002-R-03,

FTBLS-002-R-04, and FTBLS-002-R-05 is currently owned by state entities and/or private individuals and is no longer owned by, leased to, or otherwise possessed or used by the DoD. The U.S. Army cannot impose or enforce new land-use restrictions on private property.

3.2.2 Evaluation of Technologies

Using the Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (USEPA 1988), the process options were further evaluated with respect to three evaluation criteria: effectiveness, implementability, and cost. These evaluation criteria are used as an initial screen of technology types and process options to eliminate those that are ineffective or unworkable at a site. Detailed screening of technologies and process options are summarized in **Table 3-2**. For each evaluation criterion, the process options were rated as low, medium, high, or between two ratings (e.g., low-medium). The following rationale was used as a guideline:

- **Effectiveness**: Based on demonstrated ability of component technologies to achieve remediation goals, potential impacts to human health and the environment during implementation, and reliability of technology/process option with respect to addressing conditions at the site. The effectiveness analysis is based on engineering judgment and each process option is evaluated as to whether effectiveness is low, medium, or high relative to other process options in the same technology.
- **Implementability**: Based on factors such as safety; constructability; regulatory and public support; compatibility with reasonably anticipated future land use; and availability of material, equipment, technical expertise, or off-site treatment and disposal facilities. The implementability analysis is based on engineering judgment and each process option is evaluated as to whether implementability is low, medium, or high relative to other process options in the same technology.
- **Cost**: Based on overall cost, including capital costs and long-term management (LTM) costs. Capital costs are based on the amount of equipment that is needed and costs necessary to perform the process option. LTM costs are based on the relative cost required after initial implementation of the process option. The cost analysis is based on engineering judgment and each process option is evaluated as to whether costs are low, medium, or high relative to other process options in the same technology. A comprehensive discussion of costing procedures during the FS is contained in A Guide to Developing and Documenting Cost Estimates During the Feasibility Study (USEPA 2000).

The process options with favorable effectiveness, implementability, and cost were retained as the representative process options. Identifying only one or two representative process options for each technology was not intended to limit the process options that could potentially be employed in remedial design, but instead to provide a basis for evaluation of a manageable number of alternatives. The choice of a specific process option should be evaluated more completely during the remedial design process.

TABLE 3-1
POTENTIALLY APPLICABLE MEC TECHNOLOGIES AND PROCESS OPTIONS
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

General Response Action	Remedial Technology	Process Option	Example Description
No Action	None	None	No remedial action to address the MEC hazards.
Land Use Controls	Administrative Controls	Public Awareness Program	Provide public awareness regarding hazards associated with potential MEC at the MRSs through activities such as public meetings and distribution of fact sheets.
	Engineering Controls	Fence Installation	Install fencing around impacted areas to physically control access to affected areas. Must be inspected, maintained, and reviewed. Installation requires UXO safety support during construction activities to to minimize the risk of encountering MEC.
		Sign Installation	Install signage around impacted areas to warn potential receptors of MEC risks within the MRSs. Must be inspected, maintained, and reviewed. Installation requires UXO safety support during construction activities to to minimize the risk of encountering MEC.
Construction Support	Magnetometers	Construction Support	Support provided, on an as needed basis, by DoD EOD or UXO-qualified personnel during construction activities on property within high risk areas suspected to contain MEC. The DoD EOD or UXO team would halt all activities if MEC is encountered.
MEC Removal	Magnetometers	Mag and Flag	Supports MEC removal actions using active or passive hand-held sensors capable of detecting shallow metallic objects. Passive sensors can detect ferrous metal items (iron or steel) but not other metals (aluminum, copper, tin, or brass). Includes vector (e.g., flux-gate magnetometers [Schonstedt 72-CX]) and scalar magnetometers (e.g., cesium vapor magnetometers [Geometrics G-858]). Process options include ground-based and helicopter mounted systems. During the RI, a flux-gate magnetometer (i.e., Schonstedt 72-CX) was used to pinpoint target anomalies.
		Helimag	
	Electromagnetic Induction	DGM	Supports a subsurface MEC removal action by developing a map of subsurface anomalies (metallic items that might be MEC) using a digital geophysical instrument that is pulled or pushed across the ground surface. The instrument induces an electrical current that generates a secondary magnetic field in both ferrous and nonferrous metallic items, which in turn is measured and used to detect the item. Operated in either time domain or frequency domain. During the RI, the Geonics, Ltd. EM61 Mark II Time-Domain Electromagnetic System was used and found to be successful for detection of subsurface metal at the MRSs.

TABLE 3-1
POTENTIALLY APPLICABLE MEC TECHNOLOGIES AND PROCESS OPTIONS
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

General Response Action	Remedial Technology	Process Option	Example Description
MEC Removal (continued)	Discrimination Technologies	Innovative Technologies (e.g., Metal Mapper)	Supports a subsurface MEC removal action by developing a more detailed map of subsurface anomalies using innovative technologies, such as Metal Mapper. This technology provides multiple illumination directions, from a single survey location, through the use of orthogonal high power transmitter coils and triaxial receiver cubes. With this additional information, discrimination technologies can identify anomaly shapes and features that may be characteristic of MEC or non-MEC items. Discrimination technologies were not used during the RI.
	Hand Removal	Surface Clearance of MEC	Hand removal of individual items from the surface by DoD EOD or UXO-qualified personnel. DoD EOD or UXO-qualified personnel traverse the area in lines with appropriate spacing (e.g., 20-foot spacing) to provide a comprehensive clearance of metallic objects, generally using handheld metal detectors to aid in the location of surface and very near-surface metallic objects.
		Subsurface Removal of MEC	Individual target anomalies are removed to the depth of detection or anticipated MEC depth, which is variable and depends on potential types of MEC and site use (e.g., range or burial pit). Hand removal techniques are generally used for isolated munitions at relatively shallow burial depths, but mechanical excavations may be used to supplement hand excavations in order to remove overburden.
	Mechanized Removal	Subsurface Removal of MEC	For areas with a high density of metallic debris with the potential for MEC, armored or remote controlled EMM may be used for removal of subsurface MEC. This technology is usually employed at MRSs where munitions are found in soil too deep or too hard for hand excavation and where detecting individual anomalies is problematic due to clusters of metallic objects. EMM excavates the target-laden soil, which is then inspected by UXO technicians or loaded into mechanical screening equipment (i.e., trommel, shaker, rotary screen, etc.) designed to separate the soils and metallic objects to a specific size.

TABLE 3-1
POTENTIALLY APPLICABLE MEC TECHNOLOGIES AND PROCESS OPTIONS
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

General Response Action	Remedial Technology	Process Option	Example Description
MEC Removal (continued)	Detonation	BIP Detonation	BIP detonations are utilized to detroy MEC for which the risk of movement beyond the immediate vicinity of discovery is not acceptable. Normally, this is accomplished by placing an explosive charge alongside the item.
		Consolidated Detonation	Consolidated detonations are defined as the collection, configuration, and subsequent destruction of MEC by explosive detonation, where the risk of movement has been determined to be acceptable either within a current working sector or at an established demolition area.
	Thermal Treatment	Thermal Processing of MD	Scrap/residue (i.e., MD), after being documented as safe, is shipped to a smelter for thermal processing.
	Demilitarization of MD	Manual Demilitarization	Demilitarization of MD using tools such as a chop saw, acetylene cutting torch, or sledgehammer to cut or smash MD into smaller pieces so their military origin is not easily identifiable. This process produces little to no secondary waste stream.
		Mechanized Demilitarization	Demilitarization of MD using mechanized heavy equipment (e.g., industrial shredders) to cut MD into smaller pieces so their military origin is not easily identifiable. This process produces little to no secondary waste stream.
	Recycling	Recycling/Smelting	Once certified as MDAS, MD is shipped to a recycler for smelting.
Containment	Capping	Hard or Soft Cap	An engineered soil cover installed over MEC impacted areas to reduce the potential for receptor contact with MEC. Soil cover design would control drainage and runoff by proper sloping and by installing erosion controls as necessary to protect the integrity of the cover and limit the amount of erosion, which could expose underlying MEC.

Notes:

BIP = blown-in-place
DGM = digital geophysical mapping
DoD = Department of Defense
EMM = earth moving machinery
EOD = Explosive Ordnance Disposal
MD = munitions debris
MDAS = material documented as safe
MEC = munitions and explosives of concern
MRS = munitions response site
RI = remedial investigation
UXO = unexploded ordnance

TABLE 3-2
DETAILED SCREENING OF MEC TECHNOLOGIES AND PROCESS OPTIONS
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

General Response Action	Remedial Technology	Process Option	Effectiveness	Implementability	Cost	Screening Comments
No Action	None	None	**Not Applicable** No MEC removed. Potential for human exposure remains.	**Not Applicable** No implementation.	**None** Capital: None LTM: None	Retained. Required for comparison with other alternatives.
Land Use Controls	Administrative Controls	Public Awareness Program	**Low** MEC, if any, would remain in soil and the risk of receptor exposure through potentially complete pathways to surface and/or subsurface MEC would continue to exist. The overall effectiveness of this alternative would depend on the support, involvement, and willingness of local agencies and landowners.	**High** No construction activities to implement and right-of-entry agreements would not be required. Administratively, a process substantially similar to this process option has already been implemented at Fort Bliss (i.e., Community Involvement Plan) for the RI; therefore, this process option is considered administratively feasible.	**Low** Capital: Low LTM: Low	Retained.
	Engineering Controls	Fence Installation	**Low-Medium** MEC, if any, would remain in soil and the risk of receptor exposure through potentially complete pathways to surface and/or subsurface MEC would continue to exist. Engineering controls should offer some level of protection by restricting access to the MRS and also provide adequate warning to potential receptors accessing the MRS; however, an on-site land manager would not be present to ensure engineering controls are effective.	**Medium-High** Labor and materials are readily available. Installation of signs and fence would require logistics planning, UXO escort, and anomaly avoidance.	**Medium** Capital: Medium LTM: Low	Retained for Former Maneuver Area A (FTBLS-002-R-01) MRS. Some risk reduction at low-medium cost.
		Sign Installation			**Low** Capital: Low LTM: Low	Not retained for Uncontaminated Former Maneuver Area A (FTBLS-002-R-01A) MRS. This MRS is currently owned by 2,614 landowners. Engineering controls would not be effective.
Construction Support	Magnetometers	Construction-Specific Support	**Low-Medium** MEC, if any, would be addressed on an as-needed-basis and the risk of receptor exposure through potentially complete pathways to surface and/or subsurface MEC would continue to exist. Construction support would address potential pathways for construction workers, but would not address potentially complete pathways for other site receptors.	**High** Magnetometers are durable and reliable in almost all weather conditions, applicable for various terrains and vegetation, easy to use and maintain. Magnetometers are routinely used by UXO technicians, so trained operators are available.	**Low** Capital: Low LTM: Low	Not retained. MRS is no longer owned by, leased to, or otherwise possessed or used by the DoD.
MEC Removal	Magnetometers	Mag and Flag	**Medium-High** Magnetometers can detect ferrous metal items (i.e., iron or steel) but not other non-ferrous metals (aluminum, copper, tin, or brass). A magnetometer is more sensitive to deeper objects than other similar technologies. Magnetometers have the ability to continuously measure the geomagnetic field, operational reliability in almost all weather conditions, simplistic operation, and low maintenance. The presence of ferrous man-made features (buildings, power lines, utilities, fences, etc.) and/or soils and rocks with increased magnetic susceptibility can create “noise” in the magnetic measurements, which limits the overall quality of the magnetic data and sometimes severely degrades the reliability of the data, leading to higher false alarm rates (i.e., false positives).	**High** Magnetometers are durable and reliable in almost all weather conditions, applicable for various terrains and vegetation, easy to use and maintain. Magnetometers are routinely used by UXO technicians, so trained operators are available.	**Low** Capital: Low LTM: None	Retained. High implementability and low costs.

TABLE 3-2
DETAILED SCREENING OF MEC TECHNOLOGIES AND PROCESS OPTIONS
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

General Response Action	Remedial Technology	Process Option	Effectiveness	Implementability	Cost	Screening Comments
MEC Removal (continued)	Electromagnetic Induction	DGM	**High** Effective at detecting ferrous and nonferrous metals. Effective depth range is variable, depending on size and orientation of object, but can reliably detect large MEC up to a depth of 2 to 4 feet bgs. Non-munitions related metallic debris may interfere with MEC detection (e.g., metal quonsets, steel rebar); however, data are relatively immune to geological interferences such as magnetic soils. The digital data captured by DGM sensors provides a record of the subsurface at the MRSs.	**High** DGM equipment is readily available and portable. The operation of DGM equipment requires specific training, and data analysts require specialized training to effectively utilize the full capability of the instruments and measured data. To collect the necessary positional data, DGM requires good GPS coverage, which is available. Several detectors can be used together, in an array, and mounted on a single platform to increase production rates of geophysical data gathering.	**Low-Medium** Capital: Medium LTM: None	Not retained. Based on RI data, anomaly density per acre is low.
	Discrimination Technologies	Metal Mapper	**High** Although not shown to be more effective at detection than EMI (single/double coil), it may be considered more effective at the overall remediation by assisting in better determining exact location, orientation and characteristics of a subsurface anomaly.	**Medium** EMI (multiple coils) technology, such as Metal Mapper, are state-of-the-art technology that requires highly trained personnel for data processing and longer field durations than EMI (single/double coils) due to slower production rates. No innovative technology has been demonstrated in the MRS conditions found at Fort Bliss, so preliminary testing would be prudent before committing multiple field resources.	**High** Capital: High LTM: None	Not retained. Based on RI data, anomaly density per acre is low.
	Hand Removal	Surface Clearance of MEC	**Medium** The MEC surface clearance effectively reduces the probability of encountering MEC at the surface, which poses the greatest risk to current human health receptors (i.e., trespassers and hunters/ranchers). However, it does not directly address the risk associated with subsurface MEC, where most MEC is anticipated to be found. MEC, if any, would remain in subsurface soil and the risk of receptor exposure through potentially complete pathways to subsurface MEC would continue to exist. Over time, subsurface MEC may migrate to the surface through erosion.	**Medium-High** Hand removal is currently the most widely used method for removal of MEC. Exposes workers to explosives hazards, which would be addressed by using qualified UXO staff with hand-held detectors and implementing proper explosives safety procedures. Tools and hand-held detectors are readily available, but the labor pool of qualified UXO technicians is somewhat limited.	**Low-Medium** Capital: Low LTM: Medium	Retained. Effective in any terrain and for low density areas, limited only by available personnel.
		Subsurface Removal of MEC	**High** The MEC subsurface removal would effectively reduce the probability of encountering MEC in the subsurface of the MRSs. Risks associated with subsurface MEC would be reduced or eliminated though the MEC subsurface removal.	**Medium-High** Hand removal is currently the most widely used method for removal of MEC. Exposes workers to explosives hazards, which would be addressed by using qualified UXO staff with hand-held detectors and implementing proper explosives safety procedures. Tools and hand-held detectors are readily available, but the labor pool of qualified UXO technicians is somewhat limited.	**Medium** Capital: Medium LTM: Low	Retained. Effective in any terrain and for low density areas, limited only by available personnel.

TABLE 3-2
DETAILED SCREENING OF MEC TECHNOLOGIES AND PROCESS OPTIONS
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

General Response Action	Remedial Technology	Process Option	Effectiveness	Implementability	Cost	Screening Comments
MEC Removal (continued)	Mechanized Removal	Subsurface Removal of MEC	**High** Mechanized subsurface removal of MEC would provide risk reduction similar to the hand removal subsurface removal. This process option is not suitable for small areas, areas with low MEC concentrations, or for removal of large munitions. This method has a high environmental and ecological impact when large areas are cleared, resulting in the temporary loss of all vegetation and habitats.	**Low** Mechanized subsurface removal of MEC requires multiple pieces of heavy, specialized, armored and/or remote controlled equipment and skilled operators. This process option would be more efficient than hand removal in areas of highly concentrated MEC or in conditions requiring significant earthmoving, and it provides a higher level of safety for workers. It requires significant management and maintenance of equipment (refueling, cleaning, and general maintenance). Availability of specialized equipment and labor is somewhat limited.	**High** Capital: High LTM: Low	Not retained. Based on RI data, anomaly density per acre is low.
	Detonation	BIP Detonation	**High** Effective method for demolishing MEC items that are judged in the field to be unsafe to move. Each MEC item would be detonated individually. Confirmation of destruction would be done immediately.	**High** Suitable for singular or low-volume MEC items in areas that can accommodate high order detonations. Allows for certain engineering controls, resulting in reduced safety distance requirements. Although explosives hazard to workers is reduced by leaving MEC in place, BIP detonation involves high risks to workers, which would be minimized through the use of proper containment and appropriate explosives safety procedures.	**Medium-Low** Capital: Medium LTM: None	Retained. High effectiveness.
		Consolidated Detonation	**High** Effective method for demolishing MEC, particularly for high donor-to-munitions ratios. MEC items would be consolidated at a disposal location for detonation. Confirmation of destruction would be done immediately.	**Medium** Requires a large area for detonation, which is available, to ensure appropriate distances are maintained. Limited work stoppage would be necessary during remediation activities as MEC is moved to the consolidation shot location. Consolidated items need to be secured prior to and during detonation, explosives used in detonation require storage in special containers (e.g., ATF magazines) or delivered on an as-needed basis. High risks to workers would be minimized through the use of proper containment and appropriate explosives safety procedures.	**Medium-Low** Capital: Medium LTM: None	Retained. High effectiveness.
	Thermal Treatment	Thermal Processing of MD	**High** Effective removal of minor explosive residue.	**Low** Requires specialized facilities and equipment. Produces hazardous waste requiring further disposition. Very high costs associated with the mobilization of this type of equipment.	**High** Capital: High LTM: None	Not retained. Low implementability and high cost.
	Demilitarization of MD	Manual Demilitarization	**High** Effective means of deforming metallic components of MD, thus making them unusable for weapons purposes. Explosive components may still be present after this process; therefore, additional processes for full disposal of MD may be required.	**Medium** Could be implemented without the need for specialty equipment, but each item must be handled individually.	**Medium** Capital: Medium LTM: None	Not retained. Not required.

TABLE 3-2
DETAILED SCREENING OF MEC TECHNOLOGIES AND PROCESS OPTIONS
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

General Response Action	Remedial Technology	Process Option	Effectiveness	Implementability	Cost	Screening Comments
MEC Removal (continued)	Demilitarization of MD	Mechanized Demilitarization	**High** Effective means of deforming metallic components of MD, thus making them unusable for weapons purposes. Explosive components may still be present after this process; therefore, additional processes for full disposal of MD may be required.	**Medium** Easy to implement but requires special equipment (e.g., industrial shredders). Items can be handled in large quantities.	**Medium** Capital: Medium LTM: None	Not retained. Not required.
	Recycling	Recycling/ Smelting	**High** Effective method for disposition of MD. MD is shipped off site to a certified receiver for recycling/smelting.	**High** MD would be shipped off site for recycling/smelting. Easy to implement using commercially available vendors with required equipment. Items can be handled in large quantities.	**Medium** Capital: Low LTM: None	Retained. Effective and readily implemented.
Containment	Capping	Hard or Soft Cap	**Medium** Capping reduces risk of accidental contact with MEC as long as the cap is maintained and free of cracks or other damage. MEC, if any, would remain in soil and the risk of receptor exposure through potentially complete pathways to subsurface MEC would continue to exist.	**Low** Installation requires heavy equipment. Can require significant vegetation removal, drainage enhancements, and earthwork. Placement of cover involves increased risk to workers, but is minimized through the use of specially trained workers. Requires periodic inspections and maintenance to maintain cap integrity. Site monitoring and inspections required as long as MEC is present.	**High** Capital: High LTM: High	Not retained. Low implementability and high cost.

Notes:
bgs = below ground surface
BIP = blow-in-place
DGM = digital geophysical mapping
DoD = Department of Defense
EMI = electromagnetic induction
EMM = earth moving machinery
EOD = Explosive Ordnance Disposal
GPS = global positioning system
LTM = long-term management
MDAS = material documented as safe
MD = munitions debris
MEC = munitions and explosives of concern
MRS = munitions response site
RI = remedial investigation
UXO = unexploded ordnance

This section describes the development of remedial alternatives for the Fort Bliss MRSs using the technology process options that were retained during the detailed screening process in **Section 3**.

4.1 DEVELOPMENT OF ALTERNATIVES

The alternatives are designed to satisfy the RAO developed in **Section 2.3**. Alternatives developed include:

- Alternative 1 – No Action
- Alternative 2 – Public Awareness Program
- Alternative 3 – Land Use Controls
- Alternative 4 – MEC Surface Clearance
- Alternative 5 – MEC Surface Clearance and MEC Subsurface Removal

A summary of the alternatives and their response actions, technologies, and process options are presented in **Table 4-1**.

4.1.1 Alternative 1 – No Action

The No Action alternative assumes NFA would be taken regarding potential MEC in the Fort Bliss MRSs. No LUCs would be implemented. This alternative would have no capital or operations and maintenance (O&M) costs. This alternative is required by the NCP for baseline comparison purposes (40 CFR 300.430[e][6]).

4.1.2 Alternative 2 – Public Awareness Program

Alternative 2 includes a public awareness program to promote communication between the public and Fort Bliss, and to inform receptors of the risks associated with potential MEC at the MRSs. This alternative does not allow unrestricted use and unlimited exposure. Five-year reviews (a minimum frequency of once every five years after initiation of the selected remedial action) would be required to evaluate the continued effectiveness and permanence of this alternative.

The public awareness program would be implemented in accordance with the Fort Bliss Community Relations Plan. Public may include federal, regional, state, local, and Native American governmental entities and officials; public and private organizations; and individuals. The Fort Bliss MMRP public awareness program may consist of, but is not limited to, the following:

- Maintaining the administrative record and information repository
- Preparing and issuing press releases

- Preparing and distributing fact sheets
- Updating the Public Affairs Mailing List
- Public meetings

The administrative record file includes documents such as site reports, technical summaries, transcripts, press releases, and fact sheets. The current administrative record file for the MMRP is located on Fort Bliss.

Prepared statements would be released to local newspapers and/or radio and television stations as needed. The news releases would be mailed to the media and placed in the information repository. Fact sheets would be prepared as required. Fact sheets would be mailed to all parties on the Public Affairs Mailing List. In addition, copies of each fact sheet would be placed in the information repository.

Public meetings would be held as required to discuss any additional information pertinent to the public regarding the MRSs. Public notices announcing public meetings would be placed in the appropriate local media, and the meetings would be held at locations convenient to the community.

4.1.3 Alternative 3 – Land Use Controls

Alternative 3 was developed for FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 only. This alternative would not be effective for FTBLS-002-R-01. FTBLS-002-R-01 encompasses 23,356.99 acres divided into numerous parcels of varying size with approximately 2,514 landowners. None of the property located within the MRSs is owned or used by Fort Bliss. Since the property is not owned by Fort Bliss, implementation of this remedy will require the approval and participation of the landowner(s) Engineering controls would not be effective at limiting receptor exposure to MEC (**Section 3.2.1**).

Alternative 3 includes all of the components of Alternative 2 (**Section 4.1.2**) plus additional LUCs in the form of engineering controls. The engineering controls would limit human exposure to FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 by providing a physical barrier (i.e., fence) and warnings (i.e., signs). This alternative does not allow unrestricted use and unlimited exposure. Five-year reviews (a minimum frequency of once every five years after initiation of the selected remedial action) would be required to evaluate the continued effectiveness and permanence of this alternative. Annual site inspections would be completed until the first five-year review. Following the first five-year review, the site inspection frequency would be adjusted based on the effectiveness of the remedy.

Engineering controls would consist of fencing and signage around the perimeter of FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 to prevent inadvertent access to the MRSs and to inform site receptors of the potential MEC risks (**Figure 4-1**). Signs would be installed at access roads and every 500 feet around the entire perimeter of each MRS. Fencing and signs would be installed by construction workers supported by UXO personnel providing UXO safety support.

This support would consist of a minimum of two qualified DoD EOD or UXO-qualified personnel (i.e., one UXO Technician III and one UXO Technician II). The probability of encountering UXO along the perimeter of the MRS during construction is considered low; therefore, an Explosives Safety Submission (ESS) is not anticipated to be required for the UXO safety support.

Future decisions about land use would drive LTM requirements. LTM includes actions such as O&M of engineering controls and assessment of future actions required to address any changes to land use. For example, if land use changes from undeveloped to residential or some other unanticipated use, LTM decisions would need to be made with respect to the appropriate response action required (e.g., clearance and removal activities and/or construction support).

4.1.4 Alternative 4 – MEC Surface Clearance

Alternative 4 includes MEC surface clearances for FTBLS-002-R-01, FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 (**Figure 4-2**). None of the property located within the MRSs is owned or used by Fort Bliss. Since the property is not owned by Fort Bliss, implementation of this remedy will require the approval and participation of the landowner(s). MEC surface clearances involve removal and disposal of MEC, material potentially presenting an explosive hazard (MPPEH), and MD. MEC surface clearances of both MRSs would reduce the risk of site receptors encountering surface MEC, but would not address subsurface MEC or the potential for subsurface MEC to be exposed on the surface through erosion. According to Unified Facilities Criteria 3-301-01 (DoD 2013), the depth of the frost line for Fort Bliss is 0 inches; therefore, the potential for frost heave migration is considered an insignificant pathway. With the potential for subsurface MEC, LUCs described in Alternatives 2 and 3 are included in conjunction with the MEC surface clearance activities for FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05. The LUCs described in Alternative 2 are included in conjunction with the MEC surface clearance activities for FTBLS-002-R-01.

The MEC surface clearances would be completed by qualified personnel (e.g., DoD EOD or UXO-qualified personnel) using hand-held detectors (e.g., Schonstedt GA-52Cx magnetometer, a White's Spectrum XLT all-metals detector). A typical surface clearance process involves vegetation removal, partitioning the MRSs into grids, followed by a systematic surface sweep of the grids to remove MEC and possibly other metallic debris. Completing a MEC surface clearance typically requires a Senior UXO Supervisor (SUXOS) responsible for planning and directing MEC operations; a UXO Safety Officer (UXOSO) to ensure that work is performed safely; a UXO Quality Control Specialist (UXOQCS) to ensure the work is performed in accordance with rules, regulations, and planning documents; and UXO technicians.

MPPEH items would be subjected to an MPPEH inspection process in accordance with an approved ESS, USACE Engineering Manual (EM) 385-1-97, Department of Defense Instruction (DoDI) 4140.62 (DoD 2014), and USACE EM 1110-1-4009 (USACE 2007), and any subsequent guidance. MPPEH would be inspected by a UXO Technician III and the SUXOS to determine the explosive hazard and appropriate disposal method. MEC that is unsafe 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 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.

Five MEC items were identified in the Former Maneuver Area A MRS and no MEC items were identified in the Uncontaminated Former Maneuver Area A. Based on the limited number of MEC items identified, the field time to complete this alternative was estimated based on the time anticipated to complete a surface clearance of the MRS based on its total acreage. UXO teams will complete systematic sweeps with magnetometers over the surveyed grids. These UXO crews are anticipated to clear an average of 50 acres per day for each 10 hour day.

4.1.4.1 FTBLS-002-R-01

FTBLS-002-R-01 encompasses 23,356.99 acres. Completion of a surface clearance for the MRS is anticipated to require approximately 467 days (117 weeks) to complete. This would require approximately three field seasons to complete. This length of time is based on the assumption that two 20-man UXO teams would complete the MEC surface clearance for 23,357 acres at a rate of 50 acres per day, working four days per week.

4.1.4.2 FTBLS-002-R-03

FTBLS-002-R-03 encompasses 520 acres. Completion of a surface clearance for the MRS is anticipated to require approximately 11 days (3 weeks) to complete. This length of time is based on the assumption that two 20-man UXO teams would complete the MEC surface clearance for 520 acres at a rate of 50 acres per day, working four days per week.

4.1.4.3 FTBLS-002-R-04

FTBLS-002-R-03 encompasses 397 acres. Completion of a surface clearance for the MRS is anticipated to require approximately 8 days (2 weeks) to complete. This length of time is based on the assumption that two 20-man UXO teams would complete the MEC surface clearance for 397 acres at a rate of 50 acres per day, working four days per week.

4.1.4.4 FTBLS-002-R-05

FTBLS-002-R-03 encompasses 203 acres. Completion of a surface clearance for the MRS is anticipated to require approximately 4 days (1 week) to complete. This length of time is based on the assumption that two 20-man UXO teams would complete the MEC surface clearance for 203 acres at a rate of 50 acres per day, working four days per week.

4.1.5 Alternative 5 – MEC Surface Clearance and MEC Subsurface Removal

Alternative 5 includes the MEC surface clearances described in Alternative 4 (**Section 4.1.4**) and includes MEC subsurface removal actions for FTBLS-002-R-01, FTBLS-002-R-03, FTBLS-

002-R-04, and FTBLS-002-R-05 (**Figure 4-3**). None of the property located within the MRSs is owned or used by Fort Bliss. Since the property is not owned by Fort Bliss, implementation of this remedy will require the approval and participation of the landowner(s). The MEC surface clearances and MEC subsurface removals involve removal and disposal of MEC, MPPEH, and MD. For this alternative, it is assumed that the subsurface removal actions would generally be completed to depths of less than 4 feet bgs at each MRS. MEC surface clearance and MEC subsurface removal would significantly reduce the risk of encountering MEC at the MRSs.

Following the completion of the MEC surface clearances, MEC subsurface removal actions would be completed. The MEC subsurface removal actions would include a comprehensive analog survey to mag and flag subsurface anomalies, which would then be removed by hand removal methods.

MEC subsurface removal actions would be completed by qualified personnel (e.g., DoD EOD or UXO-qualified personnel) using hand-held detectors (e.g., Schonstedt GA-52Cx magnetometer, a White's Spectrum XLT all-metals detector), shovels, and/or earth moving machinery. A typical MEC subsurface removal action involves acquiring targets, removing targets, and resolving target locations. Completing a MEC subsurface removal action 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.

MPPEH items would be subjected to an MPPEH inspection process in accordance with an approved ESS, USACE EM 385-1-97, DoDI 4140.62 (DoD 2014), and USACE EM 1110-1-4009 (USACE 2007), and any subsequent guidance. MPPEH would be inspected by a UXO Technician III and the SUXOS to determine the explosive hazard and appropriate disposal method. MEC that is unsafe 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.

4.1.5.1 FTBLS-002-R-01

For MEC surface clearance, see **Section 4.1.4.1**.

The estimated quantity of potential anomalies for FTBLS-002-R-01 was calculated using data obtained from the RI's DGM and intrusive investigation results. The RI geophysical investigation for this MRS covered 119,711 linear feet and 5 grids with nominal dimensions of 100 feet by 100 feet. Assuming a 2.5-foot coverage width for DGM transect surveys, the approximate area covered for this MRS was 349,278 square feet or 8.0 acres. A total of 478 targets were identified by DGM. The average density for the investigated areas was 60 targets per acre. Since the RI grid selection was biased towards areas with greater anomaly densities, this number may represent a higher than normal density than the remainder of the MRS. VSP indicated anomaly density of anomalies is low throughout the MRS; however, based on

equivalent anomaly densities with the Former Maneuver Area A (FTBLS-002-R-03) MRS, the average anomaly density for this MRS is also estimated to be 10 anomalies per acre.

This alternative, if worked sequentially, is estimated to take eight field seasons to complete. The length of time for the MEC surface clearance is based on the assumptions that two 20-man UXO teams would complete the MEC surface clearance of 23,357 acres at a rate of 50 acres per day, working four days per week. The length of time for the MEC subsurface removal action is based on the assumptions that five 7-man UXO teams would investigate and resolve an estimated 233,570 anomalies over 23,357 acres at a rate of 30 acres per day, working four days per week.

4.1.5.2 FTBLS-002-R-03

For MEC surface clearance, see **Section 4.1.4.2**.

The estimated quantity of potential anomalies for FTBLS-002-R-03 was calculated using data obtained from the RI's DGM and intrusive investigation results. The geophysical investigation for this MRS covered 134,870 linear feet and 9 grids with nominal dimensions of 100 feet by 100 feet. Assuming a 2.5-foot coverage width for DGM transect surveys, the approximate area covered for this MRS was 337,175 square feet or 7.74 acres. A total of 513 targets were identified by DGM. The average density for the investigated areas was 66 targets per acre. Since the RI grid selection was biased towards areas with greater anomaly densities, this number may represent a higher than normal density than the remainder of the MRS. Further analysis of FTBLS-002-R-03 was completed using VSP's Geostatistical Density Mapping. VSP indicated anomaly densities ranging from low to high throughout the MRS (i.e., 0 to 75 anomalies per acre). Based on VSP, the average anomaly density for this MRS was estimated at 10 anomalies per acre.

This alternative is estimated to take less than one field season to complete. The length of time for the MEC surface clearance is based on the assumptions that two 20-man UXO teams would complete the MEC surface clearance of 520 acres at a rate of 50 acres per day, working four days per week. The length of time for the MEC subsurface removal action is based on the assumptions that five 7-man UXO teams would investigate and resolve an estimated 5,200 anomalies over 520 acres at a rate of 30 acres per day, working 4 days per week.

4.1.5.3 FTBLS-002-R-04

For MEC surface clearance, see **Section 4.1.4.3**.

The estimated quantity of potential anomalies for FTBLS-002-R-03 was calculated using data obtained from the RI's DGM and intrusive investigation results. The geophysical investigation for this MRS covered 114,125 linear feet and 8 grids with nominal dimensions of 100 feet by 100 feet. Assuming a 2.5-foot coverage width for DGM transect surveys, the approximate area covered for this MRS was 285,313 square feet or 6.55 acres. A total of 544 targets were identified by DGM. The average density for the investigated areas was 83 targets per acre. Since the RI grid selection was biased towards areas with greater anomaly densities, this number may

represent a higher than normal density than the remainder of the MRS. Further analysis of FTBLS-002-R-04 was completed using VSP's Geostatistical Density Mapping. VSP indicated anomaly densities ranging from low to high throughout the MRS (i.e., 0 to 75 anomalies per acre). Based on VSP, the average anomaly density for this MRS was estimated at 10 anomalies per acre.

This alternative is estimated to take less than one field season to complete. The length of time for the MEC surface clearance is based on the assumptions that two 20-man UXO teams would complete the MEC surface clearance of 397 acres at a rate of 50 acres per day, working four days per week. The length of time for the MEC subsurface removal action is based on the assumptions that five 7-man UXO teams would investigate and resolve an estimated 3,970 anomalies over 397 acres at a rate of 30 acres per day, working 4 days per week.

4.1.5.4 FTBLS-002-R-05

For MEC surface clearance, see **Section 4.1.4.4**.

The estimated quantity of potential anomalies for FTBLS-002-R-05 was calculated using data obtained from the RI's DGM and intrusive investigation results. The geophysical investigation for this MRS covered 48,322 linear feet and 4 grids with nominal dimensions of 100 feet by 100 feet. Assuming a 2.5-foot coverage width for DGM transect surveys, the approximate area covered for this MRS was 120,805 square feet or 2.77 acres. A total of 129 targets were identified by DGM. The average density for the investigated areas was 47 targets per acre. Since the RI grid selection was biased towards areas with greater anomaly densities, this number may represent a higher than normal density then the remainder of the MRS. Further analysis of FTBLS-002-R-05 was completed using VSP's Geostatistical Density Mapping. VSP indicated anomaly densities ranging from low to high throughout the MRS (i.e., 0 to 40 anomalies per acre). Based on VSP, the average anomaly density for this MRS was estimated at 10 anomalies per acre.

This alternative is estimated to take less than one field season to complete. The length of time for the MEC surface clearance is based on the assumptions that two 20-man UXO teams would complete the MEC surface clearance of 203 acres at a rate of 50 acres per day, working four days per week. The length of time for the MEC subsurface removal action is based on the assumptions that five 7-man UXO teams would investigate and resolve an estimated 2,030 anomalies over 203 acres at a rate of 30 acres per day, working 4 days per week.

4.2 SCREENING OF ALTERNATIVES

Five alternatives were developed to address potential MEC at FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 and four alternatives were developed to address potential MEC at FTBLS-002-R-01, as discussed in **Section 4.1**. These alternatives vary from No Action to MEC surface clearances and MEC subsurface removals. These alternatives are carried forward to the Detailed Analysis of Alternatives in **Section 5**.

TABLE 4-1
REMEDIAL ALTERNATIVES DEVELOPMENT MATRIX
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

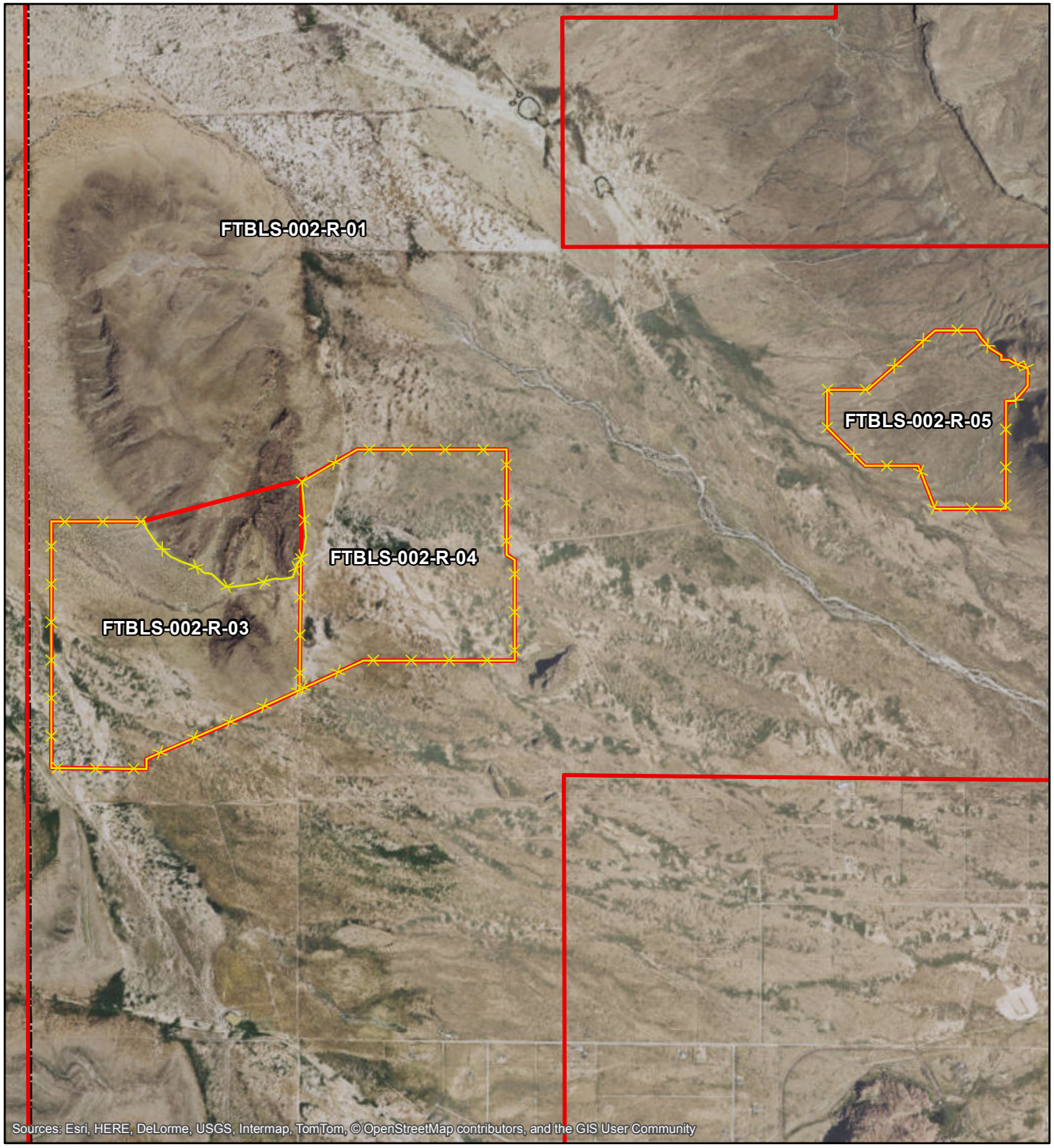
General Response Action	Remedial Technology	Process Option	Alternative 1 - No Action	Alternative 2 - Public Awareness Program	Alternative 3[1] - Land Use Controls	Alternative 4 - MEC Surface Clearance	Alternative 5 - MEC Surface Clearance and MEC Subsurface Removal
No Action	None	None	**X**				
Land Use Controls	Administrative Controls	Public Awareness Program		**X**	**X**	**X**	
	Engineering Controls	Fence Installation			**X**	**X**	
		Sign Installation			**X**	**X**	
MEC Removal	Magnetometers	Mag and Flag				**X**	**X**
	Hand Removal	Surface Clearance of MEC				**X**	**X**
		Subsurface Removal of MEC					**X**
	Detonation	BIP Detonation				**X**	**X**
		Consolidated Detonation				**X**	**X**
	Recycling	Recycling/Smelting				**X**	**X**
Alternative Carried Forward to Detailed Analysis?			**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

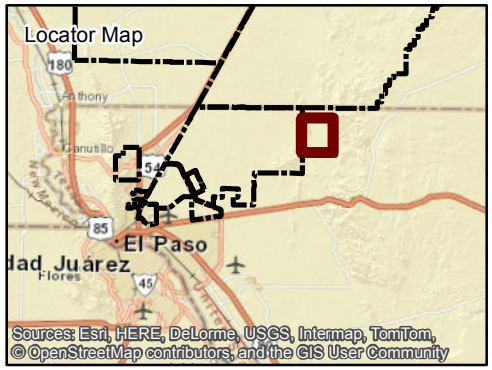
Notes:

1 Alternative 3 was developed for FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 . This alternative would not effectively address the potential MEC hazards associated with the FTBLS-002-R-01 (see Section 3.2.1).

BIP = blow-in-place

MEC = munitions and explosives of concern





Legend

- Installation Boundary
- MRS Boundary
- Engineering Controls (i.e., fence and warning signs)

N

0 1,500 3,000 6,000 Feet

URS

US Army Corps of Engineers®

Alternative 3 - Land Use Controls
Former Maneuver Area A
Fort Bliss
El Paso, Texas

Drawn By:	Date:	
JZ	8/7/2015	**Figure 4-1**
Checked By:	Project No.	
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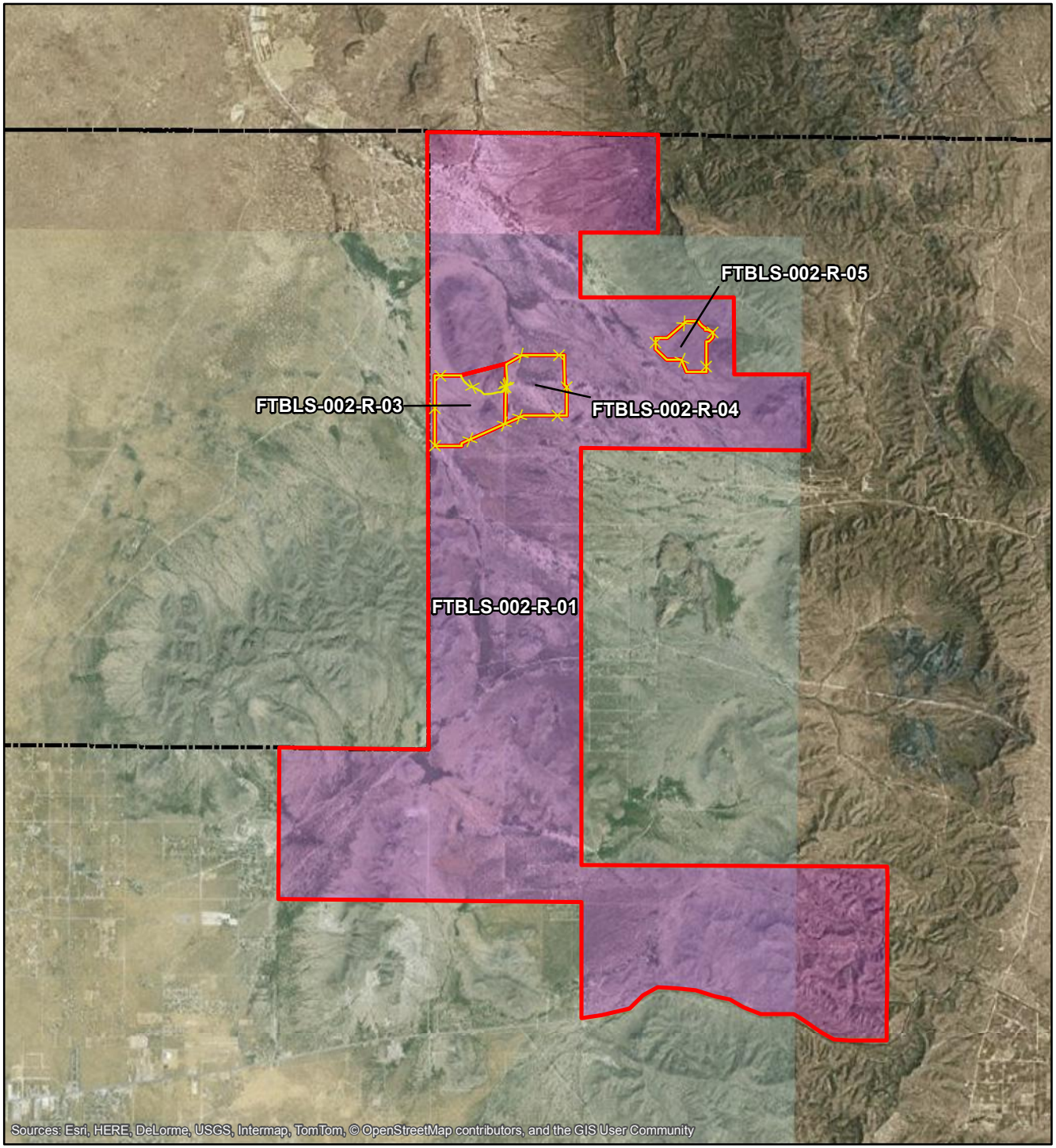

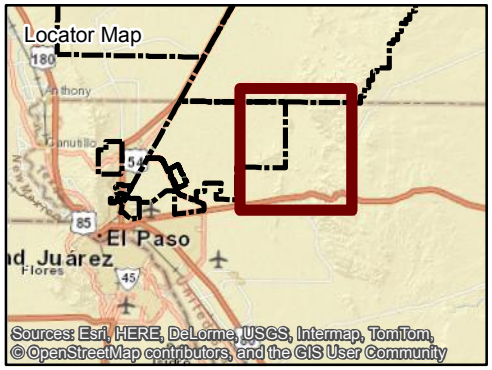

Legend

- Installation Boundary
- MRS Boundary
- Proposed MEC Surface Clearance
- Engineering Controls (i.e., fence and warning signs)

N

0 1 2 4 Miles

URS

US Army Corps of Engineers®

Alternative 4 - MEC Surface Clearance
Former Maneuver Area A
Fort Bliss
El Paso, Texas

Drawn By:	Date:	
JZ	8/31/2015	**Figure 4-2**
Checked By:	Project No.	
PW	60417030	

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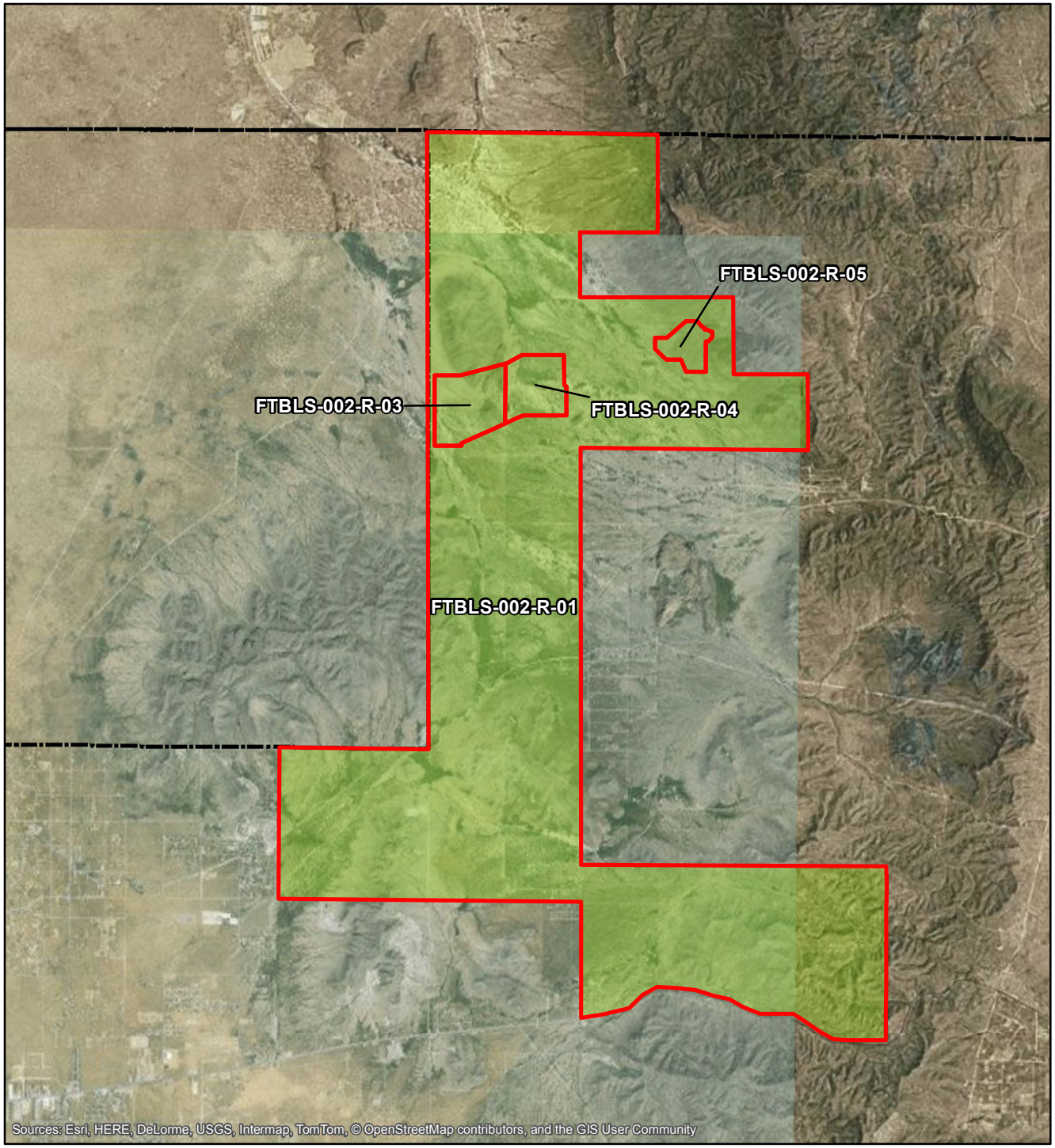

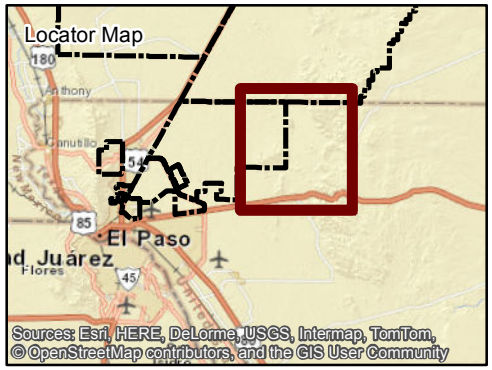

Legend

- Installation Boundary
- MRS Boundary
- Proposed MEC Surface Clearance and MEC Subsurface Removal

N

0 1 2 4 Miles

URS

US Army Corps of Engineers®

Alternative 5 - MEC Surface Clearance and MEC Subsurface Removal
Former Maneuver Area A
Fort Bliss, El Paso, Texas

Drawn By:	Date:	
JZ	8/11/2015	**Figure 4-3**
Checked By:	Project No.	
PW	60417030	

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This section presents the analysis and assessment of each alternative with respect to the evaluation criteria specified by the NCP (CFR, Title 40, Part 300.430.[e][9]):

5.1 DESCRIPTION OF EVALUATION CRITERIA

The nine criteria identified by the NCP are divided into three functional categories: threshold criteria, primary balancing criteria, and modifying criteria.

5.1.1 Threshold Criteria

Threshold criteria are requirements each alternative must meet or have specifically waived to be eligible for selection. In the absence of thresholds for MEC, the primary objective of the response is to reduce hazards while meeting ARARs. In the event a response is available that meets ARARs, the goal of the response is to reduce the MEC hazard. Threshold criteria consist of the following:

- **Overall Protection of Human Health and the Environment**: Addresses whether a remedial alternative meets all selected federal and state ARARs. To be acceptable, an alternative shall comply with ARARs or be covered by a waiver. There were no TBCs identified for any of the alternatives in previous stages of the RI/FS process.
- **Compliance with ARARs**: Addresses whether a remedial alternative meets all selected federal and state environmental statutes and regulations. To be acceptable, an alternative shall comply with ARARs or be covered by a waiver. There were no TBCs identified for any of the alternatives in previous states of the RI/FS process.

5.1.2 Primary Balancing Criteria

Primary balancing criteria are those that, for the basis for comparison among the alternatives, meet the threshold criteria. Primary balancing criteria consist of the following:

- **Long-Term Effectiveness and Permanence**: Addresses the ability of a remedial alternative to maintain reliable protection of human health and the environment over time, and considers the magnitude of residual risk/hazard, the adequacy of the response in limiting the risk/hazard, and whether LUCs and long-term maintenance are required.
- **Reduction of TMV through Treatment**: Addresses the preference for remedial actions that use treatment technologies that permanently and significantly reduce TMV of any MC-related contaminants or remove any MEC reasonably possible to detect. The achievement of this criterion depends on the irreversibility of the response and the amount of MEC removed from the MRS.
- **Short-Term Effectiveness**: Addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community, and the environment during implementation. MEC removal poses risks to workers and the public that are not associated with the environmental contaminants that must be considered and controlled.

- **Implementability**: Addresses the technical and administrative feasibility of implementing a remedial alternative from design through completion. Factors such as availability of services, materials, and operational reliability are considered. Administrative feasibility should consider the ability to coordinate with other agencies or obtain permits.
- **Cost**: Addresses the total cost of each remedial alternative, including consideration of capital costs, annual O&M costs, periodic costs, and present value costs (USEPA 2000). Costs were based on a 30-year period of analysis per USEPA guidance for estimating present value cost of a remedial alternative during the FS. A discount factor of 1.9% was utilized in calculating present value cost. This percentage was obtained from Appendix C of the Office of Management and Budget Circular A-94 (revised December 2013).

5.1.3 Modifying Criteria

State acceptance and community acceptance are modifying criteria that will be evaluated in the Record of Decision (ROD) following state and public comments on the PP. Modifying criteria consist of the following:

- **State Acceptance**: Addresses state regulatory concerns or issues identified upon review of the FS. This may include, but is not limited to, comments on ARARs, proposed use of waivers, the states preferred alternative, or concerns identified with the recommended alternative.
- **Community Acceptance**: Addresses components of an alternative that community members identify as presenting a potential issue, concern, or are simply opposed to.

5.2 INDIVIDUAL ANALYSIS OF ALTERNATIVES

5.2.1 Alternative 1 – No Action

Alternative 1 leaves the MRSs in their present conditions with no LUCs or remedial actions.

5.2.1.1 Overall Protection of Human Health and the Environment

Alternative 1 provides no protection to human health and does not provide any reduction in explosive hazards. MEC, if any, would not be eliminated, reduced, or controlled through treatment, engineering, and/or LUCs. Alternative 1 does not provide any protection of human health. MEC is not expected to have a significant negative impact on the ecosystem.

5.2.1.2 Compliance with ARARs

No applicable ARARs were identified.

5.2.1.3 Long-Term Effectiveness and Permanence

MEC, if any, would remain in soil and the risk of receptor exposure through potentially complete pathways to surface and/or subsurface MEC would remain indefinitely. Alternative 1 does not provide long-term effectiveness or permanence.

5.2.1.4 Reduction of TMV through Treatment

Toxicity and mobility factors are not specifically applicable to MEC. Alternative 1 does not provide a reduction in volume since MEC, if any, would remain in soil.

5.2.1.5 Short-Term Effectiveness

Because no action would be taken, there would be no additive short-term impacts to the community, workers, or environment.

5.2.1.6 Implementability

Alternative 1 has no action to implement.

5.2.1.7 Cost

Alternative 1 would not incur any capital, O&M, or periodic costs.

5.2.2 Alternative 2 – Public Awareness Program

Alternative 2 includes a public awareness program to promote communication between the public and Fort Bliss, and to inform receptors of the potential MEC risks associated with the MRSs. The public awareness program would be kept in place until unlimited use and unrestricted exposure could be achieved.

5.2.2.1 Overall Protection of Human Health and the Environment

Alternative 2 provides a low level of protection to human health and does not provide any reduction in explosive hazards. MEC, if any, would not be eliminated, reduced, or controlled through treatment, engineering, and/or physical LUCs. MEC is not expected to have a significant negative impact on the ecosystem.

5.2.2.2 Compliance with ARARs

No applicable ARARs were identified.

5.2.2.3 Long-Term Effectiveness and Permanence

MEC, if any, would remain in soil and the risk of receptor exposure through potentially complete pathways to surface and/or subsurface MEC would remain indefinitely. The public awareness program should educate landowners on the risks associated with potential MEC at the MRSs. The overall effectiveness of this alternative would depend on the support, involvement, and willingness of local agencies and landowners.

5.2.2.4 Reduction of TMV through Treatment

Toxicity and mobility factors are not specifically applicable to MEC. Alternative 2 does not provide a reduction in volume since MEC, if any, would remain in soil.

5.2.2.5 Short-Term Effectiveness

There would be no additive short-term impacts to the community, workers, or environment.

5.2.2.6 Implementability

Alternative 2 is considered technically and administratively feasible and services and materials are readily available. Prior to instituting the public awareness program, plans would be prepared and submitted to USACE, U.S. Army, TCEQ, and other stakeholders. At a minimum, these documents would include a PP and ROD. Alternative 2 has no construction activities to implement and ROE agreements would not be required. Administratively, a process substantially similar to this alternative was implemented at Fort Bliss (i.e., Community Relations Plan) during the RI; therefore, this alternative is considered administratively feasible.

5.2.2.7 Cost

The cost estimates include the total cost for implementation of the public awareness program and five-year reviews. The total estimated cost for each MRS for Alternative 2 is as follows:

- FTBLS-002-R-01 – $231,279
- FTBLS-002-R-03 – $231,279
- FTBLS-002-R-04 – $231,279
- FTBLS-002-R-05 – $231,279

See **Appendix A** (Cost Estimate Tables A-2, B-2, C-2, and D-2) for a comprehensive breakdown of capital costs, annual O&M costs, periodic costs, and total present values of the alternatives.

5.2.3 Alternative 3 – Land Use Controls

Alternative 3 was developed for FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05. Alternative 3 includes a public awareness program and engineering controls (i.e., fencing and

warning signs). The LUCs would be kept in place until unlimited use and unrestricted exposure could be achieved. None of the land associated with these MRSs is currently owned or used by Fort Bliss. Since the property is not owned by Fort Bliss, implementation of this remedy will require the approval and participation of the landowner(s). FTBLS-002-R-03 is currently owned by a private individual. FTBLS-002-R-04 and FTBLS-002-R-05 are currently owned by the State of Texas. ROE from the current landowners would be required to implement the engineering controls at the MRS. However, based on the limited number of landowners (one per MRS), LUCs were considered to be a viable alternative for these MRSs.

This alternative would not be effective for FTBLS-002-R-01. FTBLS-002-R-01 encompasses 23,356.99 acres divided into numerous parcels of varying size with approximately 2,514 landowners. None of the land associated with the MRS is currently owned or used by Fort Bliss. The engineering controls would not be effective at limiting receptor exposure to MEC, if any.

5.2.3.1 Overall Protection of Human Health and the Environment

Alternative 3 provides a low level of protection to human health and does not provide any reduction in explosive hazards. MEC would not be eliminated or reduced; however, potential MEC interactions for FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 would be limited by LUCs including a physical barrier (i.e., fence) to prevent inadvertent access to the MRS, and warning signs to inform site receptors of the potential presence of MEC. Current receptors at FTBLS-002-R-03 were identified as ranchers and trespassers. Current receptors at FTBLS-002-R-04 and FTBLS-002-R-05 were identified as hunters, ranchers, and trespassers. The engineering controls would not limit access to the MRS by the current receptors. Alternative 3 would provide a public awareness program to promote communication between the public and Fort Bliss and to inform potential receptors of the MEC risks associated with the MRS. MEC is not expected to have a significant negative impact on the ecosystem.

5.2.3.2 Compliance with ARARs

No applicable chemical- or action-specific ARARs were identified. Planning would be required to comply with location-specific ARARs.

5.2.3.3 Long-Term Effectiveness and Permanence

MEC, if any, would remain in soil and the risk of receptor exposure through potentially complete pathways to surface and/or subsurface MEC would remain indefinitely. Alternative 3 does provide some level of long-term effectiveness and permanence through the use of LUCs. The public awareness program should educate landowners on the risks associated with potential MEC at the MRS, and engineering controls should offer some level of protection by restricting access to the MRS and providing adequate warning to potential receptors. However, an on-site land manager would not be present to ensure that engineering controls are effective. Periodic maintenance would be required to maintain the integrity of fencing and signs around the MRS.

5.2.3.4 Reduction of TMV through Treatment

Toxicity and mobility factors are not specifically applicable to MEC. Alternative 3 does not provide a reduction in volume since MEC, if any, would remain in soil.

5.2.3.5 Short-Term Effectiveness

Construction activities for the engineering controls (i.e., fencing and signs) at FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 are estimated to take less than one field season to complete. Construction activities for installation of the fencing and signs could potentially involve additive short-term impacts to the community. Potential short-term impacts may include increased traffic flow on public roads used by the trucks to transport fence and sign materials; however, these potential impacts are expected to be minimal and would not require extensive planning. Placement of fencing and/or warning signs around the perimeter of the MRS poses a risk for construction workers to come in contact with potential MEC. These short-term risks to workers would be limited through the implementation of an approved health and safety plan and UXO safety support during construction field activities. Potential environmental impacts would be addressed in the planning documents for this alternative and are considered to be minimal.

5.2.3.6 Implementability

Alternative 3 is considered technically feasible and services and materials are readily available. Prior to instituting LUCs, plans would be prepared and submitted to USACE, U.S. Army, TCEQ, and other stakeholders before LUCs could proceed. At a minimum, these documents would include a PP and ROD.

Alternative 3 construction activities (i.e., fence and sign installation) would be somewhat difficult to implement due to the amount of construction materials required, size of the MRSs, and work in areas with limited access; however, all non-UXO personnel and materials necessary to implement the engineering controls are readily available in the local community. DoD EOD or UXO-qualified personnel providing UXO safety support may or may not be available in the local community and would need to be identified prior to construction activities. To document the completed remedial action, a Site-Specific Final Report would be prepared. Periodic maintenance would be required to maintain the integrity of fencing and signs around the MRS.

Administratively, implementation of Alternative 3 could be difficult. None of the land associated with FTBLS-002-R-03, FTBLS-002-R-04, or FTBLS-002-R-05 is currently owned or used by Fort Bliss. For the RI, ROE agreements were obtained from the landowners. Additional ROE agreements would be needed for construction activities.

5.2.3.7 Cost

The cost estimates include the total cost for implementation of LUCs, annual site inspections until the first five-year review, and five-year reviews. The total estimated cost for each MRS for Alternative 3 is as follows:

- FTBLS-002-R-01: Alternative would not be effective for this MRS and was not retained.
- FTBLS-002-R-03 – $1,114,618
- FTBLS-002-R-04 – $1,060,856
- FTBLS-002-R-05 – $929,491

See **Appendix A** (Cost Estimate Tables B-3, C-3, and D-3) for a comprehensive breakdown of capital costs, annual O&M costs, periodic costs, and total present values of the alternatives.

5.2.4 Alternative 4 – MEC Surface Clearance

Alternative 4 includes a comprehensive MEC surface clearance that would involve removal and disposal of all surface MEC within FTBLS-002-R-01, FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05. The MEC surface clearances within the MRSs would reduce the risk of site receptors encountering surface MEC.

Due to the potential for subsurface MEC, LUCs described in Alternatives 2 and 3 are included in conjunction with the MEC surface clearance activities for FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05. The LUCs described in Alternative 2 are included in conjunction with the MEC surface clearance activities for FTBLS-002-R-01. LUCs would address potential MEC in subsurface soils and would be kept in place until unlimited use and unrestricted exposure could be achieved.

5.2.4.1 Overall Protection of Human Health and the Environment

Alternative 4 provides a medium level of protection to human health and a medium level of reduction in explosive hazards on the surface of the MRSs by eliminating or reducing the amount of surface MEC. Alternative 4 provides a public awareness program to promote communication between the public and Fort Bliss and to inform potential receptors of the MEC risks associated with the MRSs. MEC is not expected to have a significant negative impact on the ecosystem.

Potential MEC interactions for FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 would also be limited by LUCs through a physical barrier (i.e., fence) to prevent inadvertent access to the MRS, and warning signs to inform site receptors of the potential presence of MEC. Current receptors at FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 include landowners. The engineering controls would not limit access to the MRS by these landowners and their associated receptors.

5.2.4.2 Compliance with ARARs

Planning would be required to comply with chemical-specific, location-specific, and action-specific ARARs. ARARs identified included regulations regarding the transportation, storage, treatment, and disposal of waste military munitions as well as regulations regarding state/federal

endangered species. Munitions regulations will be addressed by completion of all surface clearance operations in accordance with applicable guidance documents.

Endangered species will be addressed in a manner consistent with that identified in the RI work plan. No endangered species were identified during the completion of the RI field work. However, should endangered species be identified during the completion of the surface clearance activities they would be avoided to prevent disturbance of the species. Ousting animals from blow-in-place detonation work areas would be exercised. In addition to avoidance measures, the species would be photographed (if possible), reported to a URS biologist at a supporting office for species confirmation, and documentation will be made of the observation and effort to minimize adverse impact. Such activities would be outlined in the work plan for the implementation of the approved remedy.

5.2.4.3 Long-Term Effectiveness and Permanence

Alternative 4 provides a medium level of long-term effectiveness and permanence through the implementation and completion of MEC surface clearances and would effectively reduce the probability of encountering surface MEC at the MRSs. MEC, if any, would remain in the subsurface and the risk of receptor exposure through potentially complete pathways to subsurface MEC would remain indefinitely. Surface MEC poses the greatest risk to current human health receptors (e.g., residents [FTBLS-002-R-01 only], trespassers, and hunters/ranchers). However, this alternative does not address the risk associated with subsurface MEC. Over time, subsurface MEC may be exposed at the surface through erosion.

Since subsurface MEC would not be removed, LUCs would still be required. The public awareness program should educate landowners on the risks associated with potential MEC at the MRS and engineering controls should offer some level of protection by restricting access to the MRS and providing adequate warning to potential receptors. However, an on-site land manager would not be present to ensure that engineering controls are effective. The overall effectiveness of the public awareness program would depend on the support, involvement, and willingness of local agencies and landowners.

5.2.4.4 Reduction of TMV through Treatment

Toxicity and mobility factors are not specifically applicable to MEC. Alternative 4 would provide a reduction in volume of MEC, if any, on the surface of the MRS. MEC would be destroyed and removed from the surface of the MRS; however, there is no reduction in volume of potential MEC in the subsurface.

5.2.4.5 Short-Term Effectiveness

Construction activities for the engineering controls (i.e., fencing and signs) at FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 are estimated to take less than one field season to complete. Engineering controls (i.e., fencing and signs) are not proposed for FTBLS-002-R-01. Construction activities for installation of the fencing and signs could potentially involve additive

short-term impacts to the community. Potential short-term impacts may include increased traffic flow on public roads used by the trucks to transport fence and sign materials; however, these potential impacts are expected to be minimal and would not require extensive planning. Placement of fencing and/or warning signs around the perimeter of the MRS poses a risk for construction workers to come in contact with potential MEC. These short-term risks to workers would be limited through the implementation of an approved health and safety plan and UXO safety support during construction field activities. Potential environmental impacts would be addressed in the planning documents for this alternative and are considered to be minimal.

MEC surface clearance activities for FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 are estimated to take less than one field season to complete. MEC surface clearance activities for FTBLS-002-R-01 are estimated to take three field seasons to complete, but would be dependent on available resources. The MEC surface clearances pose a moderate to high risk to site workers during MEC related activities (i.e., MEC surface clearance and MEC disposal operations). Appropriately trained personnel, safety procedures, protective equipment, and approved planning documents (e.g., ESS) would be used to reduce impacts to the workers, environment, and community.

5.2.4.6 Implementability

Alternative 4 is considered technically feasible and the majority of services and materials are readily available; however, the MEC surface clearances would require the use of specialized equipment (e.g., Schonstedt GA-52Cx magnetometer, a White's Spectrum XLT all-metals detector), materials (e.g., donor explosives) and qualified personnel (e.g., UXO personnel) that may not be available locally. Prior to MEC surface clearance activities, plans would be prepared and submitted, as needed, to USACE, U.S. Army, Department of Defense Explosives Safety Board (DDESB) (ESS only), TCEQ, and other stakeholders before fieldwork could proceed. At a minimum, these documents would include a PP, ROD, ESS, and Work Plan (including, but not limited to, a Uniform Federal Policy - Quality Assurance Project Plan [UFP-QAPP] and Accident Prevention Plan [APP]).

Alternative 4 construction activities (i.e., fence and sign installation) for FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 would be somewhat difficult to implement due to the amount of construction materials required, size of the MRSs, and work in areas with limited access; however, all non-UXO personnel and materials necessary to implement the engineering controls are readily available in the local community. DoD EOD or UXO-qualified personnel providing UXO safety support may or may not be available in the local community and would need to be identified prior to construction activities. Periodic maintenance would be required to maintain the integrity of fencing and signs around FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05.

Alternative 4 MEC surface clearance activities would be somewhat difficult to implement due to the size of the MRSs and the work in areas with limited access. DoD EOD or UXO-qualified personnel may or may not be available in the local community and would need to be identified

prior to MEC-related field activities. To document the completed remedial action, a Site-Specific Final Report would be prepared.

Administratively, implementation of Alternative 4 could be difficult. FTBLS-002-R-03 is currently owned by a private individual. FTBLS-002-R-04 and FTBLS-002-R-05 are currently owned by the State of Texas. FTBLS-002-R-01 is currently owned by 2,514 landowners including state entities and private individuals. None of the land associated with these MRSs is currently owned or used by Fort Bliss. Therefore, ROE agreements would be required by the U.S. Army to allow access to these properties. For the RI, ROE agreements were obtained from 1,000 land owners (including the landowners of FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05) while 36 land owners declined to allow access to their property. The ROE agreements obtained allowed access to a total of 21,978 acres (89.9 percent) of FTBLS-002-R-01. The remaining landowners were unresponsive to the ROE request.

5.2.4.7 Cost

The cost estimates include the total cost for MEC surface clearance, implementation of LUCs, annual site inspections until the first five-year review, and five-year reviews. The total estimated cost for each MRS for Alternative 4 is as follows:

- FTBLS-002-R-01 – $33,997,793
- FTBLS-002-R-03 – $2,053,171
- FTBLS-002-R-04 – $1,819,319
- FTBLS-002-R-05 – $1,402,235

See **Appendix A** (Cost Estimate Tables A-3, B-4, C-4, and D-4) for a comprehensive breakdown of capital costs, annual O&M costs, periodic costs, and total present values of the alternatives.

5.2.5 Alternative 5 – MEC Surface Clearance and MEC Subsurface Removal

Alternative 5 includes a MEC surface clearance action similar to that described in Alternative 4 and a MEC subsurface removal action. For the purposes of Alternative 5, it is assumed that the removal action would be completed to depths of less than 4 feet bgs and would involve removal and disposal of all subsurface MEC from FTBLS-002-R-01, FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05. MEC surface clearances and MEC subsurface removals within the MRSs would reduce the risk of site receptors encountering surface and subsurface MEC.

5.2.5.1 Overall Protection of Human Health and the Environment

Alternative 5 provides a high level of protection to human health and a high level of reduction in explosive hazards on the surface and within the subsurface of the MRSs by eliminating or reducing the amount of surface and subsurface MEC. A subsurface removal action to depths of less than 4 feet bgs should capture any potential MEC within the subsurface of the MRSs. MEC is not expected to have a significant negative impact on the ecosystem.

5.2.5.2 Compliance with ARARs

Planning would be required to comply with chemical-specific, location-specific, and action-specific ARARs. ARARs identified included regulations regarding the transportation, storage, treatment, and disposal of waste military munitions as well as regulations regarding state/federal endangered species. Munitions regulations will be addressed by completion of all surface clearance operations in accordance with applicable guidance documents.

Endangered species will be addressed in a manner consistent with that identified in the RI work plan. No endangered species were identified during the completion of the RI field work. However, should endangered species be identified during the completion of the surface clearance activities they would be avoided to prevent disturbance of the species. Ousting animals from blow-in-place detonation work areas would be exercised. In addition to avoidance measures, the species would be photographed (if possible), reported to a URS biologist at a supporting office for species confirmation, and documentation will be made of the observation and effort to minimize adverse impact. Such activities would be outlined in the work plan for the implementation of the approved remedy

5.2.5.3 Long-Term Effectiveness and Permanence

Alternative 5 provides a high level of long-term effectiveness and permanence through the implementation and completion of MEC surface clearances and MEC subsurface removals, and would effectively reduce the probability of encountering MEC at the MRSs. Surface MEC poses the greatest risk to current human health receptors (e.g., residents [FTBLS-002-R-01 only], trespassers, and hunters/ranchers). Risks associated with surface and subsurface MEC would be eliminated or reduced though the MEC surface clearances and MEC subsurface removals. The overall effectiveness and permanence of this alternative is high.

5.2.5.4 Reduction of TMV through Treatment

Toxicity and mobility factors are not specifically applicable to MEC. Alternative 5 would provide a reduction in volume of MEC, if any, on the surface and in the subsurface soil of the MRSs. MEC would be destroyed and removed from the MRS.

5.2.5.5 Short-Term Effectiveness

MEC surface clearance and MEC subsurface removal activities for FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 are estimated to take less than one field season to complete. MEC surface clearance and MEC subsurface removal activities for FTBLS-002-R-01, if worked sequentially, are estimated to take eight field seasons to complete. MEC field activities could potentially involve additive short-term impacts to the community during MEC disposal operations; however, these potential impacts are expected to be minimal. The MEC fieldwork poses a moderate to high risk to site workers during MEC related activities (i.e., MEC surface clearance, MEC subsurface removals, and MEC disposal operations). Appropriately trained

personnel, safety procedures, protective equipment, and approved planning documents (e.g., ESS) would be used to reduce impacts to the workers, environment, and community.

5.2.5.6 Implementability

Alternative 5 is considered technically feasible and the services and materials are readily available. MEC surface clearances and MEC subsurface removals would require the use of specialized equipment (e.g., Schonstedt GA-52Cx magnetometer, a White's Spectrum XLT all-metals detector), materials (e.g., donor explosives) and qualified personnel (e.g., UXO personnel) that may not be available locally. Prior to MEC surface clearance and MEC subsurface removal activities, plans would be prepared and submitted, as needed, to USACE, U.S. Army, DDESB (ESS only), TCEQ, and other stakeholders before fieldwork could proceed. At a minimum, these documents would include a PP, ROD, ESS, and Work Plan (including, but not limited to, a UFP-QAPP and APP).

Alternative 5 MEC surface clearance and MEC subsurface removal activities would be somewhat difficult to implement due to the size of FTBLS-002-R-01 (23,356.99 acres) and fieldwork in areas with limited access; however, all UXO personnel and equipment necessary to implement the MEC surface clearance and MEC subsurface removal activities are readily available. DoD EOD or UXO-qualified personnel may or may not be available in the local community and would need to be identified prior to MEC field activities. To document the completed remedial action, a Site-Specific Final Report would be prepared.

Administratively, implementation of Alternative 5 could be difficult. FTBLS-002-R-03 is currently owned by a private individual. FTBLS-002-R-04 and FTBLS-002-R-05 are currently owned by the State of Texas. FTBLS-002-R-01 is currently owned by 2,514 landowners including state entities and private individuals. None of the land associated with these MRSs is currently owned or used by Fort Bliss. Therefore, ROE agreements would be required by the U.S. Army to allow access to these properties. For the RI, ROE agreements were obtained from 1,000 land owners (including the landowners of FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05) while 36 land owners declined to allow access to their property. The ROE agreements obtained allowed access to a total of 21,978 acres (89.9 percent) of FTBLS-002-R-01. The remaining landowners were unresponsive to the ROE request.

5.2.5.7 Cost

The cost estimates include the total cost for MEC surface clearances and MEC subsurface removals. The total estimated cost for each MRS for Alternative 5 is as follows:

- FTBLS-002-R-01 – $85,797,825
- FTBLS-002-R-03 – $2,260,961
- FTBLS-002-R-04 – $1,806,905
- FTBLS-002-R-05 – $1,090,750

See **Appendix A** (Cost Estimate Tables A-4, B-5, C-5, and D-5) for a comprehensive breakdown of capital costs, annual O&M costs, periodic costs, and total present values of the alternatives.

5.3 COMPARATIVE ANALYSIS OF ALTERNATIVES

A table showing the alternatives analyzed against the threshold and balancing criteria (with the exception of cost estimates) is presented as **Table 5-1**. Tables showing the annual O&M Costs, total capital costs, periodic costs, and the total present value of each alternative per MRS is presented in **Tables 5-2, 5-3, 5-4** and **5-5** for FTBLS-002-R-01, FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05, respectively. Detailed cost estimates for each MRS can be found in the Cost Estimate Summaries presented in **Appendix A**.

5.3.1 Overall Protection of Human Health and the Environment

Alternative 1 is the least protective of the alternatives. Alternatives 2 and 3 provide a low level of protection for human health through LUCs (i.e., public awareness program and/or engineering controls). Alternatives 1, 2, and 3 do not provide any reduction in explosive hazards and MEC, if any, would not be eliminated or reduced. Risks to current and future receptors would remain indefinitely. Alternatives 4 and 5 provide greater levels of protection than Alternatives 1, 2 and 3 by eliminating or reducing the amount of MEC, if any, through MEC removal actions. Therefore, Alternative 5 is considered the most protective of human health. MEC is not expected to have a significant negative impact on the ecosystem.

5.3.2 Compliance with ARARs

Planning would be required for Alternative 3, 4, and 5 to comply with chemical-specific, location-specific, and action specific ARARs. For Alternative 3, compliance with ARARs would be limited to activities related to the installation of fencing and warning signs. Compliance with ARARs for Alternatives 4 and 5 would require greater planning due to regulations governing the transportation, storage, treatment, and disposal of MEC items during surface and/or surface clearances as well as the potential impact to endangered species due to the disruptive nature of surface clearance activities in the endangered species habitat.

5.3.3 Long-Term Effectiveness and Permanence

Alternative 1 does not provide long-term effectiveness and permanence for the MRSs because potential exposure pathways between site receptors and MEC would remain. Alternatives 2 and 3 provide some long-term effectiveness and permanence through implementation of LUCs (i.e., public awareness program and/or engineering controls). The overall effectiveness of the LUCs would depend on the support, involvement, and willingness of site receptors (e.g., local agencies, landowners). Alternatives 4 and 5 provide greater long-term effectiveness and permanence because these alternatives include removal of MEC and reduction of potential exposures. Alternative 4 only includes surface MEC removal, which is less effective in the long-term when compared to the removal of surface and subsurface MEC in Alternative 5. With regards to

residual risk, there would remain a risk of potential MEC hazards for all five alternatives. The greatest reduction in risk should be achieved with Alternative 5, which provides the greatest long-term effectiveness and permanence.

5.3.4 Reduction of TMV through Treatment

Toxicity and mobility factors are not specifically applicable to MEC. Alternatives 1, 2, and 3 do not provide any reduction in the volume of MEC. Alternative 4 includes reduction in the volume of surface MEC and Alternative 5 includes a reduction in the volume of surface and subsurface MEC. Reduction in MEC for Alternatives 4 and 5 would be accomplished through MEC disposal operations (i.e., BIP or consolidated shot).

5.3.5 Short-Term Effectiveness

Alternatives 1 and 2 have no short-term impacts to the community, workers, or the environment. Alternative 3, 4, and 5 have minimal impacts to the community. Alternative 3 has relatively higher potential risks than Alternatives 1 and 2 due to fence and sign installation around the perimeter of FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05. Workers who install the fencing and signs would potentially be exposed to surface and/or subsurface MEC, but UXO safety support procedures would be utilized to lower the risk of MEC interaction. Alternatives 4 and 5 pose the highest potential risks to site workers from the handling of MEC, if any, during MEC surface clearance and MEC subsurface removal actions. Appropriately trained personnel, safety procedures, protective equipment, and approved planning documents (e.g., ESS) would be used to reduce impacts to the workers, environment, and community. The duration of worker exposure to potential safety hazards would be dependent on available resources to complete the fieldwork.

5.3.6 Implementability

Alternative 1 has no action to implement. Alternatives 2, 3, 4, and 5 are technically feasible and the services and materials necessary to implement the alternatives are available.

Alternative 2 has no construction activities to implement and ROE agreements would not be required. Administratively, a process substantially similar to this alternative was implemented at Fort Bliss (i.e., Community Involvement Plan) during the RI; therefore, this alternative is considered administratively feasible.

Alternatives 3, 4 and 5 would be difficult to implement administratively. FTBLS-002-R-03 is currently owned by a private individual. FTBLS-002-R-04 and FTBLS-002-R-05 are currently owned by the State of Texas. FTBLS-002-R-01 is currently owned by 2,514 landowners including state entities and private individuals. None of the land associated with these MRSs is currently owned or used by Fort Bliss. Therefore, ROE agreements would be required by the U.S. Army to allow access to these properties. For the RI, ROE agreements were obtained from 1,000 land owners (including the landowners of FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05) while 36 land owners declined to allow access to their property. The ROE

agreements obtained allowed access to a total of 21,978 acres (89.9 percent) of FTBLS-002-R-01. The remaining landowners were unresponsive to the ROE request.

5.3.7 Cost

The total estimated costs for implementing the alternatives at each MRS are included in **Tables 5-2** through **5-5**. These costs were obtained from the Cost Estimate Summaries presented in **Appendix A**.

- Alternative 1 (No Action) –No associated capital, O&M, or periodic costs.
- Alternative 2 (Public Awareness Program) – Capital costs include labor and materials for implementation of a public awareness program. Periodic costs for five-year reviews include continued public awareness and participation, and administrative record review.
- Alternative 3 (Land Use Controls) – Capital costs include labor and materials for the installation of fencing and signs and implementation of a public awareness program. Annual O&M costs include annual site inspections until the first five-year review. Periodic costs for five-year reviews include site inspection and maintenance, continued public awareness and participation, and administrative record review. This alternative was retained for FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05. This alternative was not retained for FTBLS-002-R-01.
- Alternative 4 (MEC Surface Clearance) – Capital costs include labor and materials for the installation of implementation of LUCs and MEC surface clearance. Periodic costs for five-year reviews include site inspection and maintenance, continued public awareness and participation, and administrative record review.
- Alternative 5 (MEC Surface Clearance and MEC Subsurface Removal) – Capital costs include labor and materials for the MEC surface clearance and MEC subsurface removal. There are no periodic costs associated with this alternative.

5.3.8 State Acceptance

State acceptance cannot be assessed until comments on the FS and PP are received. Modifying criteria (State and Community Acceptance) are considered in the remedy selection process.

5.3.9 Community Acceptance

Community acceptance cannot be assessed until comments on the PP are received. Modifying criteria (State and Community Acceptance) are considered in the remedy selection process.

TABLE 5-1
DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

EVALUATION CRITERIA	Alternative 1 - No Action	Alternative 2 - Public Awareness Program	Alternative 3[1] - Land Use Controls	Alternative 4 - MEC Surface Clearance	Alternative 5 - MEC Surface Clearance and MEC Subsurface Removal
OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT					
Human Health Protection	This alternative provides no protection to human health and does not provide any reduction in explosive hazards. MEC, if any, would not be eliminated, reduced, or controlled through treatment, engineering, and/or LUCs.	This alternative provides a low level of protection to human health and does not provide any reduction in explosive hazards. MEC, if any, would not be eliminated, reduced, or controlled through treatment, engineering, or LUCs. Alternative 2 provides a public awareness program to promote communication between the public and Fort Bliss, and to inform receptors of the potential MEC risks associated with the MRSs.	This alternative provides a low level of protection to human health and does not provide any reduction in explosive hazards. Potential MEC would not be eliminated or reduced. Potential MEC interactions would be limited through LUCs.	This alternative provides a medium level of protection to human health and a medium level reduction in explosive hazards on the surface of the MRSs by eliminating or reducing the amount of surface MEC. Potential subsurface MEC interactions would be limited through LUCs.	This alternative provides a high level of protection to human health and a high level of reduction in explosive hazards on the surface and subsurface of the MRSs by eliminating or reducing the amount of surface and subsurface MEC.
Environmental Protection	MEC is not expected to have a significant negative impact on the ecosystem.	MEC is not expected to have a significant negative impact on the ecosystem.	MEC is not expected to have a significant negative impact on the ecosystem.	MEC is not expected to have a significant negative impact on the ecosystem.	MEC is not expected to have a significant negative impact on the ecosystem.
COMPLIANCE WITH ARARs					
Compliance with ARARs	No applicable ARARs	No applicable ARARs	No applicable chemical-specific or action-specific ARARs. Planning would be required to comply with location-specific ARARs.	Planning would be required to comply with chemical-specific, location-specific, and action specific ARARs.	Planning would be required to comply with chemical-specific, location-specific, and action specific ARARs.
LONG-TERM EFFECTIVENESS					
Magnitude of Residual Risk	Risks to potential future receptors would remain indefinitely.	Risks to potential future receptors would remain indefinitely.	Risks to potential future receptors would remain indefinitely.	Risks to potential future receptors would remain for intrusive activities and for any potentially unidentified MEC.	Risks to potential receptors would remain for any potentially unidentified MEC.
Adequacy and Reliability of Controls	Not applicable	The overall effectiveness of this alternative would depend on the support, involvement, and willingness of local agencies and landowners.	Engineering controls should offer some level of protection by restricting access to the MRS and providing adequate warning to potential receptors. However, an on-site land manager would not be present to ensure that engineering controls are effective.	The MEC surface clearances would effectively reduce the probability of encountering MEC at the surface of the MRSs. However, this alternative does not address the risk associated with subsurface MEC, where a large percentage of MEC is anticipated to be found. Over time, subsurface MEC may be exposed at the surface through erosion. Risks to receptors completing intrusive activities within the MRSs would remain. Since subsurface MEC would not be removed, LUCs would still be required.	The MEC surface clearances and MEC subsurface removals would effectively reduce the probability of encountering MEC at the surface and within the subsurface of the MRSs.
REDUCTION OF TOXICITY, MOBILITY, AND VOLUME					
Treatment Process Used	None	None	None	Disposal of MEC by detonation.	Disposal of MEC by detonation.
Reduction of TMV	None	None	None	Total volume of MEC would be reduced by the amount removed from the surface.	Total volume of MEC would be reduced by the amount removed from the surface and subsurface.
SHORT-TERM EFFECTIVENESS					
Time Required to Achieve Remedial Action Objectives	Indefinite	Indefinite	RAO would be met upon implementation of LUCs.	RAO would be met upon implementation of LUCs and completion of the remedial action. The time required for the MEC surface clearances would be dependent on available resources.	RAO would be met upon completion of the remedial action. The time required for the MEC surface clearances and MEC subsurface removals would be dependent on available resources.

TABLE 5-1
DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

EVALUATION CRITERIA	Alternative 1 - No Action	Alternative 2 - Public Awareness Program	Alternative 3[1] - Land Use Controls	Alternative 4 - MEC Surface Clearance	Alternative 5 - MEC Surface Clearance and MEC Subsurface Removal
Protection of Community During Remedial Action	No action taken.	No action taken.	Potential short-term impacts may include increased traffic flow on public roads used by the trucks to transport fence and sign materials; however, these potential impacts are expected to be minimal and would not require extensive planning.	Potential short-term impacts may include increased traffic flow on public roads used by the trucks to transport fence and sign materials; however, these potential impacts are expected to be minimal and would not require extensive planning. MEC field activities could potentially involve additive short-term impacts to the community during MEC disposal operations. Appropriately trained personnel, safety procedures, protective equipment, and approved planning documents (e.g., ESS) would be used to reduce impacts to the workers, environment, and community.	MEC field activities could potentially involve additive short-term impacts to the community during MEC disposal operations. Appropriately trained personnel, safety procedures, protective equipment, and approved planning documents (e.g., ESS) would be used to reduce impacts to the workers, environment, and community.
Protection of Workers During Remedial Action	No action taken.	No action taken.	Placement of fencing and/or warning signs along the perimeter of the MRS poses a risk for construction workers to come in contact with potential MEC. These short-term risks to workers would be limited through the implementation of an approved health and safety plan and use of UXO safety support during construction field activities.	For LUCs, see Alternative 3. The MEC surface clearance poses a moderate to high risk to site workers during MEC-related activities. Appropriately trained personnel, safety procedures, protective equipment, and approved planning documents would be used to reduce impacts to the workers, environment, and community.	The MEC fieldwork poses a moderate to high risk to site workers during MEC-related activities. Appropriately trained personnel, safety procedures, protective equipment, and approved planning documents would be used to reduce impacts to the workers, environment, and community.
IMPLEMENTABILITY					
Technical Feasibility	Not applicable	Alternative uses well-established processes that are technically feasible.	Alternative uses well-established processes that are technically feasible.	Alternative uses well-established processes that are technically feasible.	Alternative uses well-established processes that are technically feasible.
Administrative Feasibility	Not applicable	Alternative is considered administratively feasible. This alternative has no construction activities to implement and ROE agreements would not be required. Administratively, a process substantially similar to this alternative was implemented at Fort Bliss (i.e., Community Relations Plan) duiring the RI.	Administratively, implementation of Alternative 3 could be difficult. None of the land associated with FTBLS-002-R-03, FTBLS-002-R-04, or FTBLS-002-R-05 is currently owned or used by Fort Bliss.	Administratively, implementation of Alternative 4 could be difficult. FTBLS-002-R-03 is currently owned by a private individual. FTBLS-002-R-04 and FTBLS-002-R-05 are currently owned by the State of Texas. FTBLS-002-R-01 is currently owned by 2,514 landowners including state entities and private individuals. None of the land associated with these MRSs is currently owned or used by Fort Bliss.	Administratively, implementation of Alternative 5 could be difficult. FTBLS-002-R-03 is currently owned by a private individual. FTBLS-002-R-04 and FTBLS-002-R-05 are currently owned by the State of Texas. FTBLS-002-R-01 is currently owned by 2,514 landowners including state entities and private individuals. None of the land associated with these MRSs is currently owned or used by Fort Bliss.
Availability of services and materials	Not applicable	Services and materials are readily available.	Services and materials are readily available.	Detection and disposal technologies are readily available and moderately easy to implement. Field activities would require extensive logistic support and planning due to land ownership.	Detection and disposal technologies are readily available and moderately easy to implement. Field activities would require extensive logistic support and planning due to land ownership.

Notes:

1 Alternative 3 was developed for the Former Maneuver Area A (FTBLS-002-R-01) MRS only. This alternative would not effectively address the potential MEC hazards associated with the Uncontaminated Former Maneuver Area A (FTBLS-002-R-01A) MRS (see Section 3.2.1).

ARAR = Applicable or Relevant and Appropriate Requirements
LUC = land use control
MEC = munitions and explosives of concern
MRS = munitions response site
RAO = Remedial Action Objective
RI = remedial investigation
ROE = right-of-entry
TMV = Toxicity, Mobility, or Volume
UXO = unexploded ordnance

TABLE 5-2
COST SUMMARY OF REMEDIAL ACTION ALTERNATIVES - FTBLS-002-R-01
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

	Alternative 1 - No Action	Alternative 2 - Public Awareness Program	Alternative 3[2] - Land Use Controls	Alternative 4 - MEC Surface Clearance	Alternative 5 - MEC Surface Clearance and MEC Subsurface Removal
Description					
Total Project Duration (Years)	0	30	-	30	8
Capital Cost	$0	$88,406	-	$33,651,339	$85,797,825
Total O&M/Periodic Cost	$0	$189,750	-	$461,099	$0
Total Cost of Alternative[1]	**$0**	**$278,156**	**-**	**$34,112,438**	**$85,797,825**
Total Present Value of Alternative	$0	$231,279	-	$33,997,793	$85,797,825

Notes

[1]Cost estimates are developed in the FS primarily for the purpose of comparing remedial action alternatives, not for establishing project budgets.

2 Alternative 3 was developed for the Former Maneuver Area A (FTBLS-002-R-01) MRS only. This alternative would not effectively address the potential MEC hazards associated with the Uncontaminated Former Maneuver Area A (FTBLS-002-R-01A) MRS (see Section 3.2.1).

TABLE 5-3
COST SUMMARY OF REMEDIAL ACTION ALTERNATIVES -
FTBLS-002-R-03
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

	Alternative 1 - No Action	Alternative 2 - Public Awareness Program	Alternative 3 - Land Use Controls	Alternative 4 - MEC Surface Clearance	Alternative 5 - MEC Surface Clearance and MEC Subsurface Removal
Description					
Total Project Duration (Years)	0	30	30	30	1
Capital Cost	$0	$88,406	$652,914	$1,591,467	$2,260,961
Total O&M/Periodic Cost	$0	$189,750	$578,197	$578,197	$0
Total Cost of Alternative[1]	**$0**	**$278,156**	**$1,231,111**	**$2,169,664**	**$2,260,961**
Total Present Value of Alternative	$0	$231,279	$1,114,618	$2,053,171	$2,260,961

Notes

[1]Cost estimates are developed in the FS primarily for the purpose of comparing remedial action alternatives, not for establishing project budgets.

TABLE 5-4
COST SUMMARY OF REMEDIAL ACTION ALTERNATIVES -
FTBLS-002-R-04
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

	Alternative 1 - No Action	Alternative 2 - Public Awareness Program	Alternative 3 - Land Use Controls	Alternative 4 - MEC Surface Clearance	Alternative 5 - MEC Surface Clearance and MEC Subsurface Removal
Description					
Total Project Duration (Years)	0	30	30	30	1
Capital Cost	$0	$88,406	$605,683	$1,364,146	$1,806,905
Total O&M/Periodic Cost	$0	$189,750	$569,494	$569,494	$0
Total Cost of Alternative[1]	**$0**	**$278,156**	**$1,175,176**	**$1,933,639**	**$1,806,905**
Total Present Value of Alternative	$0	$231,279	$1,060,856	$1,819,319	$1,806,905

Notes

[1]Cost estimates are developed in the FS primarily for the purpose of comparing remedial action alternatives, not for establishing project budgets.

TABLE 5-5
COST SUMMARY OF REMEDIAL ACTION ALTERNATIVES -
FTBLS-002-R-05
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

	Alternative 1 - No Action	Alternative 2 - Public Awareness Program	Alternative 3 - Land Use Controls	Alternative 4 - MEC Surface Clearance	Alternative 5 - MEC Surface Clearance and MEC Subsurface Removal
Description					
Total Project Duration (Years)	0	30	30	30	1
Capital Cost	$0	$88,406	$490,273	$963,017	$1,090,750
Total O&M/Periodic Cost	$0	$189,750	$548,226	$548,226	$0
Total Cost of Alternative[1]	**$0**	**$278,156**	**$1,038,500**	**$1,511,244**	**$1,090,750**
Total Present Value of Alternative	$0	$231,279	$929,491	$1,402,235	$1,090,750

Notes

[1]Cost estimates are developed in the FS primarily for the purpose of comparing remedial action alternatives, not for establishing project budgets.

Five remedial action alternatives to achieve the RAO for FTBLS-002-R-01, FTBLS-002-R-03, FTBLS-002-R-04, and FTBLS-002-R-05 were evaluated in this FS, consisting of the following:

- Alternative 1 - No Action
- Alternative 2 - Public Awareness Program
- Alternative 3 - Land Use Controls
- Alternative 4 - MEC Surface Clearance
- Alternative 5 - MEC Surface Clearance and MEC Subsurface Removal

Recommendations for the preferred alternative at each MRS are discussed below. Agency and community acceptance will be fully evaluated after presentation of the selected remedy to the public for comment in a PP. Following public comment, a final remedy will be selected for each MRS and documented in a ROD, prior to remedy implementation.

6.1 FTBLS-002-R-01

FTBLS-002-R-01 includes residential homes, commercial businesses, light industry, and undeveloped land and encompasses approximately 23,356.99 acres. This MRS is part of the Former Maneuver Area MRA, which was used for various military training exercises from 1939 into the 1970s, but has not been part of the Fort Bliss military installation since 1980. According to the RI, the MRS is currently owned by 2,514 landowners including state entities and private individuals.

During the RI visual survey, 119,711 linear feet of transects were completed and 34 MD items were identified on the surface of the MRS. During RI intrusive investigation activities, 478 anomalies were investigated and 25 MD items were identified in the subsurface of the MRS. No MEC items were identified on the surface or in the subsurface of the MRS. No potentially complete pathways for interactions between MEC sources and receptors were identified during the RI. Based on the RI data, MEC is not anticipated to be found in surface or subsurface soil within the MRS.

Based on the FS analysis, Alternatives 1, 2, 4, and 5 are applicable to FTBLS-002-R-01. Alternative 3 (Land Use Controls) was not retained for evaluation because it will be very difficult to effectively implement a long term land use controls strategy, with engineering controls, considering the MRS is comprised of approximately 2,514 landowners. The large number of landowners at FTBLS-002-R-01 will also represent a significant challenge to the implementation of Alternatives 4 or 5. However, once Alternative 4 of 5 has been implemented, long-term land use control strategy would not require engineering controls (i.e. fencing and signage). Successful implementation of Alternative 4 or 5 would require all or at least a significant number of the landowners to approve and participate in the completion of the remedy on their property.

MEC items were not discovered on the surface or within the subsurface of FTBLS-002-R-01. The amount of MD items found within this MRS was minimal and not indicative of a high density area (i.e., target or demolition/disposal area) where MEC would be anticipated. The MD items found have no associated explosives hazards. Based on the absence of explosive hazards to justify the completion of Alternatives 4 or 5 and logistical issues identified with regard to implementation of the remedy (due to the large number of landowners), Alternative 2 is recommended as the preferred alternative. Alternative 2 is technically and administratively feasible (a process substantially similar to this alternative was implemented at Fort Bliss during the RI), could be implemented without obtaining ROE agreements, and provides the best balance of long-term effectiveness and cost.

6.2 FTBLS-002-R-03

FTBLS-002-R-03 encompasses approximately 520 acres of undeveloped land that is primarily used for ranching. This MRS is part of the Former Maneuver Area MRA, which was used for various military training exercises from 1939 into the 1970s, but has not been part of the Fort Bliss military installation since 1980. According to the RI, the MRS is part of a larger parcel of land currently owned by a private individual.

During the RI visual survey, 134,870 linear feet of transects were completed and 87 MD items were identified on the surface of the MRS. During the RI intrusive investigation activities, 513 anomalies were investigated. One MEC item and 378 MD items were identified in the subsurface of the MRS. Potentially complete pathways for interactions between MEC sources and receptors were identified during the RI. Surface MEC poses the greatest risk to current human health receptors (e.g., trespassers and ranchers) within this MRS.

Based on the FS analysis, all five alternatives are applicable to FTBLS-002-R-03. MEC items were discovered within the subsurface of this MRS; therefore, Alternative 5 is recommended as the preferred alternative. Alternative 5 is technically and administratively feasible (only one landowner), is the most protective of human health, and provides the best balance of long-term effectiveness and reduction of risk to human health. Alternative 5 would potentially allow the U.S. Army to pursue NFA for the MRS.

6.3 FTBLS-002-R-04

FTBLS-002-R-04 encompasses approximately 397 acres of undeveloped land that is primarily used for ranching and/or recreational hunting. This MRS is part of the Former Maneuver Area MRA, which was used for various military training exercises from 1939 into the 1970s, but has not been part of the Fort Bliss military installation since 1980. According to the RI, the MRS is part of a larger parcel of land currently owned by a State of Texas entity (the Texas General Land Office).

During the RI visual survey, 114,125 linear feet of transects were completed and 78 MD items were identified on the surface of the MRS. During the RI intrusive investigation activities, 544

anomalies were investigated. Two MEC items and 355 MD items were identified in the subsurface of the MRS. Potentially complete pathways for interactions between MEC sources and receptors were identified during the RI. Surface MEC poses the greatest risk to current human health receptors (e.g., trespassers and hunters/ranchers) within this MRS.

Based on the FS analysis, all five alternatives are applicable to FTBLS-002-R-04. MEC items were discovered within the subsurface of this MRS; therefore, Alternative 5 is recommended as the preferred alternative. Alternative 5 is technically and administratively feasible (only one landowner), is the most protective of human health, and provides the best balance of long-term effectiveness and reduction of risk to human health. Alternative 5 would potentially allow the U.S. Army to pursue NFA for the MRS.

6.4 FTBLS-002-R-05

FTBLS-002-R-05 encompasses approximately 203 acres of undeveloped land that is primarily used for ranching and/or recreational hunting. This MRS is part of the Former Maneuver Area MRA, which was used for various military training exercises from 1939 into the 1970s, but has not been part of the Fort Bliss military installation since 1980. According to the RI, the MRS is part of a larger parcel of land currently owned by a State of Texas entity (the Texas General Land Office).

During the RI visual survey, 48,322 linear feet of transects were completed and 4 MD items were identified on the surface of the MRS. During the RI intrusive investigation activities, 129 anomalies were investigated. Two MEC items and 69 MD items were identified in the subsurface of the MRS. Potentially complete pathways for interactions between MEC sources and receptors were identified during the RI. Surface MEC poses the greatest risk to current human health receptors (e.g., trespassers and hunters/ranchers) within this MRS.

Based on the FS analysis, all five alternatives are applicable to FTBLS-002-R-05. MEC items were discovered on the surface and within the subsurface of this MRS; therefore, Alternative 5 is recommended as the preferred alternative. Alternative 5 is technically and administratively feasible (only one landowner), is the most protective of human health, and provides the best balance of long-term effectiveness and reduction of risk to human health. Alternative 5 would potentially allow the U.S. Army to pursue NFA for the MRS.

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FTBLS-002-R-01

TABLE A-1
COST COMPARISON OF REMEDIAL ACTION ALTERNATIVES
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Site:	**FTBLS-002-R-01**	**Base Year:**	**2014**
Installation:	**Fort Bliss, El Paso, Texas**	**Date:**	**05/03/2016**
Phase:	**Feasibility Study (-30% to +50%)**		

	Alternative 1	**Alternative 2**	**Alternative 3[2]**	**Alternative 4**	**Alternative 5**
Description	**No Action**	**Public Awareness Program**	**Land Use Controls (Not retained)**	**MEC Surface Clearance**	**MEC Surface Clearance and MEC Subsurface Removal**
Total Project Duration (Years)	0	30	-	30	8
Capital Cost	$0	$88,406	-	$33,651,339	$85,797,825
Total O&M/Periodic Cost	$0	$189,750	-	$461,099	$0
Total Cost of Alternative[1]	**$0**	**$278,156**	**-**	**$34,112,438**	**$85,797,825**
Total Present Value of Alternative	$0	$231,279	-	$33,997,793	$85,797,825

Notes

[1]Cost estimates are developed in the FS primarily for the purpose of comparing remedial action alternatives, not for establishing project budgets.

2 Alternative 3 was developed for the Former Maneuver Area A (FTBLS-002-R-01) MRS only. This alternative would not be effective for the Uncontaminated Former Maneuver Area A (FTBLS-002-R-01A) MRS (Section 3.2.1).

TABLE A-2
COST COMPARISON OF REMEDIAL ACTION ALTERNATIVES
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 2 - Public Awareness Program — **COST ESTIMATE SUMMARY**

Site: FTBLS-002-R-01

Installation: Fort Bliss, El Paso, Texas

Phase: Feasibility Study (-30% to +50%)

Base Year: 2014

Description: Includes completion of a Proposed Plan (PP), Record of Decision (ROD), and Public Awareness Program including a Community Relations Plan. Periodic costs include a five-year periodic review report. Capital costs occur in Year 0, annual O&M costs occur in Years 1 - 30, and periodic costs occur in Years 5, 10, 15, 20, 25, and 30.

CAPITAL COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Field Activities					
Public Awareness Program Mailings	1	LS	$10,000	$10,000	
Reporting					
PP/ROD	-	LS	$40,000	$40,000	
Meetings/Public Participation	-	LS	$12,500	$12,500	Public Meeting for PP
SUBTOTAL 1				$62,500	
Contingency	15%			$9,375	5% scope + 10% bid
SUBTOTAL 2				$71,875	
Project Management	8%			$5,750	
Remedial Design	15%			$10,781	
SUBTOTAL 3				$88,406	
TOTAL CAPITAL COST				**$88,406**	

ANNUAL O&M COSTS

Description	QTY	U/M		Cost	Notes
Website and Server Fees and Updates	1	LS	$2,000	$2,000	
SUBTOTAL 1				$2,000	
Contingency	15%			$300	5% scope + 10% bid
SUBTOTAL 2				$2,300	
Project Management	10%			$230	
SUBTOTAL 3				$2,530	
TOTAL ANNUAL O&M COST				**$2,530**	

PERIODIC COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Five Year Review Report	1	LS	$15,000	$15,000	
SUBTOTAL 1				$15,000	
Contingency	15%			$2,250	5% scope + 10% bid
SUBTOTAL 2				$17,250	
Project Management	10%			$1,725	
SUBTOTAL 3				$18,975	
TOTAL PERIODIC COST				**$18,975**	

PRESENT VALUE ANALYSIS

Description	Year	Cost	Cost/Year	DF (1.9%)	Present Value	Notes
Capital Cost	0	$88,406	$88,406	1.000	$88,406.00	
Annual O&M Costs	1 - 30	$75,900	$2,530	22.710	$57,456.30	Multi-year discount factor
Periodic Costs	5	$18,975	$18,975	0.910	$17,270.74	
Periodic Costs	10	$18,975	$18,975	0.828	$15,719.54	
Periodic Costs	15	$18,975	$18,975	0.754	$14,307.67	
Periodic Costs	20	$18,975	$18,975	0.686	$13,022.61	
Periodic Costs	25	$18,975	$18,975	0.754	$14,307.67	
Periodic Costs	30	$18,975	$18,975	0.569	$10,788.38	
		$278,156			$231,278.92	

TOTAL COST OF ALTERNATIVE **$278,156**

TOTAL PRESENT VALUE OF ALTERNATIVE **$231,279**

TABLE A-3
COST COMPARISON OF REMEDIAL ACTION ALTERNATIVES
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 4 - MEC Surface Clearance — **COST ESTIMATE SUMMARY**

Site: FTBLS-002-R-01

Installation: Fort Bliss, El Paso, Texas

Phase: Feasibility Study (-30% to +50%)

Base Year: 2014

Description: Includes completion of a Proposed Plan (PP), Record of Decision (ROD), Public Awareness Program including a Community Relations Plan, MEC Surface Clearance Work Plan, Explosives Safety Submission, and Site Specific Final Report. Includes MEC surface clearance of 23,357 acres by a 40-man UXO field crew (2-UXO Technician IIIs, 12-UXO Technician IIs, and 26-UXO Technician Is). Includes a MEC surface clearance rate of 50 acres per day. Includes oversight by 1-Senior UXO Supervisor, 1-UXO Safety Officer, and 1-UXO QC Specialist. Includes no detonation costs or post-demolition sampling for explosives in soil. Periodic costs include site inspections and five-year periodic review reports. Capital costs occur in Year 0, annual O&M costs occur in Years 1 - 30, and periodic costs occur in Years 5, 10, 15, 20, 25, and 30.

CAPITAL COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Field Activities					
Public Awareness Program Mailings	2	LS	$10,000	$20,000	
UXO Management Mobilization	2	LS	$8,670	$17,341	See Table UCW-6
UXO Management	467	Day	$4,970.16	$2,321,761	See Table UCW-7
MEC Field Crew Mobilization	80	Each	$2,337.21	$186,977	See Table UCW-8
MEC Surface Clearance	23,357	Acre	$926.05	$21,629,640	See Table UCW-9
Detonations	0	EA	$2,033.03	$0	See Table UCW-11
Reporting					
Site-Specific Final Report	-	LS	$25,000	$25,000	
PP/ROD	-	LS	$40,000	$40,000	
Meetings/Public Participation	-	LS	$12,500	$12,500	Public Meeting for PP
SUBTOTAL 1				$24,253,218	
Contingency	25%			$6,063,304	15% scope + 10% bid
SUBTOTAL 2				$30,316,522	
Project Management	5%			$1,515,826	
Remedial Design	6%			$1,818,991	
SUBTOTAL 3				$33,651,339	
TOTAL CAPITAL COST				**$33,651,339**	

ANNUAL O&M COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Website and Server Fees and Updates	1	LS	$2,000	$2,000	
SUBTOTAL 1				$2,000	
Contingency	15%			$300	5% scope + 10% bid
SUBTOTAL 2				$2,300	
Project Management	10%			$230	
SUBTOTAL 3				$2,530	
TOTAL ANNUAL O&M COST				**$2,530**	

TABLE A-3
COST COMPARISON OF REMEDIAL ACTION ALTERNATIVES
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 4 - MEC Surface Clearance					**COST ESTIMATE SUMMARY**
PERIODIC COSTS					
Description	**QTY**	**U/M**	**Unit Cost**	**Cost**	**Notes**
Site Inspection Team Mobilization	1	LS	$5,101	$5,101	See Table UCW-4
Site Inspection	10	Day	$2,565	$25,650	See Table UCW-5
Site Inspection Report	1	LS	$5,000	$5,000	
Five Year Review Report	1	LS	$15,000	$15,000	
SUBTOTAL 1				$50,751	
Contingency	15%			$7,613	5% scope + 10% bid
SUBTOTAL 2				$58,363	
Project Management	10%			$5,836	
SUBTOTAL 3				$64,200	
TOTAL PERIODIC COST				**$64,200**	

PRESENT VALUE ANALYSIS

Description	**Year**	**Cost**	**Cost/Year**	**DF (1.9%)**	**Present Value**	**Notes**
Capital Cost	0	$33,651,339	$33,651,339	1.000	$33,651,338.97	
Annual O&M Costs	1 - 30	$75,900	$2,530	22.710	$57,456.30	
Periodic Costs	5	$64,200	$64,200	0.910	$58,433.63	
Periodic Costs	10	$64,200	$64,200	0.828	$53,185.34	
Periodic Costs	15	$64,200	$64,200	0.754	$48,408.43	
Periodic Costs	20	$64,200	$64,200	0.686	$44,060.57	
Periodic Costs	25	$64,200	$64,200	0.754	$48,408.43	
Periodic Costs	30	$64,200	$64,200	0.569	$36,501.29	
		$34,112,438			$33,997,792.95	
TOTAL COST OF ALTERNATIVE					**$34,112,438**	
TOTAL PRESENT VALUE OF ALTERNATIVE					**$33,997,793**	

TABLE A-4
COST COMPARISON OF REMEDIAL ACTION ALTERNATIVES
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 5 - MEC Surface Clearance and MEC Subsurface Removal — **COST ESTIMATE SUMMARY**

Site: FTBLS-002-R-01

Installation: Fort Bliss, El Paso, Texas
Phase: Feasibility Study (-30% to +50%)
Base Year: 2014

Description: Includes completion of a Proposed Plan (PP), Record of Decision (ROD), MEC Surface Clearance Work Plan, Explosives Safety Submission, Site Specific Final Report, and Closure Documentation,. Includes MEC surface clearance of 23,357 acres by a 40-man UXO field crew (2-UXO Technician IIIs, 12-UXO Technician IIs, and 26-UXO Technician Is). Includes a MEC surface clearance rate of 50 acres per day. Includes MEC subsurface removal of 23,357 acres by a 35-man UXO field crew (5-UXO Technician IIIs, 15-UXO Technician IIs, and 15-UXO Technician Is). Includes a MEC subsurface removal rate of 30 acres per day. Includes oversight by 1-Senior UXO Supervisor, 1-UXO Safety Officer, and 1-UXO QC Specialist. Includes no detonation costs or post-demolition sampling for explosives in soil. Capital costs occur in Year 0 and there are no annual costs or periodic costs.

CAPITAL COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Field Activities					
UXO Management Mobilization	6	LS	$8,670	$52,022	See Table UCW-6
UXO Management	1,246	Day	$4,970.16	$6,191,361	See Table UCW-7
MEC Field Crew Mobilization	282	Each	$2,337.21	$659,092	See Table UCW-8
MEC Surface Clearance	23,357	Acre	$926.05	$21,629,640	See Table UCW-9
MEC Subsurface Removal	23,357	Acre	$1,422.34	$33,221,654	See Table UCW-10
Detonations	0	EA	$2,033.03	$0	See Table UCW-11
Reporting					
Site-Specific Final Report	-	LS	$25,000	$25,000	
PP/ROD	-	LS	$40,000	$40,000	
Closure Documentation	-	LS	$5,000	$5,000	
Meetings/Public Participation	-	LS	$12,500	$12,500	Public Meeting for PP
SUBTOTAL 1				$61,836,270	
Contingency	25%			$15,459,068	15% scope + 10% bid
SUBTOTAL 2				$77,295,338	
Project Management	5%			$3,864,767	
Remedial Design	6%			$4,637,720	
SUBTOTAL 3				$85,797,825	
TOTAL CAPITAL COST				**$85,797,825**	

ANNUAL O&M COSTS	Unit Cost	
TOTAL ANNUAL O&M COST		**$0**

PERIODIC COSTS	Unit Cost	
TOTAL PERIODIC COST		**$0**

PRESENT VALUE ANALYSIS

Description	Year	Cost	Cost/Year	DF (1.9%)	Present Value	Notes
Capital Cost	0	$85,797,825	$85,797,825	1.000	$85,797,825.05	
Annual O&M Costs	1 - 30	$0	$0	22.710	$0.00	
Periodic Costs	0	$0	$0	0.000	$0.00	
		$85,797,825			$85,797,825.05	

TOTAL COST OF ALTERNATIVE	**$85,797,825**
TOTAL PRESENT VALUE OF ALTERNATIVE	**$85,797,825**

FTBLS-002-R-03

TABLE B-1
COST COMPARISON OF REMEDIAL ACTION ALTERNATIVES
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Site:	**FTBLS-002-R-03**	**Base Year:**	**2014**
Installation:	**Fort Bliss, El Paso, Texas**	**Date:**	**05/03/2016**
Phase:	**Feasibility Study (-30% to +50%)**		

	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Description	**No Action**	**Public Awareness Program**	**Land Use Controls**	**MEC Surface Clearance**	**MEC Surface Clearance and MEC Subsurface Removal**
Total Project Duration (Years)	0	30	30	30	1
Capital Cost	$0	$88,406	$652,914	$1,591,467	$2,260,961
Total O&M/Periodic Cost	$0	$189,750	$578,197	$578,197	$0
Total Cost of Alternative[1]	**$0**	**$278,156**	**$1,231,111**	**$2,169,664**	**$2,260,961**
Total Present Value of Alternative	$0	$231,279	$1,114,618	$2,053,171	$2,260,961

Notes

[1]Cost estimates are developed in the FS primarily for the purpose of comparing remedial action alternatives, not for establishing project budgets.

TABLE B-2
ALTERNATIVE 2 - PUBLIC AWARENESS PROGRAM
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 2 - Public Awareness Program — **COST ESTIMATE SUMMARY**

Site: FTBLS-002-R-03

Installation: Fort Bliss, El Paso, Texas

Phase: Feasibility Study (-30% to +50%)

Base Year: 2014

Description: Includes completion of a Proposed Plan (PP), Record of Decision (ROD), and Public Awareness Program including a Community Relations Plan. Periodic costs include a five-year periodic review report. Capital costs occur in Year 0, annual O&M costs occur in Years 1 - 30, and periodic costs occur in Years 5, 10, 15, 20, 25, and 30.

CAPITAL COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Field Activities					
Public Awareness Program Mailings	1	LS	$10,000	$10,000	
Reporting					
PP/ROD	-	LS	$40,000	$40,000	
Meetings/Public Participation	-	LS	$12,500	$12,500	Public Meeting for PP
SUBTOTAL 1				$62,500	
Contingency	15%			$9,375	5% scope + 10% bid
SUBTOTAL 2				$71,875	
Project Management	8%			$5,750	
Remedial Design	15%			$10,781	
SUBTOTAL 3				$88,406	
TOTAL CAPITAL COST				**$88,406**	

ANNUAL O&M COSTS

Description	QTY	U/M		Cost	Notes
Website and Server Fees and Updates	1	LS	$2,000	$2,000	
SUBTOTAL 1				$2,000	
Contingency	15%			$300	5% scope + 10% bid
SUBTOTAL 2				$2,300	
Project Management	10%			$230	
SUBTOTAL 3				$2,530	
TOTAL ANNUAL O&M COST				**$2,530**	

PERIODIC COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Five Year Review Report	1	LS	$15,000	$15,000	
SUBTOTAL 1				$15,000	
Contingency	15%			$2,250	5% scope + 10% bid
SUBTOTAL 2				$17,250	
Project Management	10%			$1,725	
SUBTOTAL 3				$18,975	
TOTAL PERIODIC COST				**$18,975**	

PRESENT VALUE ANALYSIS

Description	Year	Cost	Cost/Year	DF (1.9%)	Present Value	Notes
Capital Cost	0	$88,406	$88,406	1.000	$88,406.00	
Annual O&M Costs	1 - 30	$75,900	$2,530	22.710	$57,456.30	Multi-year discount factor
Periodic Costs	5	$18,975	$18,975	0.910	$17,270.74	
Periodic Costs	10	$18,975	$18,975	0.828	$15,719.54	
Periodic Costs	15	$18,975	$18,975	0.754	$14,307.67	
Periodic Costs	20	$18,975	$18,975	0.686	$13,022.61	
Periodic Costs	25	$18,975	$18,975	0.754	$14,307.67	
Periodic Costs	30	$18,975	$18,975	0.569	$10,788.38	
		$278,156			$231,278.92	
TOTAL COST OF ALTERNATIVE					**$278,156**	
TOTAL PRESENT VALUE OF ALTERNATIVE					**$231,279**	

TABLE B-3
ALTERNATIVE 3 - LAND USE CONTOLS
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 3 - Land Use Controls — **COST ESTIMATE SUMMARY**

Site: FTBLS-002-R-03

Installation: Fort Bliss, El Paso, Texas

Phase: Feasibility Study (-30% to +50%)

Base Year: 2014

Description: Includes completion of a Proposed Plan (PP), Record of Decision (ROD), Public Awareness Program including a Community Relations Plan, and Land Use Control Plan. Includes installation of 18,616 linear feet of fence and 37 signs around the perimeter of the MRS. Periodic costs include site inspections and five-year periodic review report. Annual O&M costs include annual site inspections until the first Five-Year Review. Periodic costs include site inspections and Five-Year Review Reports. Capital costs occur in Year 0, annual O&M costs occur in Years 1 - 30, and periodic costs occur in Years 5, 10, 15, 20, 25, and 30.

CAPITAL COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Field Activities					
Public Awareness Program Mailings	1	LS	$10,000	$10,000	
Survey	18,616	LF	$0.25	$4,568	See Table UCW-1
Fence Installation	18,616	LF	$20.00	$372,303	See Table UCW-2
Sign Installation	37	Each	$450.54	$16,775	See Table UCW-3
Reporting					
Site-Specific Final Report	-	LS	$25,000	$25,000	
PP/ROD	-	LS	$40,000	$40,000	
Meetings/Public Participation	-	LS	$12,500	$12,500	Public Meeting for PP
SUBTOTAL 1				$481,145	
Contingency	15%			$72,172	5% scope + 10% bid
SUBTOTAL 2				$553,317	
Project Management	6%			$33,199	
Remedial Design	12%			$66,398	
SUBTOTAL 3				$652,914	
TOTAL CAPITAL COST				**$652,914**	

ANNUAL O&M COSTS (YEARS 1- 4)

Description	QTY	U/M		Cost	Notes
Website and Server Fees and Updates	1	LS	$2,000	$2,000	
Site Inspection Team Mobilization	1	LS	$5,101	$5,101	See Table UCW-4
Site Inspection	5	Day	$2,565	$12,825	See Table UCW-5
Site Inspection Report	1	LS	$5,000	$5,000	
SUBTOTAL 1				$24,926	
Contingency	15%			$3,739	5% scope + 10% bid
SUBTOTAL 2				$28,665	
Project Management	10%			$2,866	
SUBTOTAL 3				$31,531	
TOTAL ANNUAL O&M COST (YEARS 1- 4)				**$31,531**	

ANNUAL O&M COSTS (YEARS 5- 30)

Description	QTY	U/M		Cost	Notes
Website and Server Fees and Updates	1	LS	$2,000	$2,000	
SUBTOTAL 1				$2,000	
Contingency	15%			$300	5% scope + 10% bid
SUBTOTAL 2				$2,300	
Project Management	10%			$230	
SUBTOTAL 3				$2,530	
TOTAL ANNUAL O&M COST (YEARS 5- 30)				**$2,530**	

TABLE B-3
ALTERNATIVE 3 - LAND USE CONTOLS
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 3 - Land Use Controls — **COST ESTIMATE SUMMARY**

PERIODIC COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Site Inspection Team Mobilization	1	LS	$5,101	$5,101	See Table UCW-4
Site Inspection	5	Day	$2,565	$12,825	See Table UCW-5
Site Inspection Report	1	LS	$5,000	$5,000	
Sign and Fence Maintenance	1	LS	$12,969.25	$12,969	20% replacement / 30 years
Five Year Review Report	1	LS	$15,000	$15,000	
SUBTOTAL 1				$50,895	
Contingency	15%			$7,634	5% scope + 10% bid
SUBTOTAL 2				$58,529	
Project Management	10%			$5,853	
SUBTOTAL 3				$64,382	
TOTAL PERIODIC COST				**$64,382**	

PRESENT VALUE ANALYSIS

Description	Year	Cost	Cost/Year	DF (1.9%)	Present Value	Notes
Capital Cost	0	$652,914	$652,914	1.000	$652,914.24	
Annual O&M Costs	1 - 4	$126,124.24	$31,531	3.82	$120,354.06	Multi-year discount factor
Annual O&M Costs	5 - 30	$65,780	$2,530	20.37	$51,531.04	Multi-year discount factor
Periodic Costs	5	$64,382	$64,382	0.910	$58,599.60	
Periodic Costs	10	$64,382	$64,382	0.828	$53,336.40	
Periodic Costs	15	$64,382	$64,382	0.754	$48,545.92	
Periodic Costs	20	$64,382	$64,382	0.686	$44,185.71	
Periodic Costs	25	$64,382	$64,382	0.754	$48,545.92	
Periodic Costs	30	$64,382	$64,382	0.569	$36,604.97	
		$1,231,111			$1,114,617.86	
TOTAL COST OF ALTERNATIVE					**$1,231,111**	
TOTAL PRESENT VALUE OF ALTERNATIVE					**$1,114,618**	

TABLE B-4
ALTERNATIVE 4 - MEC SURFACE CLEARANCE
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 4 - MEC Surface Clearance — **COST ESTIMATE SUMMARY**

Site: FTBLS-002-R-03

Installation: Fort Bliss, El Paso, Texas

Phase: Feasibility Study (-30% to +50%)

Base Year: 2014

Description: Includes completion of a Proposed Plan (PP), Record of Decision (ROD), Public Awareness Program including a Community Relations Plan, Land Use Control Plan, MEC Surface Clearance Work Plan, Explosives Safety Submission, and Site Specific Final Report. Includes MEC surface clearance of 520 acres by a 40-man UXO field crew (2-UXO Technician IIIs, 12-UXO Technician IIs, and 26-UXO Technician Is). Includes a MEC surface clearance rate of 50 acres per day. Includes oversight by 1-Senior UXO Supervisor, 1-UXO Safety Officer, and 1-UXO QC Specialist. Includes detonation costs for 5 MEC items and MD disposition. Includes post-demolition sampling for explosives in soil. Includes installation of 18,616 linear feet of fence and 37 signs around the perimter of the MRS. Annual O&M costs include annual site inspections until the first Five-Year Review. Periodic costs include site inspections and Five-Year Review Reports. Capital costs occur in Year 0, annual O&M costs occur in Years 1 - 30, and periodic costs occur in Years 5, 10, 15, 20, 25, and 30.

CAPITAL COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Field Activities					
Public Awareness Program Mailings	1	LS	$10,000	$10,000	
UXO Management Mobilization	1	LS	$8,670	$8,670	See Table UCW-6
UXO Management	10	Day	$4,970.16	$51,690	See Table UCW-7
MEC Field Crew Mobilization	40	Each	$2,337.21	$93,488	See Table UCW-8
MEC Surface Clearance	520	Acre	$926.05	$481,544	See Table UCW-9
Detonations	5	EA	$2,033.03	$10,165	See Table UCW-11
Survey	18,616	LF	$0.25	$4,568	See Table UCW-1
Fence Installation	18,616	LF	$20.00	$372,303	See Table UCW-2
Sign Installation	37	Each	$450.54	$16,775	See Table UCW-3
Reporting					
Site-Specific Final Report	-	LS	$25,000	$25,000	
PP/ROD	-	LS	$40,000	$40,000	
Meetings/Public Participation	-	LS	$12,500	$12,500	Public Meeting for PP
SUBTOTAL 1				$1,126,702	
Contingency	25%			$281,676	15% scope + 10% bid
SUBTOTAL 2				$1,408,378	
Project Management	5%			$70,419	
Remedial Design	8%			$112,670	
SUBTOTAL 3				$1,591,467	
TOTAL CAPITAL COST				**$1,591,467**	

ANNUAL O&M COSTS (YEARS 1- 4)

Description	QTY	U/M	Unit Cost	Cost	Notes
Website and Server Fees and Updates	1	LS	$2,000	$2,000	
Site Inspection Team Mobilization	1	LS	$5,101	$5,101	See Table UCW-4
Site Inspection	5	Day	$2,565	$12,825	See Table UCW-5
Site Inspection Report	1	LS	$5,000	$5,000	
SUBTOTAL 1				$24,926	
Contingency	15%			$3,739	5% scope + 10% bid
SUBTOTAL 2				$28,665	
Project Management	10%			$2,866	
SUBTOTAL 3				$31,531	
TOTAL ANNUAL O&M COST (YEARS 1- 4)				**$31,531**	

TABLE B-4
ALTERNATIVE 4 - MEC SURFACE CLEARANCE
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 4 - MEC Surface Clearance — **COST ESTIMATE SUMMARY**

ANNUAL O&M COSTS (YEARS 5- 30)

Description	QTY	U/M	Unit Cost	Cost	Notes
Website and Server Fees and Updates	1	LS	$2,000	$2,000	
SUBTOTAL 1				$2,000	
Contingency	15%			$300	5% scope + 10% bid
SUBTOTAL 2				$2,300	
Project Management	10%			$230	
SUBTOTAL 3				$2,530	
TOTAL ANNUAL O&M COST (YEARS 5- 30)				**$2,530**	

PERIODIC COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Site Inspection Team Mobilization	1	LS	$5,101	$5,101	See Table UCW-4
Site Inspection	5	LS	$2,565	$12,825	See Table UCW-5
Site Inspection Report	1	LS	$5,000	$5,000	
Sign and Fence Maintenance	1	LS	$12,969.25	$12,969	20% replacement / 30 years
Five Year Review Report	1	LS	$15,000	$15,000	
SUBTOTAL 1				$50,895	
Contingency	15%			$7,634	5% scope + 10% bid
SUBTOTAL 2				$58,529	
Project Management	10%			$5,853	
SUBTOTAL 3				$64,382	
TOTAL PERIODIC COST				**$64,382**	

PRESENT VALUE ANALYSIS

Description	Year	Cost	Cost/Year	DF (1.9%)	Present Value	Notes
Capital Cost	0	$1,591,467	$1,591,467	1.000	$1,591,467.29	
Annual O&M Costs	1 - 4	$126,124	$31,531	3.82	$120,354.06	Multi-year discount factor
Annual O&M Costs	5 - 30	$65,780	$2,530	20.37	$51,531.04	Multi-year discount factor
Periodic Costs	5	$64,382	$64,382	0.910	$58,599.60	
Periodic Costs	10	$64,382	$64,382	0.828	$53,336.40	
Periodic Costs	15	$64,382	$64,382	0.754	$48,545.92	
Periodic Costs	20	$64,382	$64,382	0.686	$44,185.71	
Periodic Costs	25	$64,382	$64,382	0.754	$48,545.92	
Periodic Costs	30	$64,382	$64,382	0.569	$36,604.97	
		$2,169,664			$2,053,170.91	

TOTAL COST OF ALTERNATIVE **$2,169,664**

TOTAL PRESENT VALUE OF ALTERNATIVE **$2,053,171**

TABLE B-5
ALTERNATIVE 5 - MEC SURFACE CLEARANCE AND MEC SUBSURFACE REMOVAL
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 5 - MEC Surface Clearance and MEC Subsurface Removal — **COST ESTIMATE SUMMARY**

Site: FTBLS-002-R-03

Installation: Fort Bliss, El Paso, Texas

Phase: Feasibility Study (-30% to +50%)

Base Year: 2014

Description: Includes completion of a Proposed Plan (PP), Record of Decision (ROD), MEC Surface Clearance Work Plan, Explosives Safety Submission, Site Specific Final Report, and Closure Documentation,. Includes MEC surface clearance of 520 acres by a 40-man UXO field crew (2-UXO Technician IIIs, 12-UXO Technician IIs, and 26-UXO Technician Is). Includes a MEC surface clearance rate of 50 acres per day. Includes MEC subsurface removal of 520 acres by a 35-man UXO field crew (5-UXO Technician IIIs, 15-UXO Technician IIs, and 15-UXO Technician Is). Includes a MEC subsurface removal rate of 30 acres per day. Includes oversight by 1-Senior UXO Supervisor, 1-UXO Safety Officer, and 1-UXO QC Specialist. Includes detonation costs for 20 MEC items and MD disposition. Includes post-demolition sampling for explosives in soil. Capital costs occur in Year 0 and there are no annual costs or periodic costs.

CAPITAL COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Field Activities					
UXO Management Mobilization	1	LS	$8,670	$8,670	See Table UCW-6
UXO Management	28	Day	$4,970.16	$137,839	See Table UCW-7
MEC Field Crew Mobilization	47	Each	$2,337.21	$109,849	See Table UCW-8
MEC Surface Clearance	520	Acre	$926.05	$481,544	See Table UCW-9
MEC Subsurface Removal	520	Acre	$1,422.34	$739,618	See Table UCW-10
Detonations	20	EA	$2,033.03	$40,661	See Table UCW-11
Reporting					
Site-Specific Final Report	-	LS	$25,000	$25,000	
PP/ROD	-	LS	$40,000	$40,000	
Closure Documentation	-	LS	$5,000	$5,000	
Meetings/Public Participation	-	LS	$12,500	$12,500	Public Meeting for PP
SUBTOTAL 1				$1,600,680	
Contingency	25%			$400,170	15% scope + 10% bid
SUBTOTAL 2				$2,000,850	
Project Management	5%			$100,043	
Remedial Design	8%			$160,068	
SUBTOTAL 3				$2,260,961	
TOTAL CAPITAL COST				**$2,260,961**	

ANNUAL O&M COSTS	Unit Cost	
TOTAL ANNUAL O&M COST		**$0**

PERIODIC COSTS	Unit Cost	
TOTAL PERIODIC COST		**$0**

PRESENT VALUE ANALYSIS

Description	Year	Cost	Cost/Year	DF (1.9%)	Present Value	Notes
Capital Cost	0	$2,260,961	$2,260,961	1.000	$2,260,961.49	
Annual O&M Costs	1 - 30	$0	$0	22.710	$0.00	
Periodic Costs	0	$0	$0	0.000	$0.00	
		$2,260,961			$2,260,961.49	

TOTAL COST OF ALTERNATIVE	**$2,260,961**
TOTAL PRESENT VALUE OF ALTERNATIVE	**$2,260,961**

FTBLS-002-R-04

TABLE C-1
COST COMPARISON OF REMEDIAL ACTION ALTERNATIVES
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Site:	**FTBLS-002-R-04**	**Base Year:**	**2014**
Installation:	**Fort Bliss, El Paso, Texas**	**Date:**	**05/03/2016**
Phase:	**Feasibility Study (-30% to +50%)**		

	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Description	**No Action**	**Public Awareness Program**	**Land Use Controls**	**MEC Surface Clearance**	**MEC Surface Clearance and MEC Subsurface Removal**
Total Project Duration (Years)	0	30	30	30	1
Capital Cost	$0	$88,406	$605,683	$1,364,146	$1,806,905
Total O&M/Periodic Cost	$0	$189,750	$569,494	$569,494	$0
Total Cost of Alternative[1]	**$0**	**$278,156**	**$1,175,176**	**$1,933,639**	**$1,806,905**
Total Present Value of Alternative	$0	$231,279	$1,060,856	$1,819,319	$1,806,905

Notes

[1]Cost estimates are developed in the FS primarily for the purpose of comparing remedial action alternatives, not for establishing project budgets.

TABLE C-2
ALTERNATIVE 2 - PUBLIC AWARENESS PROGRAM
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 2 - Public Awareness Program — **COST ESTIMATE SUMMARY**

Site: FTBLS-002-R-04

Installation: Fort Bliss, El Paso, Texas

Phase: Feasibility Study (-30% to +50%)

Base Year: 2014

Description: Includes completion of a Proposed Plan (PP), Record of Decision (ROD), and Public Awareness Program including a Community Relations Plan. Periodic costs include a five-year periodic review report. Capital costs occur in Year 0, annual O&M costs occur in Years 1 - 30, and periodic costs occur in Years 5, 10, 15, 20, 25, and 30.

CAPITAL COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Field Activities					
Public Awareness Program Mailings	1	LS	$10,000	$10,000	
Reporting					
PP/ROD	-	LS	$40,000	$40,000	
Meetings/Public Participation	-	LS	$12,500	$12,500	Public Meeting for PP
SUBTOTAL 1				$62,500	
Contingency	15%			$9,375	5% scope + 10% bid
SUBTOTAL 2				$71,875	
Project Management	8%			$5,750	
Remedial Design	15%			$10,781	
SUBTOTAL 3				$88,406	
TOTAL CAPITAL COST				**$88,406**	

ANNUAL O&M COSTS

Description	QTY	U/M		Cost	Notes
Website and Server Fees and Updates	1	LS	$2,000	$2,000	
SUBTOTAL 1				$2,000	
Contingency	15%			$300	5% scope + 10% bid
SUBTOTAL 2				$2,300	
Project Management	10%			$230	
SUBTOTAL 3				$2,530	
TOTAL ANNUAL O&M COST				**$2,530**	

PERIODIC COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Five Year Review Report	1	LS	$15,000	$15,000	
SUBTOTAL 1				$15,000	
Contingency	15%			$2,250	5% scope + 10% bid
SUBTOTAL 2				$17,250	
Project Management	10%			$1,725	
SUBTOTAL 3				$18,975	
TOTAL PERIODIC COST				**$18,975**	

PRESENT VALUE ANALYSIS

Description	Year	Cost	Cost/Year	DF (1.9%)	Present Value	Notes
Capital Cost	0	$88,406	$88,406	1.000	$88,406.00	
Annual O&M Costs	1 - 30	$75,900	$2,530	22.710	$57,456.30	Multi-year discount factor
Periodic Costs	5	$18,975	$18,975	0.910	$17,270.74	
Periodic Costs	10	$18,975	$18,975	0.828	$15,719.54	
Periodic Costs	15	$18,975	$18,975	0.754	$14,307.67	
Periodic Costs	20	$18,975	$18,975	0.686	$13,022.61	
Periodic Costs	25	$18,975	$18,975	0.754	$14,307.67	
Periodic Costs	30	$18,975	$18,975	0.569	$10,788.38	
		$278,156			$231,278.92	
TOTAL COST OF ALTERNATIVE					**$278,156**	
TOTAL PRESENT VALUE OF ALTERNATIVE					**$231,279**	

TABLE C-3
ALTERNATIVE 3 - LAND USE CONTOLS
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 3 - Land Use Controls — **COST ESTIMATE SUMMARY**

Site: FTBLS-002-R-04

Installation: Fort Bliss, El Paso, Texas

Phase: Feasibility Study (-30% to +50%)

Base Year: 2014

Description: Includes completion of a Proposed Plan (PP), Record of Decision (ROD), Public Awareness Program including a Community Relations Plan, and Land Use Control Plan. Includes installation of 16,970 linear feet of fence and 34 signs around the perimeter of the MRS. Periodic costs include site inspections and five-year periodic review report. Annual O&M costs include annual site inspections until the first Five-Year Review. Periodic costs include site inspections and Five-Year Review Reports. Capital costs occur in Year 0, annual O&M costs occur in Years 1 - 30, and periodic costs occur in Years 5, 10, 15, 20, 25, and 30.

CAPITAL COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Field Activities					
Public Awareness Program Mailings	1	LS	$10,000	$10,000	
Survey	16,970	LF	$0.25	$4,164	See Table UCW-1
Fence Installation	16,970	LF	$20.00	$339,384	See Table UCW-2
Sign Installation	34	Each	$450.54	$15,291	See Table UCW-3
Reporting					
Site-Specific Final Report	-	LS	$25,000	$25,000	
PP/ROD	-	LS	$40,000	$40,000	
Meetings/Public Participation	-	LS	$12,500	$12,500	Public Meeting for PP
SUBTOTAL 1				$446,340	
Contingency	15%			$66,951	5% scope + 10% bid
SUBTOTAL 2				$513,291	
Project Management	6%			$30,797	
Remedial Design	12%			$61,595	
SUBTOTAL 3				$605,683	
TOTAL CAPITAL COST				**$605,683**	

ANNUAL O&M COSTS (YEARS 1- 4)

Description	QTY	U/M		Cost	Notes
Website and Server Fees and Updates	1	LS	$2,000	$2,000	
Site Inspection Team Mobilization	1	LS	$5,101	$5,101	See Table UCW-4
Site Inspection	5	Day	$2,565	$12,825	See Table UCW-5
Site Inspection Report	1	LS	$5,000	$5,000	
SUBTOTAL 1				$24,926	
Contingency	15%			$3,739	5% scope + 10% bid
SUBTOTAL 2				$28,665	
Project Management	10%			$2,866	
SUBTOTAL 3				$31,531	
TOTAL ANNUAL O&M COST (YEARS 1- 4)				**$31,531**	

ANNUAL O&M COSTS (YEARS 5- 30)

Description	QTY	U/M		Cost	Notes
Website and Server Fees and Updates	1	LS	$2,000	$2,000	
SUBTOTAL 1				$2,000	
Contingency	15%			$300	5% scope + 10% bid
SUBTOTAL 2				$2,300	
Project Management	10%			$230	
SUBTOTAL 3				$2,530	
TOTAL ANNUAL O&M COST (YEARS 5- 30)				**$2,530**	

TABLE C-3
ALTERNATIVE 3 - LAND USE CONTOLS
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 3 - Land Use Controls — **COST ESTIMATE SUMMARY**

PERIODIC COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Site Inspection Team Mobilization	1	LS	$5,101	$5,101	See Table UCW-4
Site Inspection	5	Day	$2,565	$12,825	See Table UCW-5
Site Inspection Report	1	LS	$5,000	$5,000	
Sign and Fence Maintenance	1	LS	$11,822.52	$11,823	20% replacement / 30 years
Five Year Review Report	1	LS	$15,000	$15,000	
SUBTOTAL 1				$49,748	
Contingency	15%			$7,462	5% scope + 10% bid
SUBTOTAL 2				$57,211	
Project Management	10%			$5,721	
SUBTOTAL 3				$62,932	
TOTAL PERIODIC COST				**$62,932**	

PRESENT VALUE ANALYSIS

Description	Year	Cost	Cost/Year	DF (1.9%)	Present Value	Notes
Capital Cost	0	$605,683	$605,683	1.000	$605,682.70	
Annual O&M Costs	1 - 4	$126,124	$31,531	3.82	$120,354.06	Multi-year discount factor
Annual O&M Costs	5 - 30	$65,780	$2,530	20.37	$51,531.04	Multi-year discount factor
Periodic Costs	5	$62,932	$62,932	0.910	$57,279.28	
Periodic Costs	10	$62,932	$62,932	0.828	$52,134.67	
Periodic Costs	15	$62,932	$62,932	0.754	$47,452.13	
Periodic Costs	20	$62,932	$62,932	0.686	$43,190.16	
Periodic Costs	25	$62,932	$62,932	0.754	$47,452.13	
Periodic Costs	30	$62,932	$62,932	0.569	$35,780.21	
		$1,175,176			$1,060,856.37	
TOTAL COST OF ALTERNATIVE					**$1,175,176**	
TOTAL PRESENT VALUE OF ALTERNATIVE					**$1,060,856**	

TABLE C-4
ALTERNATIVE 4 - MEC SURFACE CLEARANCE
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 4 - MEC Surface Clearance — **COST ESTIMATE SUMMARY**

Site: FTBLS-002-R-04

Installation: Fort Bliss, El Paso, Texas

Phase: Feasibility Study (-30% to +50%)

Base Year: 2014

Description: Includes completion of a Proposed Plan (PP), Record of Decision (ROD), Public Awareness Program including a Community Relations Plan, Land Use Control Plan, MEC Surface Clearance Work Plan, Explosives Safety Submission, and Site Specific Final Report. Includes MEC surface clearance of 397 acres by a 40-man UXO field crew (2-UXO Technician IIIs, 12-UXO Technician IIs, and 26-UXO Technician Is). Includes a MEC surface clearance rate of 50 acres per day. Includes oversight by 1-Senior UXO Supervisor, 1-UXO Safety Officer, and 1-UXO QC Specialist. Includes detonation costs for 5 MEC items and MD disposition. Includes post-demolition sampling for explosives in soil. Includes installation of 16,970 linear feet of fence and 34 signs around the perimter of the MRS. Annual O&M costs include annual site inspections until the first Five-Year Review. Periodic costs include site inspections and Five-Year Review Reports. Capital costs occur in Year 0, annual O&M costs occur in Years 1 - 30, and periodic costs occur in Years 5, 10, 15, 20, 25, and 30.

CAPITAL COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Field Activities					
Public Awareness Program Mailings	1	LS	$10,000	$10,000	
UXO Management Mobilization	1	LS	$8,670	$8,670	See Table UCW-6
UXO Management	8	Day	$4,970.16	$39,463	See Table UCW-7
MEC Field Crew Mobilization	40	Each	$2,337.21	$93,488	See Table UCW-8
MEC Surface Clearance	397	Acre	$926.05	$367,640	See Table UCW-9
Detonations	5	EA	$2,033.03	$10,165	See Table UCW-11
Survey	16,970	LF	$0.25	$4,164	See Table UCW-1
Fence Installation	16,970	LF	$20.00	$339,384	See Table UCW-2
Sign Installation	34	Each	$450.54	$15,291	See Table UCW-3
Reporting					
Site-Specific Final Report	-	LS	$25,000	$25,000	
PP/ROD	-	LS	$40,000	$40,000	
Meetings/Public Participation	-	LS	$12,500	$12,500	Public Meeting for PP
SUBTOTAL 1				$965,767	
Contingency	25%			$241,442	15% scope + 10% bid
SUBTOTAL 2				$1,207,209	
Project Management	5%			$60,360	
Remedial Design	8%			$96,577	
SUBTOTAL 3				$1,364,146	
TOTAL CAPITAL COST				**$1,364,146**	

ANNUAL O&M COSTS (YEARS 1- 4)

Description	QTY	U/M	Unit Cost	Cost	Notes
Website and Server Fees and Updates	1	LS	$2,000	$2,000	
Site Inspection Team Mobilization	1	LS	$5,101	$5,101	See Table UCW-4
Site Inspection	5	Day	$2,565	$12,825	See Table UCW-5
Site Inspection Report	1	LS	$5,000	$5,000	
SUBTOTAL 1				$24,926	
Contingency	15%			$3,739	5% scope + 10% bid
SUBTOTAL 2				$28,665	
Project Management	10%			$2,866	
SUBTOTAL 3				$31,531	
TOTAL ANNUAL O&M COST (YEARS 1- 4)				**$31,531**	

TABLE C-4
ALTERNATIVE 4 - MEC SURFACE CLEARANCE
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 4 - MEC Surface Clearance — **COST ESTIMATE SUMMARY**

ANNUAL O&M COSTS (YEARS 5- 30)

Description	QTY	U/M	Unit Cost	Cost	Notes
Website and Server Fees and Updates	1	LS	$2,000	$2,000	
SUBTOTAL 1				$2,000	
Contingency	15%			$300	5% scope + 10% bid
SUBTOTAL 2				$2,300	
Project Management	10%			$230	
SUBTOTAL 3				$2,530	
TOTAL ANNUAL O&M COST (YEARS 5- 30)				**$2,530**	

PERIODIC COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Site Inspection Team Mobilization	1	LS	$5,101	$5,101	See Table UCW-4
Site Inspection	5	LS	$2,565	$12,825	See Table UCW-5
Site Inspection Report	1	LS	$5,000	$5,000	
Sign and Fence Maintenance	1	LS	$11,822.52	$11,823	20% replacement / 30 years
Five Year Review Report	1	LS	$15,000	$15,000	
SUBTOTAL 1				$49,748	
Contingency	15%			$7,462	5% scope + 10% bid
SUBTOTAL 2				$57,211	
Project Management	10%			$5,721	
SUBTOTAL 3				$62,932	
TOTAL PERIODIC COST				**$62,932**	

PRESENT VALUE ANALYSIS

Description	Year	Cost	Cost/Year	DF (1.9%)	Present Value	Notes
Capital Cost	0	$1,364,146	$1,364,146	1.000	$1,364,145.58	
Annual O&M Costs	1 - 4	$126,124.24	$31,531	3.82	$120,354.06	Multi-year discount factor
Annual O&M Costs	5 - 30	$65,780	$2,530	20.37	$51,531.04	Multi-year discount factor
Periodic Costs	5	$62,932	$62,932	0.910	$57,279.28	
Periodic Costs	10	$62,932	$62,932	0.828	$52,134.67	
Periodic Costs	15	$62,932	$62,932	0.754	$47,452.13	
Periodic Costs	20	$62,932	$62,932	0.686	$43,190.16	
Periodic Costs	25	$62,932	$62,932	0.754	$47,452.13	
Periodic Costs	30	$62,932	$62,932	0.569	$35,780.21	
		$1,933,639			$1,819,319.25	

TOTAL COST OF ALTERNATIVE **$1,933,639**

TOTAL PRESENT VALUE OF ALTERNATIVE **$1,819,319**

TABLE C-5
ALTERNATIVE 5 - MEC SURFACE CLEARANCE AND MEC SUBSURFACE REMOVAL
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 5 - MEC Surface Clearance and MEC Subsurface Removal — **COST ESTIMATE SUMMARY**

Site: FTBLS-002-R-04

Installation: Fort Bliss, El Paso, Texas

Phase: Feasibility Study (-30% to +50%)

Base Year: 2014

Description: Includes completion of a Proposed Plan (PP), Record of Decision (ROD), MEC Surface Clearance Work Plan, Explosives Safety Submission, Site Specific Final Report, and Closure Documentation,. Includes MEC surface clearance of 397 acres by a 40-man UXO field crew (2-UXO Technician IIIs, 12-UXO Technician IIs, and 26-UXO Technician Is). Includes a MEC surface clearance rate of 50 acres per day. Includes MEC subsurface removal of 397 acres by a 35-man UXO field crew (5-UXO Technician IIIs, 15-UXO Technician IIs, and 15-UXO Technician Is). Includes a MEC subsurface removal rate of 30 acres per day. Includes oversight by 1-Senior UXO Supervisor, 1-UXO Safety Officer, and 1-UXO QC Specialist. Includes detonation costs for 20 MEC items and MD disposition. Includes post-demolition sampling for explosives in soil. Capital costs occur in Year 0 and there are no annual costs or periodic costs.

CAPITAL COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Field Activities					
UXO Management Mobilization	1	LS	$8,670	$8,670	See Table UCW-6
UXO Management	21	Day	$4,970.16	$105,235	See Table UCW-7
MEC Field Crew Mobilization	47	Each	$2,337.21	$109,849	See Table UCW-8
MEC Surface Clearance	397	Acre	$926.05	$367,640	See Table UCW-9
MEC Subsurface Removal	397	Acre	$1,422.34	$564,670	See Table UCW-10
Detonations	20	EA	$2,033.03	$40,661	See Table UCW-11
Reporting					
Site-Specific Final Report	-	LS	$25,000	$25,000	
PP/ROD	-	LS	$40,000	$40,000	
Closure Documentation	-	LS	$5,000	$5,000	
Meetings/Public Participation	-	LS	$12,500	$12,500	Public Meeting for PP
SUBTOTAL 1				$1,279,225	
Contingency	25%			$319,806	15% scope + 10% bid
SUBTOTAL 2				$1,599,031	
Project Management	5%			$79,952	
Remedial Design	8%			$127,922	
SUBTOTAL 3				$1,806,905	
TOTAL CAPITAL COST				**$1,806,905**	

ANNUAL O&M COSTS	Unit Cost	
TOTAL ANNUAL O&M COST		**$0**

PERIODIC COSTS	Unit Cost	
TOTAL PERIODIC COST		**$0**

PRESENT VALUE ANALYSIS

Description	Year	Cost	Cost/Year	DF (1.9%)	Present Value	Notes
Capital Cost	0	$1,806,905	$1,806,905	1.000	$1,806,904.54	
Annual O&M Costs	1 - 30	$0	$0	22.710	$0.00	
Periodic Costs	0	$0	$0	0.000	$0.00	
		$1,806,905			$1,806,904.54	

TOTAL COST OF ALTERNATIVE	**$1,806,905**
TOTAL PRESENT VALUE OF ALTERNATIVE	**$1,806,905**

FTBLS-002-R-05

TABLE D-1
COST COMPARISON OF REMEDIAL ACTION ALTERNATIVES
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Site:	**FTBLS-002-R-05**	**Base Year:**	**2014**
Installation:	**Fort Bliss, El Paso, Texas**	**Date:**	**05/03/2016**
Phase:	**Feasibility Study (-30% to +50%)**		

	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Description	**No Action**	**Public Awareness Program**	**Land Use Controls**	**MEC Surface Clearance**	**MEC Surface Clearance and MEC Subsurface Removal**
Total Project Duration (Years)	0	30	30	30	1
Capital Cost	$0	$88,406	$490,273	$963,017	$1,090,750
Total O&M/Periodic Cost	$0	$189,750	$548,226	$548,226	$0
Total Cost of Alternative[1]	**$0**	**$278,156**	**$1,038,500**	**$1,511,244**	**$1,090,750**
Total Present Value of Alternative	$0	$231,279	$929,491	$1,402,235	$1,090,750

Notes

[1]Cost estimates are developed in the FS primarily for the purpose of comparing remedial action alternatives, not for establishing project budgets.

TABLE D-2
ALTERNATIVE 2 - PUBLIC AWARENESS PROGRAM
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 2 - Public Awareness Program — **COST ESTIMATE SUMMARY**

Site: FTBLS-002-R-05

Installation: Fort Bliss, El Paso, Texas

Phase: Feasibility Study (-30% to +50%)

Base Year: 2014

Description: Includes completion of a Proposed Plan (PP), Record of Decision (ROD), and Public Awareness Program including a Community Relations Plan. Periodic costs include a five-year periodic review report. Capital costs occur in Year 0, annual O&M costs occur in Years 1 - 30, and periodic costs occur in Years 5, 10, 15, 20, 25, and 30.

CAPITAL COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Field Activities					
Public Awareness Program Mailings	1	LS	$10,000	$10,000	
Reporting					
PP/ROD	-	LS	$40,000	$40,000	
Meetings/Public Participation	-	LS	$12,500	$12,500	Public Meeting for PP
SUBTOTAL 1				$62,500	
Contingency	15%			$9,375	5% scope + 10% bid
SUBTOTAL 2				$71,875	
Project Management	8%			$5,750	
Remedial Design	15%			$10,781	
SUBTOTAL 3				$88,406	
TOTAL CAPITAL COST				**$88,406**	

ANNUAL O&M COSTS

Description	QTY	U/M		Cost	Notes
Website and Server Fees and Updates	1	LS	$2,000	$2,000	
SUBTOTAL 1				$2,000	
Contingency	15%			$300	5% scope + 10% bid
SUBTOTAL 2				$2,300	
Project Management	10%			$230	
SUBTOTAL 3				$2,530	
TOTAL ANNUAL O&M COST				**$2,530**	

PERIODIC COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Five Year Review Report	1	LS	$15,000	$15,000	
SUBTOTAL 1				$15,000	
Contingency	15%			$2,250	5% scope + 10% bid
SUBTOTAL 2				$17,250	
Project Management	10%			$1,725	
SUBTOTAL 3				$18,975	
TOTAL PERIODIC COST				**$18,975**	

PRESENT VALUE ANALYSIS

Description	Year	Cost	Cost/Year	DF (1.9%)	Present Value	Notes
Capital Cost	0	$88,406	$88,406	1.000	$88,406.00	
Annual O&M Costs	1 - 30	$75,900	$2,530	22.710	$57,456.30	Multi-year discount factor
Periodic Costs	5	$18,975	$18,975	0.910	$17,270.74	
Periodic Costs	10	$18,975	$18,975	0.828	$15,719.54	
Periodic Costs	15	$18,975	$18,975	0.754	$14,307.67	
Periodic Costs	20	$18,975	$18,975	0.686	$13,022.61	
Periodic Costs	25	$18,975	$18,975	0.754	$14,307.67	
Periodic Costs	30	$18,975	$18,975	0.569	$10,788.38	
		$278,156			$231,278.92	
TOTAL COST OF ALTERNATIVE					**$278,156**	
TOTAL PRESENT VALUE OF ALTERNATIVE					**$231,279**	

TABLE D-3
ALTERNATIVE 3 - LAND USE CONTOLS
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 3 - Land Use Controls — **COST ESTIMATE SUMMARY**

Site: FTBLS-002-R-05

Installation: Fort Bliss, El Paso, Texas

Phase: Feasibility Study (-30% to +50%)

Base Year: 2014

Description: Includes completion of a Proposed Plan (PP), Record of Decision (ROD), Public Awareness Program including a Community Relations Plan, and Land Use Control Plan. Includes installation of 12,948 linear feet of fence and 26 signs around the perimeter of the MRS. Periodic costs include site inspections and five-year periodic review report. Annual O&M costs include annual site inspections until the first Five-Year Review. Periodic costs include site inspections and Five-Year Review Reports. Capital costs occur in Year 0, annual O&M costs occur in Years 1 - 30, and periodic costs occur in Years 5, 10, 15, 20, 25, and 30.

CAPITAL COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Field Activities					
Public Awareness Program Mailings	1	LS	$10,000	$10,000	
Survey	12,948	LF	$0.25	$3,177	See Table UCW-1
Fence Installation	12,948	LF	$20.00	$258,948	See Table UCW-2
Sign Installation	26	Each	$450.54	$11,667	See Table UCW-3
Reporting					
Site-Specific Final Report	-	LS	$25,000	$25,000	
PP/ROD	-	LS	$40,000	$40,000	
Meetings/Public Participation	-	LS	$12,500	$12,500	Public Meeting for PP
SUBTOTAL 1				$361,292	
Contingency	15%			$54,194	5% scope + 10% bid
SUBTOTAL 2				$415,486	
Project Management	6%			$24,929	
Remedial Design	12%			$49,858	
SUBTOTAL 3				$490,273	
TOTAL CAPITAL COST				**$490,273**	

ANNUAL O&M COSTS (YEARS 1- 4)

Description	QTY	U/M		Cost	Notes
Website and Server Fees and Updates	1	LS	$2,000	$2,000	
Site Inspection Team Mobilization	1	LS	$5,101	$5,101	See Table UCW-4
Site Inspection	5	Day	$2,565	$12,825	See Table UCW-5
Site Inspection Report	1	LS	$5,000	$5,000	
SUBTOTAL 1				$24,926	
Contingency	15%			$3,739	5% scope + 10% bid
SUBTOTAL 2				$28,665	
Project Management	10%			$2,866	
SUBTOTAL 3				$31,531	
TOTAL ANNUAL O&M COST (YEARS 1- 4)				**$31,531**	

ANNUAL O&M COSTS (YEARS 5- 30)

Description	QTY	U/M		Cost	Notes
Website and Server Fees and Updates	1	LS	$2,000	$2,000	
SUBTOTAL 1				$2,000	
Contingency	15%			$300	5% scope + 10% bid
SUBTOTAL 2				$2,300	
Project Management	10%			$230	
SUBTOTAL 3				$2,530	
TOTAL ANNUAL O&M COST (YEARS 5- 30)				**$2,530**	

TABLE D-3
ALTERNATIVE 3 - LAND USE CONTOLS
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 3 - Land Use Controls					COST ESTIMATE SUMMARY
PERIODIC COSTS					
Description	**QTY**	**U/M**	**Unit Cost**	**Cost**	**Notes**
Site Inspection Team Mobilization	1	LS	$5,101	$5,101	See Table UCW-4
Site Inspection	5	Day	$2,565	$12,825	See Table UCW-5
Site Inspection Report	1	LS	$5,000	$5,000	
Sign and Fence Maintenance	1	LS	$9,020.51	$9,021	20% replacement / 30 years
Five Year Review Report	1	LS	$15,000	$15,000	
SUBTOTAL 1				$46,946	
Contingency	15%			$7,042	5% scope + 10% bid
SUBTOTAL 2				$53,988	
Project Management	10%			$5,399	
SUBTOTAL 3				$59,387	
TOTAL PERIODIC COST				**$59,387**	

PRESENT VALUE ANALYSIS

Description	Year	Cost	Cost/Year	DF (1.9%)	Present Value	Notes
Capital Cost	0	$490,273	$490,273	1.000	$490,273.36	
Annual O&M Costs	1 - 4	$126,124	$31,531	3.82	$120,354.06	Multi-year discount factor
Annual O&M Costs	5 - 30	$65,780	$2,530	20.37	$51,531.04	Multi-year discount factor
Periodic Costs	5	$59,387	$59,387	0.910	$54,053.09	
Periodic Costs	10	$59,387	$59,387	0.828	$49,198.24	
Periodic Costs	15	$59,387	$59,387	0.754	$44,779.44	
Periodic Costs	20	$59,387	$59,387	0.686	$40,757.52	
Periodic Costs	25	$59,387	$59,387	0.754	$44,779.44	
Periodic Costs	30	$59,387	$59,387	0.569	$33,764.93	
		$1,038,500			$929,491.13	
TOTAL COST OF ALTERNATIVE					**$1,038,500**	
TOTAL PRESENT VALUE OF ALTERNATIVE					**$929,491**	

TABLE D-4
ALTERNATIVE 4 - MEC SURFACE CLEARANCE
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 4 - MEC Surface Clearance — **COST ESTIMATE SUMMARY**

Site: FTBLS-002-R-05

Installation: Fort Bliss, El Paso, Texas

Phase: Feasibility Study (-30% to +50%)

Base Year: 2014

Description: Includes completion of a Proposed Plan (PP), Record of Decision (ROD), Public Awareness Program including a Community Relations Plan, Land Use Control Plan, MEC Surface Clearance Work Plan, Explosives Safety Submission, and Site Specific Final Report. Includes MEC surface clearance of 203 acres by a 40-man UXO field crew (2-UXO Technician IIIs, 12-UXO Technician IIs, and 26-UXO Technician Is). Includes a MEC surface clearance rate of 50 acres per day. Includes oversight by 1-Senior UXO Supervisor, 1-UXO Safety Officer, and 1-UXO QC Specialist. Includes detonation costs for 5 MEC items and MD disposition. Includes post-demolition sampling for explosives in soil. Includes installation of 12,948 linear feet of fence and 34 signs around the perimter of the MRS. Annual O&M costs include annual site inspections until the first Five-Year Review. Periodic costs include site inspections and Five-Year Review Reports. Capital costs occur in Year 0, annual O&M costs occur in Years 1 - 30, and periodic costs occur in Years 5, 10, 15, 20, 25, and 30.

CAPITAL COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Field Activities					
Public Awareness Program Mailings	1	LS	$10,000	$10,000	
UXO Management Mobilization	1	LS	$8,670	$8,670	See Table UCW-6
UXO Management	4	Day	$4,970.16	$20,179	See Table UCW-7
MEC Field Crew Mobilization	40	Each	$2,337.21	$93,488	See Table UCW-8
MEC Surface Clearance	203	Acre	$926.05	$187,987	See Table UCW-9
Detonations	5	EA	$2,033.03	$10,165	See Table UCW-11
Survey	12,948	LF	$0.25	$3,177	See Table UCW-1
Fence Installation	12,948	LF	$20.00	$258,948	See Table UCW-2
Sign Installation	26	Each	$450.54	$11,667	See Table UCW-3
Reporting					
Site-Specific Final Report	-	LS	$25,000	$25,000	
PP/ROD	-	LS	$40,000	$40,000	
Meetings/Public Participation	-	LS	$12,500	$12,500	Public Meeting for PP
SUBTOTAL 1				$681,782	
Contingency	25%			$170,446	15% scope + 10% bid
SUBTOTAL 2				$852,228	
Project Management	5%			$42,611	
Remedial Design	8%			$68,178	
SUBTOTAL 3				$963,017	
TOTAL CAPITAL COST				**$963,017**	

ANNUAL O&M COSTS (YEARS 1- 4)

Description	QTY	U/M	Unit Cost	Cost	Notes
Website and Server Fees and Updates	1	LS	$2,000	$2,000	
Site Inspection Team Mobilization	1	LS	$5,101	$5,101	See Table UCW-4
Site Inspection	5	Day	$2,565	$12,825	See Table UCW-5
Site Inspection Report	1	LS	$5,000	$5,000	
SUBTOTAL 1				$24,926	
Contingency	15%			$3,739	5% scope + 10% bid
SUBTOTAL 2				$28,665	
Project Management	10%			$2,866	
SUBTOTAL 3				$31,531	
TOTAL ANNUAL O&M COST (YEARS 1- 4)				**$31,531**	

TABLE D-4
ALTERNATIVE 4 - MEC SURFACE CLEARANCE
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 4 - MEC Surface Clearance				COST ESTIMATE SUMMARY	
ANNUAL O&M COSTS (YEARS 5- 30)			**Unit Cost**		
Description	**QTY**	**U/M**		**Cost**	**Notes**
Website and Server Fees and Updates	1	LS	$2,000	$2,000	
SUBTOTAL 1				$2,000	
Contingency	15%			$300	5% scope + 10% bid
SUBTOTAL 2				$2,300	
Project Management	10%			$230	
SUBTOTAL 3				$2,530	
TOTAL ANNUAL O&M COST (YEARS 5- 30)				**$2,530**	

PERIODIC COSTS					
Description	**QTY**	**U/M**	**Unit Cost**	**Cost**	**Notes**
Site Inspection Team Mobilization	1	LS	$5,101	$5,101	See Table UCW-4
Site Inspection	5	LS	$2,565	$12,825	See Table UCW-5
Site Inspection Report	1	LS	$5,000	$5,000	
Sign and Fence Maintenance	1	LS	$9,020.51	$9,021	20% replacement / 30 years
Five Year Review Report	1	LS	$15,000	$15,000	
SUBTOTAL 1				$46,946	
Contingency	15%			$7,042	5% scope + 10% bid
SUBTOTAL 2				$53,988	
Project Management	10%			$5,399	
SUBTOTAL 3				$59,387	
TOTAL PERIODIC COST				**$59,387**	

PRESENT VALUE ANALYSIS

Description	**Year**	**Cost**	**Cost/Year**	**DF (1.9%)**	**Present Value**	**Notes**
Capital Cost	0	$963,017	$963,017	1.000	$963,017.23	
Annual O&M Costs	1 - 4	$126,124	$31,531	3.82	$120,354.06	Multi-year discount factor
Annual O&M Costs	5 - 30	$65,780	$2,530	20.37	$51,531.04	Multi-year discount factor
Periodic Costs	5	$59,387	$59,387	0.910	$54,053.09	
Periodic Costs	10	$59,387	$59,387	0.828	$49,198.24	
Periodic Costs	15	$59,387	$59,387	0.754	$44,779.44	
Periodic Costs	20	$59,387	$59,387	0.686	$40,757.52	
Periodic Costs	25	$59,387	$59,387	0.754	$44,779.44	
Periodic Costs	30	$59,387	$59,387	0.569	$33,764.93	
		$1,511,244			$1,402,235.00	

TOTAL COST OF ALTERNATIVE	**$1,511,244**
TOTAL PRESENT VALUE OF ALTERNATIVE	**$1,402,235**

TABLE D-5
ALTERNATIVE 5 - MEC SURFACE CLEARANCE AND MEC SUBSURFACE REMOVAL
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Alternative 5 - MEC Surface Clearance and MEC Subsurface Removal — **COST ESTIMATE SUMMARY**

Site: FTBLS-002-R-05

Installation: Fort Bliss, El Paso, Texas

Phase: Feasibility Study (-30% to +50%)

Base Year: 2014

Description: Includes completion of a Proposed Plan (PP), Record of Decision (ROD), MEC Surface Clearance Work Plan, Explosives Safety Submission, Site Specific Final Report, and Closure Documentation,. Includes MEC surface clearance of 203 acres by a 40-man UXO field crew (2-UXO Technician IIIs, 12-UXO Technician IIs, and 26-UXO Technician Is). Includes a MEC surface clearance rate of 50 acres per day. Includes MEC subsurface removal of 203 acres by a 35-man UXO field crew (5-UXO Technician IIIs, 15-UXO Technician IIs, and 15-UXO Technician Is). Includes a MEC subsurface removal rate of 30 acres per day. Includes oversight by 1-Senior UXO Supervisor, 1-UXO Safety Officer, and 1-UXO QC Specialist. Includes detonation costs for 20 MEC items and MD disposition. Includes post-demolition sampling for explosives in soil. Capital costs occur in Year 0 and there are no annual costs or periodic costs.

CAPITAL COSTS

Description	QTY	U/M	Unit Cost	Cost	Notes
Field Activities					
UXO Management Mobilization	1	LS	$8,670	$8,670	See Table UCW-6
UXO Management	11	Day	$4,970.16	$53,810	See Table UCW-7
MEC Field Crew Mobilization	47	Each	$2,337.21	$109,849	See Table UCW-8
MEC Surface Clearance	203	Acre	$926.05	$187,987	See Table UCW-9
MEC Subsurface Removal	203	Acre	$1,422.34	$288,736	See Table UCW-10
Detonations	20	EA	$2,033.03	$40,661	See Table UCW-11
Reporting					
Site-Specific Final Report	-	LS	$25,000	$25,000	
PP/ROD	-	LS	$40,000	$40,000	
Closure Documentation	-	LS	$5,000	$5,000	
Meetings/Public Participation	-	LS	$12,500	$12,500	Public Meeting for PP
SUBTOTAL 1				$772,213	
Contingency	25%			$193,053	15% scope + 10% bid
SUBTOTAL 2				$965,266	
Project Management	5%			$48,263	
Remedial Design	8%			$77,221	
SUBTOTAL 3				$1,090,750	
TOTAL CAPITAL COST				**$1,090,750**	

ANNUAL O&M COSTS	Unit Cost	
TOTAL ANNUAL O&M COST		**$0**

PERIODIC COSTS	Unit Cost	
TOTAL PERIODIC COST		**$0**

PRESENT VALUE ANALYSIS

Description	Year	Cost	Cost/Year	DF (1.9%)	Present Value	Notes
Capital Cost	0	$1,090,750	$1,090,750	1.000	$1,090,749.71	
Annual O&M Costs	1 - 30	$0	$0	22.710	$0.00	
Periodic Costs	0	$0	$0	0.000	$0.00	
		$1,090,750			$1,090,749.71	

TOTAL COST OF ALTERNATIVE	**$1,090,750**
TOTAL PRESENT VALUE OF ALTERNATIVE	**$1,090,750**

UNIT COST WORKSHEETS

TABLE UCW-1
SURVEYING
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Capital Cost Sub-Element
Surveying

UNIT COST WORKSHEET

Site: Multiple
Installation: Fort Bliss, El Paso, Texas

Work Statement:

Includes subcontractor costs for 2-man survey team and 1-UXO Technician II for UXO escort. Includes per diem and ODC costs for UXO Tech II. Includes 10,000 linear feet surveyed per day. Grid layout includes 626 linear feet of surveying. Includes no UXO management.

Cost Analysis:

DESCRIPTION	QTY	U/M	UNIT COST	COST	NOTES
Labor					
UXO Technician II	10	Hour	$99.20	$992	Backup 1
Subtotal Labor Cost				**$992**	
ODCs/Subs					
Rental Vehicle	1	Day	$75.00	$75	
Gasoline	1	Day	$20.00	$20	
Schonstedt	1	Day	$50.00	$50	
Level D PPE	1	Day	$5.00	$5	
Survey Team - Instrument Man	1	Day	$545.00	$545	
Survey Team - Rodman	1	Day	$505.00	$505	
Survey Team - GPS	1	Day	$80.00	$80	
Subtotal ODC/Subs Costs				**$1,280**	
Prime Contractor Overhead and Profit	8%			**$182**	8% profit
UNIT COST PER DAY FOR 2-MAN SURVEY TEAM WITH UXO ESCORT				**$2,454**	
UNIT COST PER LINEAR FOOT				**$0.25**	

Source of Cost Data:

Costs based on previous experience.

Cost Adjustment Checklist:

	FACTOR:	NOTES:
✓	H&S Productivity (labor & equip only)	
✓	Escalation to Base Year	2014 is base year.
✓	Area Cost Factor	Costs are based on local quotes, historical data, and RS Means.
✓	Subcontractor Overhead and Profit	Included in cost.
✓	Prime Contractor Overhead and Profit	Included in cost.

TABLE UCW-2
FENCE INSTALLATION
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Capital Cost Sub-Element
Fence Installation

UNIT COST WORKSHEET

Site: Multiple
Installation: Fort Bliss, El Paso, Texas

Work Statement:

Unit cost is for installation of 6' high chain link fence 10' O.C. alumized steel, 11 gauge wire around the perimeter of the MRS. Assumes 250 linear feet of fencing installed per day.

Cost Analysis:

DESCRIPTION	QTY	U/M	UNIT COST	COST	NOTES
Labor					
1 - UXO Technician II	10	Hour	$99.20	$992	Backup 1
Subtotal Labor Cost				**$992**	
ODCs/Subs					
Chain link industrial fence, schedule 20, 11 gauge wire, 6' high, no barb wire	250	LF	$14.55	$3,638	RS Means
Subtotal ODC/Subs Costs				**$3,638**	
Prime Contractor Overhead and Profit	8%			**$370**	8% profit
UNIT COST PER LINEAR FOOT OF FENCE INSTALLATION				**$20**	

Source of Cost Data:

Costs based on previous experience.

Cost Adjustment Checklist:

	FACTOR:	NOTES:
✓	H&S Productivity (labor & equip only)	
✓	Escalation to Base Year	2014 is base year.
✓	Area Cost Factor	Costs are based on local quotes, historical data, and RS Means.
✓	Subcontractor Overhead and Profit	Included in cost.
✓	Prime Contractor Overhead and Profit	Included in cost.

TABLE UCW-3
SIGN INSTALLATION
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Capital Cost Sub-Element
Sign Installation

UNIT COST WORKSHEET

Site: Multiple
Installation: Fort Bliss, El Paso, Texas

Work Statement:

Unit cost is for installation of warning signs around the perimeter and along roads. Assumes signs are installed by 3-man team (1-UXO Tech II and 2-UXO Tech I). Assumes 10 signs installed per day.

Cost Analysis:

DESCRIPTION	QTY	U/M	UNIT COST	COST	NOTES
Labor					
1 - UXO Technician II	10	Hour	$99.20	$992	Backup 1
2 - UXO Technician I	20	Hour	$86.24	$1,725	Backup 1
Subtotal Labor Cost				**$2,717**	
ODCs/Subs					
Tractor/post hole drill/loader	1	Day	$75.00	$75	
Trimble Handheld GPS	1	Day	$30.00	$30	
Level D PPE	3	Day	$15.00	$45	
Steel Post	10	Each	$35.00	$350	
Warning Sign	10	CY	$78.50	$785	
Concrete (Premixed bags)	30	CY	$4.00	$120	
Miscellaneous Field Supplies	1	LS	$50.00	$50	
Subtotal ODC/Subs Costs				**$1,455**	
Prime Contractor Overhead and Profit	8%			**$334**	8% profit
UNIT COST PER SIGN				**$451**	10 signs installed per day

Source of Cost Data:

Costs based on previous experience.

Cost Adjustment Checklist:

	FACTOR:	NOTES:
✓	H&S Productivity (labor & equip only)	
✓	Escalation to Base Year	2014 is base year.
✓	Area Cost Factor	Costs are based on local quotes, historical data, and RS Means.
✓	Subcontractor Overhead and Profit	Included in cost.
✓	Prime Contractor Overhead and Profit	Included in cost.

TABLE UCW-4
ANNUAL/PERIODIC SITE INSPECTION TEAM MOBILIZATION
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Capital Cost Sub-Element
Annual/Periodic Site Inspection Team Mobilization

UNIT COST WORKSHEET

Site: Multiple
Installation: Fort Bliss, El Paso, Texas

Work Statement:

Assumes an annual/periodic site inspection involves 2-man team (Geologist and UXO Technician II). Includes 16 hours for travel and 1 airfare for each personnel.

Cost Analysis:

DESCRIPTION	QTY	U/M	UNIT COST	COST	NOTES
Labor					
Geologist	16	Hour	$85.00	$1,360	Backup 1
UXO Technician II	16	Hour	$69.00	$1,104	Backup 1
Per Diem - Travel	2	Each	$38.25	$77	GSA
Per Diem - Lodging	2	Hour	$141.00	$282	GSA
Subtotal Labor Cost				**$2,823**	
ODCs/Subs					
Airfare	2	Each	$750.00	$1,500	
Subtotal ODC/Subs Costs				**$1,500**	
Prime Contractor Overhead and Profit	18%			**$778**	10% overhead + 8% profit
UNIT COST PER SITE INSPECTION TEAM MOBILIZATION				**$5,101**	

Source of Cost Data:

Costs based on previous experience.

Cost Adjustment Checklist:

	FACTOR:	NOTES:
✓	H&S Productivity (labor & equip only)	
✓	Escalation to Base Year	2014 is base year.
✓	Area Cost Factor	Costs are based on local quotes, historical data, and RS Means.
✓	Subcontractor Overhead and Profit	Included in cost.
✓	Prime Contractor Overhead and Profit	Included in cost.

TABLE UCW-5
ANNUAL/PERIODIC SITE INSPECTION
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Capital Cost Sub-Element
Annual/Periodic Site Inspection

UNIT COST WORKSHEET

Site: Multiple
Installation: Fort Bliss, El Paso, Texas

Work Statement:

Unit cost is for annual/periodic site inspection. Assumes site inspection involves 2-man team (Geologist and UXO Technician II). Includes completing an inspection of the site and photographing current site conditions.

Cost Analysis:

DESCRIPTION	QTY	U/M	UNIT COST	COST	NOTES
Labor					
Geologist	10	Hour	$109.68	$1,097	Backup 1
UXO Technician II	10	Hour	$99.20	$992	Backup 1
Subtotal Labor Cost				**$2,089**	
ODCs/Subs					
Rental Vehicle	1	Day	$60.00	$60	
Gasoline	1	Day	$15.00	$15	
Level D PPE	2	Day	$5.00	$10	
Subtotal ODC/Subs Costs				**$85**	
Prime Contractor Overhead and Profit	18%			**$391**	10% overhead + 8% profit
UNIT COST PER DAY SITE INSPECTION				**$2,565**	

Source of Cost Data:

Costs based on previous experience.

Cost Adjustment Checklist:

	FACTOR:	NOTES:
✓	H&S Productivity (labor & equip only)	
✓	Escalation to Base Year	2014 is base year.
✓	Area Cost Factor	Costs are based on local quotes, historical data, and RS Means.
✓	Subcontractor Overhead and Profit	Included in cost.
✓	Prime Contractor Overhead and Profit	Included in cost.

TABLE UCW-6
UXO FIELD MANAGEMENT MOBILIZATION
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Capital Cost Sub-Element
UXO Field Management Mobilization

UNIT COST WORKSHEET

Site: Multiple
Installation: Fort Bliss, El Paso, Texas

Work Statement:

Includes 1-Senior UXO Supervisor, 1-UXO Quality Control Specialist, and 1-UXO Safety Officer. Assumes a separate UXOSO and UXOQCS will be required. Includes 16 hours for travel and 1 airfare.

Cost Analysis:

DESCRIPTION	QTY	U/M	UNIT COST	COST	NOTES
Labor					
Senior UXO Supervisor	16	Hour	$100.00	$1,600	Backup 1
UXO QC Specialist	16	Hour	$92.50	$1,480	Backup 1
UXO Safety Officer	16	Hour	$92.50	$1,480	Backup 1
Per Diem - Travel	3	Each	$38.25	$115	GSA
Per Diem - Lodging	3	Hour	$141.00	$423	GSA
Subtotal Labor Cost				**$5,098**	
ODCs/Subs					
Airfare	3	Each	$750.00	$2,250	
Subtotal ODC/Subs Costs				**$2,250**	
Prime Contractor Overhead and Profit	18%			**$1,323**	10% overhead + 8% profit
UNIT COST PER UXO FIELD MANAGEMENT MOBILIZATION				**$8,670**	

Source of Cost Data:

Costs based on previous experience.

Cost Adjustment Checklist:

	FACTOR:	NOTES:
✓	H&S Productivity (labor & equip only)	
✓	Escalation to Base Year	2014 is base year.
✓	Area Cost Factor	Costs are based on local quotes, historical data, and RS Means.
✓	Subcontractor Overhead and Profit	Included in cost.
✓	Prime Contractor Overhead and Profit	Included in cost.

TABLE UCW-7
UXO FIELD MANAGEMENT
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Capital Cost Sub-Element
UXO Field Management

UNIT COST WORKSHEET

Site: Multiple
Installation: Fort Bliss, El Paso, Texas

Work Statement:

Includes 1-Senior UXO Supervisor, 1-UXO Quality Control Specialist, and 1-UXO Safety Officer. Assumes a separate UXOSO and UXOQCS will be required. Includes per diem and ODC costs.

Cost Analysis:

DESCRIPTION	QTY	U/M	UNIT COST	COST	NOTES
Labor					
Senior UXO Supervisor	40	Hour	$132.68	$5,307	Backup 1
UXO QC Specialist	40	Hour	$124.58	$4,983	Backup 1
UXO Safety Officer	40	Hour	$124.58	$4,983	Backup 1
Subtotal Labor Cost				**$15,273**	
ODCs/Subs					
Rental Vehicle	3	Week	$250.00	$750	
Gasoline	3	Week	$75.00	$225	
Schonstedt	2	Week	$120.00	$240	
GPS	1	Week	$300.00	$300	
PPE	12	Day	$5.00	$60	
Subtotal ODC/Subs Costs				**$1,575**	
Prime Contractor Overhead and Profit	18%			**$3,033**	10% overhead + 8% profit
UNIT COST PER WEEK				**$19,881**	
UNIT COST PER DAY				**$4,970.16**	

Source of Cost Data:

Costs based on previous experience.

Cost Adjustment Checklist:

	FACTOR:	NOTES:
✓	H&S Productivity (labor & equip only)	
✓	Escalation to Base Year	2014 is base year.
✓	Area Cost Factor	Costs are based on local quotes, historical data, and RS Means.
✓	Subcontractor Overhead and Profit	Included in cost.
✓	Prime Contractor Overhead and Profit	Included in cost.

TABLE UCW-8
MEC FIELD CREW MOBILIZATION
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Capital Cost Sub-Element
MEC Field Crew Mobilization

UNIT COST WORKSHEET

Site: Multiple
Installation: Fort Bliss, El Paso, Texas

Work Statement:

Includes mobilization costs for 1-UXO Technician IIIs, 3-UXO Technician IIs, and 3-UXO Technician Is to develop an average mobilization rate for 1 UXO field crew member. Includes 16 hours for travel and 1 airfare.

Cost Analysis:

DESCRIPTION	QTY	U/M	UNIT COST	COST	NOTES
Labor					
1 - UXO Technician III	16	Hour	$82.00	$1,312	Backup 1
3 - UXO Technician II	48	Hour	$69.00	$3,312	Backup 1
3 - UXO Technician I	48	Hour	$57.00	$2,736	Backup 1
Per Diem - Travel	7	Each	$38.25	$268	GSA
Per Diem - Lodging	7	Hour	$141.00	$987	GSA
Subtotal Labor Cost				**$8,615**	
ODCs/Subs					
Airfare	7	Week	$750.00	$5,250	
Subtotal ODC/Subs Costs				**$5,250**	
Prime Contractor Overhead and Profit	18%			**$2,496**	10% overhead + 8% profit
UNIT COST UXO FIELD CREW MEMBER				**$16,360**	
UNIT COST BLENDED FOR ONE UXO FIELD CREW MEMBER				**$2,337.21**	

Source of Cost Data:

Costs based on previous experience.

Cost Adjustment Checklist:

	FACTOR:	NOTES:
✓	H&S Productivity (labor & equip only)	
✓	Escalation to Base Year	2014 is base year.
✓	Area Cost Factor	Costs are based on local quotes, historical data, and RS Means.
✓	Subcontractor Overhead and Profit	Included in cost.
✓	Prime Contractor Overhead and Profit	Included in cost.

TABLE UCW-9
MEC SURFACE CLEARANCE
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Capital Cost Sub-Element
MEC Surface Clearance

UNIT COST WORKSHEET

Site: Multiple
Installation: Fort Bliss, El Paso, Texas

Work Statement:

Includes 2-UXO Technician IIIs, 12-UXO Technician IIs, and 26-UXO Technician Is. UXO teams will complete systematic sweeps with magnetometers over the surveyed grids. This crew is anticipated to clear an average of 50 acres per day for each 10 hour day. The clearance rate is equivalent to 5 acres per hour. Includes per diem and ODC costs. Includes no UXO management.

Cost Analysis:

DESCRIPTION	QTY	U/M	UNIT COST	COST	NOTES
Labor					
2 - UXO Technician III	80	Hour	$113.24	$9,059	Backup 1
12 - UXO Technician II	480	Hour	$99.20	$47,614	Backup 1
26 - UXO Technician I	1040	Hour	$86.24	$89,684	Backup 1
Subtotal Labor Cost				**$146,357**	
ODCs/Subs					
Rental Vehicle	10	Week	$250.00	$2,500	
Gasoline	10	Week	$75.00	$750	
Schonstedt	40	Week	$120.00	$4,800	
GPS	2	Week	$300.00	$600	
Level D PPE	160	Day	$5.00	$800	
MD Disposition	50	Pound	$3.00	$150	1 lb/acre
Miscellaneous Field Supplies	4	Week	$250.00	$1,000	
Subtotal ODC/Subs Costs				**$10,600**	
Prime Contractor Overhead and Profit	18%			**$28,252**	10% overhead + 8% profit
UNIT COST PER WEEK				**$185,209**	
UNIT COST PER DAY				**$46,302.27**	

Source of Cost Data:

Costs based on previous experience.

Cost Adjustment Checklist:

	FACTOR:	NOTES:
✓	H&S Productivity (labor & equip only)	
✓	Escalation to Base Year	2014 is base year.
✓	Area Cost Factor	Costs are based on local quotes, historical data, and RS Means.
✓	Subcontractor Overhead and Profit	Included in cost.
✓	Prime Contractor Overhead and Profit	Included in cost.

TABLE UCW-10
MEC SUBSURFACE REMOVAL
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Capital Cost Sub-Element
MEC Subsurface Removal

UNIT COST WORKSHEET

Site: Multiple
Installation: Fort Bliss, El Paso, Texas

Work Statement:

Includes 5-UXO Technician IIIs, 15-UXO Technician IIs, and 15-UXO Technician Is. UXO teams will dig all subsurface anomalies to depths less than 4 feet below ground surface. This crew is anticipated to complete subsurface removal of a low density of anomalies (10 anomalies per acre) from 30 acres per day for each 10 hour day. The subsurface removal rate is equivalent to 3 acres per hour. Includes per diem and ODC costs. Includes no UXO management.

Cost Analysis:

DESCRIPTION	QTY	U/M	UNIT COST	COST	NOTES
Labor					
5 - UXO Technician III	200	Hour	$113.24	$22,647	Backup 1
15 - UXO Technician II	600	Hour	$99.20	$59,517	Backup 1
15 - UXO Technician I	600	Hour	$86.24	$51,741	Backup 1
Subtotal Labor Cost				**$133,905**	
ODCs/Subs					
Rental Vehicle	10	Week	$250.00	$2,500	
Gasoline	10	Week	$75.00	$750	
Schonstedt	35	Week	$120.00	$4,200	
GPS	5	Week	$300.00	$1,500	
Level D PPE	140	Day	$5.00	$700	
MD Disposition	30	Pound	$3.00	$90	1 lb/acre
Miscellaneous Field Supplies	4	Week	$250.00	$1,000	
Subtotal ODC/Subs Costs				**$10,740**	
Prime Contractor Overhead and Profit	18%			**$26,036**	10% overhead + 8% profit
UNIT COST PER WEEK				**$170,681**	
UNIT COST PER DAY				**$42,670.28**	

Source of Cost Data:

Costs based on previous experience.

Cost Adjustment Checklist:

	FACTOR:	NOTES:
✓	H&S Productivity (labor & equip only)	
✓	Escalation to Base Year	2014 is base year.
✓	Area Cost Factor	Costs are based on local quotes, historical data, and RS Means.
✓	Subcontractor Overhead and Profit	Included in cost.
✓	Prime Contractor Overhead and Profit	Included in cost.

TABLE UCW-11
DETONATIONS
FEASIBILITY STUDY FORMER MANEUVER AREA A
FORT BLISS, EL PASO, TEXAS

Capital Cost Sub-Element
Detonations

UNIT COST WORKSHEET

Site: Multiple
Installation: Fort Bliss, El Paso, Texas

Work Statement:

BIP or consolidated shots to destroy MEC identified within the MRSs during the MEC surface clearance and MEC subsurface removal activities.

Cost Analysis:

DESCRIPTION	QTY	U/M	UNIT COST	COST	NOTES
Labor					
Senior UXO Supervisor	2	Hour	$132.68	$265	Backup 1
UXO Safety Officer	2	Hour	$124.58	$249	Backup 1
UXO Technician II	2	Hour	$99.20	$198	Backup 1
Subtotal Labor Cost				**$713**	
ODCs/Subs					
Explosives	1	Each	$225.00	$225	
Explosives Handling and Delivery	1	Each	$550.00	$550	
Explosives (SW-846 Method 8330B)	1	Each	$110.00	$110	
Sample Shipping	1	Each	$75.00	$75	
Miscellaneous Supplies	1	Each	$50.00	$50	
Subtotal ODC/Subs Costs				**$1,010**	
Prime Contractor Overhead and Profit	18%			**$310**	10% overhead + 8% profit
UNIT COST PER SHOT				**$2,033**	

Source of Cost Data:

Costs based on previous experience.

Cost Adjustment Checklist:

	FACTOR:	NOTES:
✓	H&S Productivity (labor & equip only)	
✓	Escalation to Base Year	2014 is base year.
✓	Area Cost Factor	Costs are based on local quotes, historical data, and RS Means.
✓	Subcontractor Overhead and Profit	Included in cost.
✓	Prime Contractor Overhead and Profit	Included in cost.