U.S. ARMY CORPS OF ENGINEERS ANNOUNCES PROPOSED PLAN

The purpose of the Proposed Plan is to summarize the Remedial Investigation / Feasibility Study (RI/FS) activities at **Former Fort Huachuca Munitions Response Sites (MRS)**, present an evaluation of the remedial alternatives for mitigating potential explosive hazards at each MRS, present the Preferred Alternative for each MRS, and solicit public review and comment on all of the alternatives presented. Two **Former Fort Huachuca MRSs** were identified by U.S. Army Corps of Engineers (USACE) and assigned individual Formerly Used Defense Sites (FUDS) project numbers as follows: **MRS01 – Charleston Maneuver Area** (J09AZ106701) and **MRS02 – Artillery, Mortar Ranges and Maneuver Area** (J09AZ106702). Following completion of the RI, MRS02 was subdivided into three new MRSs: MRS02, MRS03, and MRS04, which were referred to as MRS02c, MRS02a, and MRS02b, respectively, in the *Final RI/FS Report* (revised based on the 2016 *Inventory Project Report* [INPR] update [Ref. 1]).

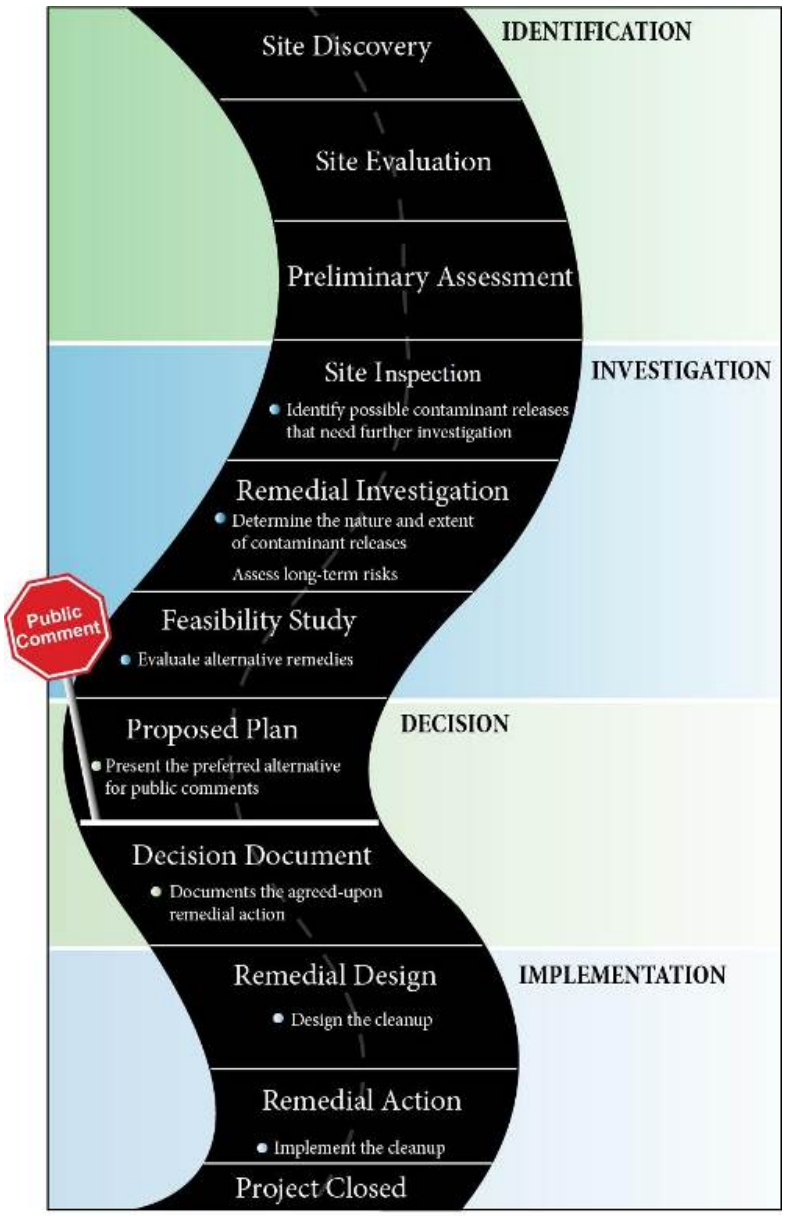
This Proposed Plan identifies the Preferred Alternatives for cleaning up potential Munitions and Explosives of Concern (MEC) contamination at the **Former Fort Huachuca MRSs** in Cochise County, Arizona, and provides the rationale for these preferences. Additionally, this plan includes summaries of other remedial alternatives evaluated for potential use at each of the MRSs. The alternatives and Preferred Alternatives are identified below. Details regarding the decision process and the alternatives selection are discussed in the Summary of Remedial Alternatives and Summary of Preferred Alternatives sections.

- Alternative 1 – No Action;
- Alternative 2 – Institutional Controls to Protect Current and Future Site Users - Preferred Alternative for MRS01 and MRS02;
- Alternative 3 – Munitions and Explosives of Concern Removal from the Surface with Institutional Controls to Protect Current and Future Site Users - Preferred Alternative for MRS04; and
- Alternative 4 – Digital Geophysical Mapping and Surface / Subsurface Removal of Munitions and Explosives of Concern (to a depth of 2 feet below ground surface [bgs]) with Institutional Controls to Protect Current and Future Site Users - Preferred Alternative for MRS03.

This document is issued by USACE, the lead agency for site activities, with support from the primary regulatory agency–the Arizona Department of Environmental Quality (ADEQ). USACE, in coordination with ADEQ and the U. S. Bureau of Land Management (BLM), will select a final remedy for the sites after reviewing and considering all information submitted during the public comment period but may modify the Preferred Alternative or select another remedial alternative presented in this Proposed Plan based on new information or public comment. Therefore, the public is encouraged to review and comment on all the alternatives in this Proposed Plan. **Figure 1** depicts the process followed by USACE, in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (Ref. 2), for the **Former Fort Huachuca MRSs**. This figure also illustrates the importance of public participation in the selection of the remedial alternatives for each of the **Former Fort Huachuca MRSs**.

USACE is issuing this Proposed Plan as part of its public participation responsibilities under Section (§) 117 (a) of CERCLA [42 United States Code [USC] §9617(a)] (Ref. 2) and 40 Code of Federal Regulations (CFR) 300.430(f)(3) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (Ref. 3). This Proposed Plan summarizes information that can be found in greater detail in the *RI/FS Work Plan* (Ref. 4) and the *Final RI/FS Report* (Ref. 5) and other documents contained in the Administrative Record file for the **Former Fort Huachuca MRSs**. USACE encourages the public to review these documents to gain a more comprehensive understanding of the **Former Fort Huachuca MRSs** and previous remedial activities that have been conducted at the sites.

FIGURE 1 – ROADMAP OF THE CERCLA PROCESS



SITE HISTORY AND BACKGROUND

The **Former Fort Huachuca MRSs** are situated to the immediate east of the active Fort Huachuca Artillery Range (East Range) in Sierra Vista, Cochise County, Arizona (**Figure 2**). The **Former Fort Huachuca MRSs** are located along the western boundary (**Former Fort Huachuca MRS02, MRS03, and MRS04**) and the southeastern boundary (**Former Fort Huachuca MRS01**) of the FUDS. Together, the MRSs comprise 1,505 acres. **Former Fort Huachuca MRS01** covers 72 acres (revised from 53 acres based on the 2014 *INPR* update [Ref. 6]) (**Figure 3**), **Former Fort Huachuca MRS02** covers 569 acres, MRS03 covers 548 acres, and MRS04 covers 316 acres (based on the 2016 *INPR* update [Ref. 1]) (**Figure 4**).

Fort Huachuca was founded in 1877 to protect settlers and transportation routes from Native Americans. It remained active through World War I as a cavalry post and served as an infantry division post during World War II. Fort Huachuca was closed in the summer of 1947.

In February 1951, the Air Force reacquired Fort Huachuca and an additional 3,000 acres of the East Artillery Range; the Army returned later that year and initiated a major renovation of the post. A large portion of the fort is still an active Department of Defense (DoD) site.

MARK YOUR CALENDARS

PUBLIC COMMENT PERIOD:

[Start date] – [End date]

USACE will accept written comments on the Proposed Plan during the public comment period. Comment letters must be postmarked by [date placeholder], and should be submitted to:

Jesse Laurie
Project Manager
USACE, Los Angeles District
5205 E. Comanche St.
Tucson, Arizona 85707
Phone: (520) 584-1677
Fax: (213) 452-4213
Email: jesse.laurie@usace.army.mil

To request an extension of the public comment period, send a written request to Mr. Jesse Laurie by [date placeholder].

PUBLIC MEETING:

[date placeholder], 6:00 PM to 8:00 PM

USACE will host a public meeting to explain the Proposed Plan and all of the alternatives resulting from the FS (the study completed prior to this Proposed Plan). Oral and written comments will be accepted at the meeting, held at:

[location placeholder]
[address placeholder].
[address placeholder]

For more information, see the Administrative Record file, which includes a copy of the *Final RI/FS Report*, at the following location:

Sierra Vista Public Library
2600 East Tacoma Street
Sierra Vista, Arizona 85635
Contact: (520) 458-4225

The 3,220-acres that encompass the area of focus of the Site Inspection (SI) and subsequent RI were leased by the federal government from the Boquillas Land and Cattle Company on September 9, 1943, and used for a variety of training activities, including artillery and infantry training. The ruins of the town of Charleston, occupied by mill workers from Millville beginning in 1879, are located within the boundary of **Former Fort Huachuca MRS01**. The Army made improvements to the ruins to enable troops to practice combat training in an urban-like setting. The area was reportedly used for combat training from approximately January 1944 until July 1946. Only small arms fire is believed to have occurred at, and in the vicinity of, the old Charleston Ruins (also identified as Charleston Combat City). However, the types of munitions used throughout the remainder of the site are not indicated in the historical records. Historical information indicates that **Former Fort Huachuca**

MRS02, MRS03, MRS04, which encompass 1,433 acres, consists of three overlapping ranges: Artillery Range (Safety Fan), Mortar Range, and Maneuver Area.

The SI was conducted in 2008 to determine whether the **Former Fort Huachuca MRSs** warranted subsequent characterization as part of a RI/FS. The SI was performed to gather and evaluate evidence of the potential residual presence of MEC, Munitions Debris (MD), and Munitions Constituents (MC) at **Former Fort Huachuca MRS01** and **Former Fort Huachuca MRS02** within the Fort Huachuca FUDS. Both MRSs are on undeveloped rangeland managed by BLM as the San Pedro Riparian National Conservation Area (SPRNCA).

Data collected during the SI phase verified the use of the **Former Fort Huachuca MRSs** for DoD training activities.

The USACE Project Manager worked with BLM managers to obtain the Right of Entry (ROE) for all work areas within **Former Fort Huachuca MRS01** and **Former Fort Huachuca MRS02**; thereby, making them fully accessible to the RI field teams.

An *RI/FS Report* for the **Former Fort Huachuca MRSs** was completed in December 2015 by Bristol Environmental Remediation Services, LLC (Bristol) of Anchorage, Alaska. This Proposed Plan was developed based on findings in the *Final RI/FS Report* (Ref. 5).

FIGURE 2 – FORMER FORT HUACHUCA MRS01, MRS02, MRS03, AND MRS04 SITE LOCATION

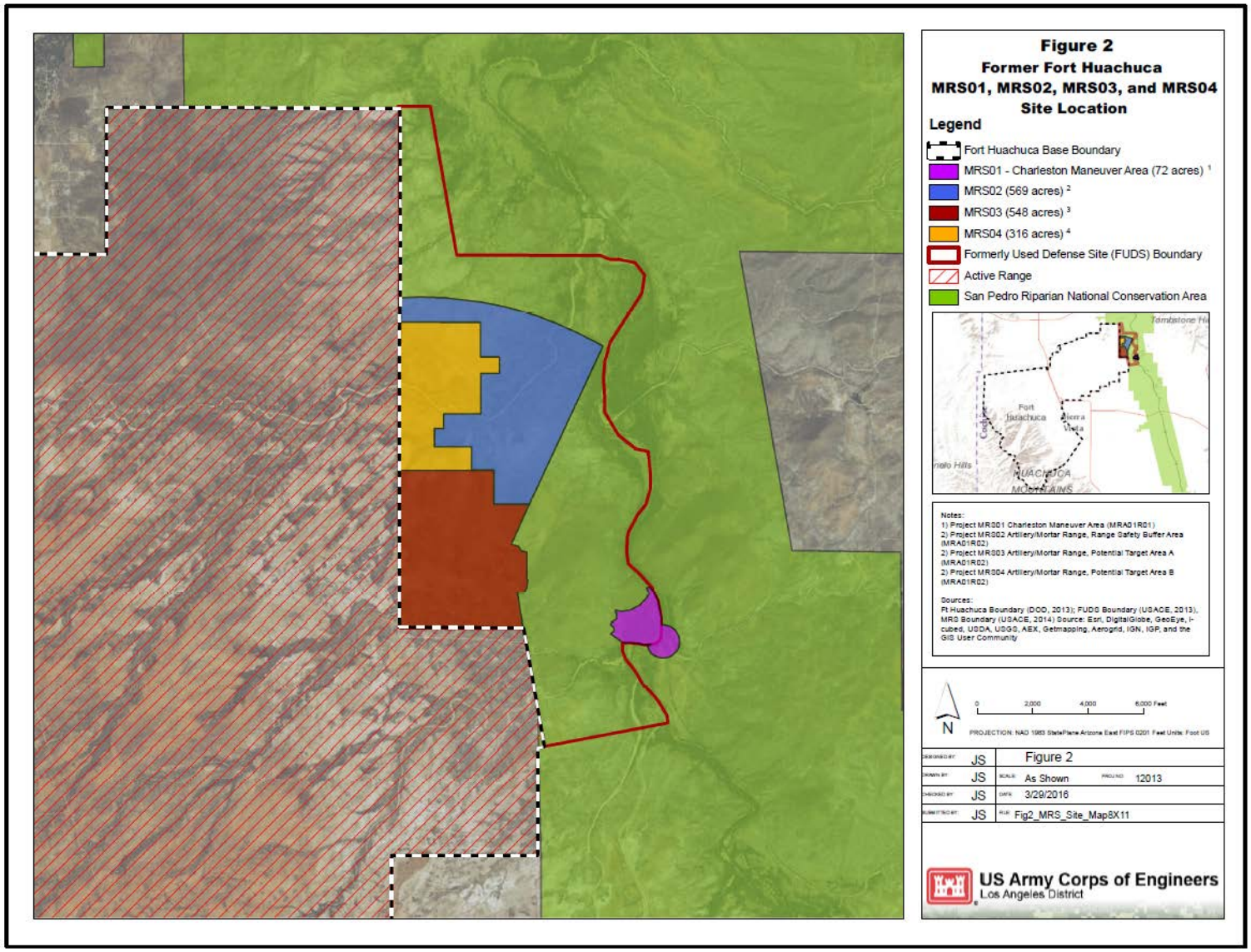


FIGURE 3 – FORMER FORT HUACHUCA MRS01

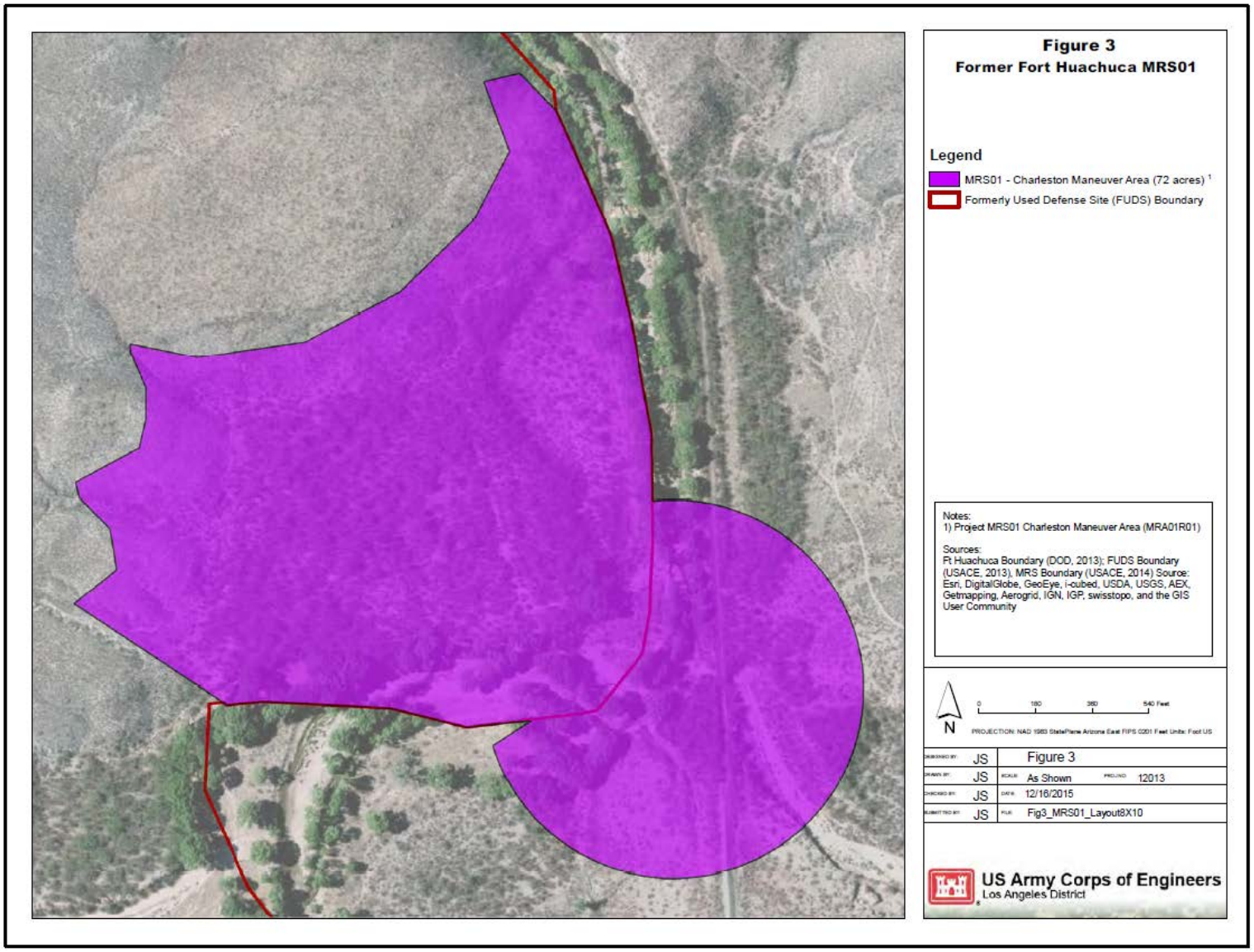
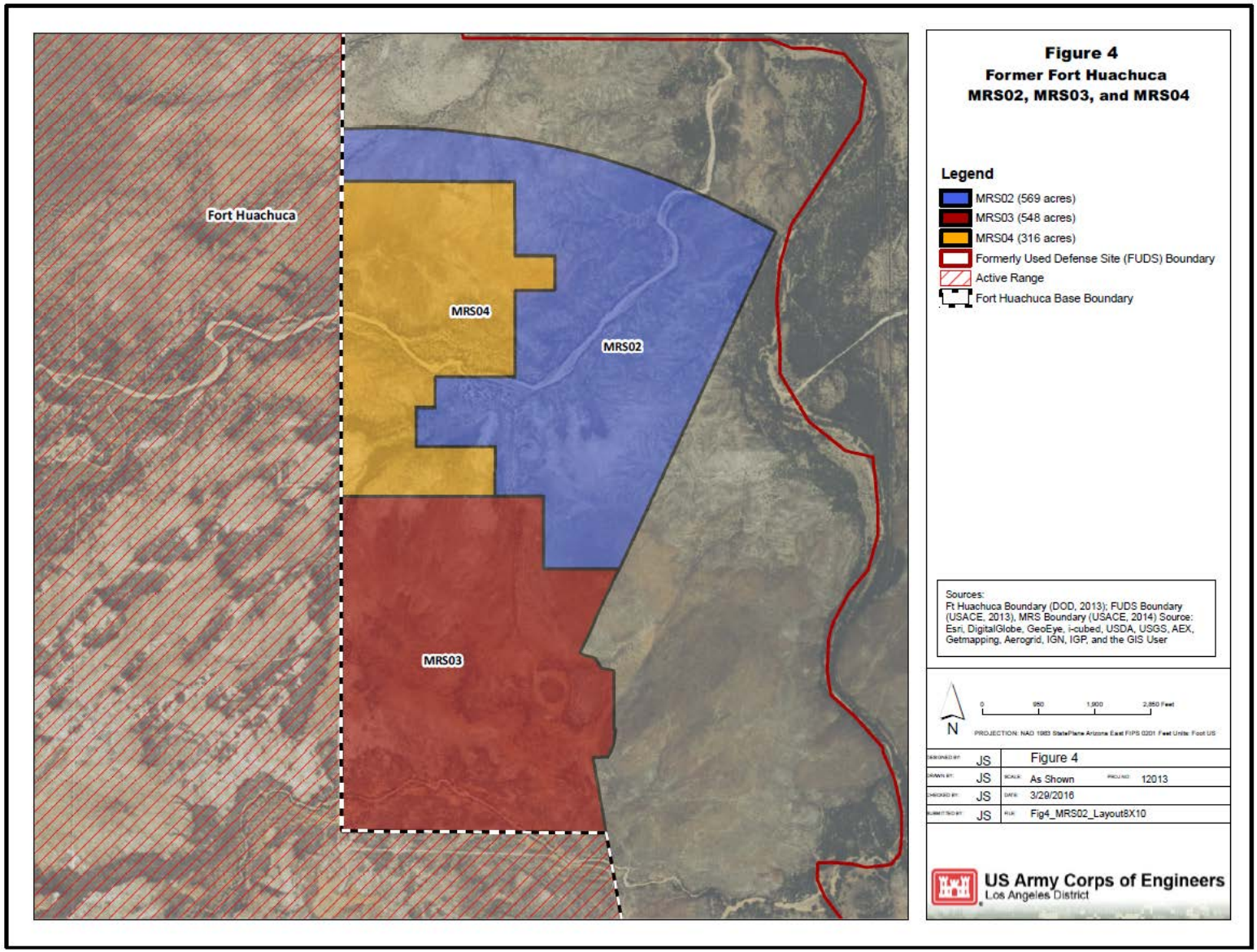


FIGURE 4 – FORMER FORT HUACHUCA MRS02, MRS03, AND MRS04



SITE CHARACTERISTICS

Current and Future Land Use

The **Former Fort Huachuca MRSs** are immediately east of the currently active Fort Huachuca East Artillery Range (East Range) (**Figure 2**). They are comprised of undeveloped rangeland that is currently managed by BLM as SPRNCA (**Figure 2**). This area is considered a Globally Important Bird Area by the Audubon Society. The land is used for recreational activities including birding, hunting, fishing, hiking, and permitted backcountry camping and is accessed using the trailhead located south of **Former Fort Huachuca MRS01**. Projected land use is expected to remain as undeveloped rangeland and a recreational activities area.

Access to **Former Fort Huachuca MRS02, MRS03, and MRS04** from the west is restricted by active Fort Huachuca East Range and the installation fence; however, all four MRSs can be accessed from the east by designated hiking trails that begin at the trailhead located approximately one mile south of **Former Fort Huachuca MRS01**. Campsites were observed during the SI field effort in **Former Fort Huachuca MRS01** (Ref. 8); however, no campsites were observed in either MRS during the RI field operations. According to the BLM website, backcountry camping is allowed within SPRNCA; however, a permit is required. Therefore, there is the potential that recreational users could camp within the MRSs boundaries. Warning signs regarding the potential presence of explosive hazards are posted at the trailhead (Ref. 5).

Topography

Former Fort Huachuca MRS01 (Figure 3) is located within the floodplain of the San Pedro River and is relatively flat in the vicinity of the river with steep terrain on the northern portion of the MRS. The topography slopes gently from the north where the elevation is approximately 4,000 feet above mean sea level (amsl) to the south where the elevation is approximately 3,950 feet amsl. The northern site boundary abuts a steep hillside that reaches an elevation of approximately 4,100 feet amsl.

The topography of western half of **Former Fort Huachuca MRS02, MRS03, and MRS04 (Figure 4)** is relatively flat with slight variation in elevation, but in general, the elevation is between 3,900 and 4,100 feet amsl. The eastern halves of **Former Fort Huachuca MRS02 and MRS04** are characterized by mountainous terrain with volcanic and granitic outcroppings cut by steep valleys. The highest elevation atop a steep cone-shaped mountain on the eastern border of the MRSs is approximately 4,370 feet amsl. Two dry streambeds cross the MRSs from west to east. The northernmost streambed reaches a width of 0.4 miles at its widest point and the stream bank varies from a few feet in height to over 10 feet. The southernmost streambed is narrower with a width of approximately 0.2 miles; however, the stream bank also varies from a few feet to approximately 10 feet in height.

Soils

Underlying the **Former Fort Huachuca MRSs** are Tertiary sediments with some Tertiary-aged volcanic rocks possibly occurring at depths of about 250 to 350 meters (Ref. 10). The sediments consist of a valley fill that is as much as 2,000 feet thick and composed of alkali (sodium or potassium carbonate); thick lake deposits; and sloping layers of silt, sand, clay, and gravel washed down from the surrounding mountains.

Soils of the **Former Fort Huachuca MRSs** consist of deep, well to excessively drained, sandy, silty soils overlaying lake or alluvial deposits. Vertical permeability and available water capacity are both low. Soil runoff is moderate; however, the field teams did observe evidence of sheet flow, which indicates that soil runoff may occur in isolated areas. In addition, the likelihood of soil erosion due to blowing winds is high in sparsely vegetated areas. The soils are typically alkaline with accumulation of some salts. There is little or no potential for frost development in the soil at **Former Fort Huachuca MRSs** (Ref. 11).

Biological Resources

The following subsections describe the biological resources in the vicinity of the **Former Fort Huachuca MRSs**.

Plant Resources

The six major vegetation types in SPRNCA are Chihuahuan Desert scrub, cottonwood-willow riparian corridors, mesquite terraces, sacaton grasslands, rocky outcrops, and cienegas (Ref. 12) (for detailed descriptions, see Section 2.2.1.2 in the *Final RI/FS Report* [Ref. 5]). Vegetation within **Former Fort Huachuca MRS01** is characterized by very dense stands of riparian plants such as cottonwood and tamarisk. **Former Fort Huachuca MRS02, MRS03, and MRS04** vegetation is generally dense with a mixture of mesquite and creosote bushes. Areas of dense vegetation are more common along streams and in the mountainous area on the eastern edge of the MRSs.

Wetlands

USACE regulates wetland uses under the Clean Water Act and requires the use of the 1987 Corps of Engineers Wetlands Delineation Manual for jurisdictional purposes. The USACE manual uses a three-parameter method for identifying wetlands, which requires positive indicators of hydrophytic vegetation, hydric soils, and wetland hydrology. The U.S. Fish and Wildlife Service (USFWS) Wetlands Online Mapper, through the National Wetlands Inventory (NWI) database, was used to identify the wetlands within the **Former Fort Huachuca MRSs**. According to the NWI database, there are two main types of riverine wetland systems on site, which encompass approximately 23.3 acres (See Figure 2-4 in Appendix G, *Final RI/FS Report* [Ref. 5]). These two wetland types are:

- R2USC (1.7 acres) – Riverine, lower perennial, unconsolidated shore, seasonally flooded; and
- R4USJ (21.6 acres) – Riverine, intermittent, unconsolidated shore, intermittently flooded.

Animal Resources

The desert habitat comprising the **Former Fort Huachuca MRSs** provides crucial habitat and movement corridors for a large variety of desert wildlife. Based on the information presented in the following subsections and a review of the U.S. Army Checklist for Important Ecological Places (Ref. 13), the MRSs are considered important ecological places due to the presence of wetlands and critical habitat on sites. The primary purpose for SPRNCA is to protect and enhance the desert riparian ecosystem (home to more than 80 species of mammals, two native species and several introduced species of fish, more than 40 species of amphibians and reptiles,

and 100 species of breeding birds [Ref. 14]). This area is also considered a Globally Important Bird Area by the Audubon Society (Ref. 14).

Special Status Listed Taxa

According to the USFWS Information, Planning, and Conservation System (IPaC) database, one endangered species, the Huachuca water umbel flowering plant (*Lilaeopsis schaffneriana* var. *recurva*), has critical habitat along the San Pedro River within the boundary of **Former Fort Huachuca MRS01**.

Hydrology

The **Former Fort Huachuca MRSs** are located in a desert area that lies within the Basin and Range physiographic province, which is characterized by steep, rugged mountain ranges bounded by broad, gently sloping alluvium-filled valleys or basins. Average annual rainfall ranges from around 4- to 8-inches in the basins with 16-inches of annual precipitation typically along the mountain ranges. Surface water runoff from precipitation events occurs to the northeast via intermittent creek beds and discharges to the San Pedro River, which flows on the eastern boundary of the MRSs and onward to meet the Gila River in Winkelman, Arizona (Ref. 11). The U.S. Geological Survey (USGS) maintained a stream gauge on the San Pedro River, Charleston area that covered a drainage area of 1,234 square miles. The data from this USGS gage station (located 3,945 feet amsl) indicates that the median discharge from 1995 to 1997 was between approximately 4 and 70 cubic feet per second (cfs) with a maximum discharge of approximately 2,000 and a minimum discharge of approximately 1.2 cfs (Ref. 15).

No surface water was observed within **Former Fort Huachuca MRS02, MRS03, and MRS04** by the field teams during the RI field operations; however, drainages for intermittent streams were observed. No standing surface water was observed within **Former Fort Huachuca MRS01**; however, the San Pedro River forms the southeast boundary of the site.

Groundwater

Aquifers in this region often consist of two or more water-bearing units separated by a fine-grained unit that forms a leaky confining layer over the lower basin fill (Ref. 9). The largest source of groundwater in the vicinity of the MRSs is found within the alluvial deposits in the sedimentary basins of the region. Groundwater either occurs in confined or unconfined conditions, depending on the presence of clays or silts overlying the saturated sediments that restrict the normal upward flow of groundwater. Regionally, the depth to groundwater ranges from near land surface around perennial streams to more than 500 feet bgs around the mountain bases in some basins. Recharge to the alluvial aquifer is limited. Groundwater recharge to the aquifer occurs primarily through infiltration of runoff along major streams, infiltration near mountain bases, and from lateral flow from adjacent sedimentary basins (Ref. 11).

Specific depths to groundwater at the **Former Fort Huachuca MRSs** have not been measured, though shallow groundwater may be present due to the sites' proximity to the San Pedro River. Groundwater was not investigated as part of the RI/FS, because no specific releases to groundwater have been documented.

Prehistoric and Historic Cultural Resources

Research conducted for USACE in 2012, confirmed the presence of 11 recorded cultural resources in the **Former Fort Huachuca MRSs**. Four sites are prehistoric in age or have a component dating to the prehistoric era, four sites date to the historical period or have a site component dating to the historical period, and five sites are of unknown temporal and archaeological-cultural affiliations or contain components that are of unknown temporal and archaeological-cultural affiliations. Five of the 11 cultural resources lie within **Former Fort Huachuca MRS01** and 6 of the 11 lie within **Former Fort Huachuca MRS02, MRS03, and MRS04**.

Prior to starting the RI field operations, all personnel involved received resource protection training approved by the USACE and BLM archaeologists. Bristol's archaeologist subcontractor, Statistical Research Inc., (SRI), performed historical records searches (see Section 6.4 in the *Final RI/FS Work Plan* for a detailed summary) and performed oversight during the field effort to ensure the identification and avoidance of cultural resources (Ref. 4).

In general, there were no cultural resources restrictions related to the geophysical work. Any intrusive investigations that took place within the boundaries of cultural resources were coordinated with USACE and BLM prior to intrusive work. No cultural resource concerns were encountered during intrusive work and excavations within sensitive areas were documented by the archaeologist. The documentation associated with this fieldwork has been provided to USACE and BLM under a separate submittal. See Section 2.3 in the *Final RI/FS Report* for a detailed Cultural and Archaeological Resources Overview (Ref. 5).

SUMMARY OF PREVIOUS INVESTIGATION RESULTS

Previous investigations were conducted at the **Former Fort Huachuca MRSs** from 1999 to 2014. Brief summaries of the previous investigations and site visits at the MRSs are provided below.

Inventory Project Report, Fort Huachuca, Cochise County, Arizona. 1999 – The *INPR* delineated the preliminary FUDS boundary, assigned a FUDS project number, and determined the FUDS was eligible for the Defense Environmental Restoration Program (DERP) FUDS program. A preliminary investigation and a site visit were conducted from June 4 to June 6, 1999. The determination of eligibility that designated the site as a FUDS was signed on September 30, 1999 (Ref. 16).

Archives Search Report Findings for Fort Huachuca, Cochise County, Arizona. 2001 – The 2001 *Archives Search Report* (ASR) (Ref. 11) documents a site visit, community interviews, and confirmation of MD findings. In support of the *ASR*, a site visit to Former Fort Huachuca was conducted on March 7, 2001. In addition, USACE, St. Louis District, conducted a historical records search and community interviews. During the site visit, no MEC items were located, but the following items were observed: M15 White Phosphorus grenade fragments; 60 millimeter (mm) and 81mm mortar round fragments; .30-caliber cartridge cases dating from World War II; clips from M1 rifles; fragments from artillery projectiles possibly as large as 8-inch Howitzers; and target debris.

The *ASR* reported that in December 1998, hikers discovered two intact World War II-era 155mm illumination rounds within the FUDS boundary; however, the exact location is unknown. The two rounds were removed by Army Explosive Ordnance Disposal (EOD) personnel (Ref. 8).

Archives Search Report Supplement Fort Huachuca, Cochise County, Arizona. 2004 – In 2004, USACE, St. Louis District, completed the *ASR Supplement* as an addition to the 2001 *ASR*. The *ASR Supplement* identified the two MRSs, assigned a Risk Assessment Code (RAC) score to each MRS, and listed the munitions suspected to have been used at each MRS. It also listed the calculated acreage of the **Former Fort Huachuca MRSs**, which totaled 1,486 acres.

The *ASR Supplement* delineated 53 acres for **Former Fort Huachuca MRS01** and assigned it a RAC score of 5, indicating no risk. The *ASR Supplement* delineated 1,433 acres for **Former Fort Huachuca MRS02** (now delineated as MRS02, MRS03, and MRS04) and assigned it a RAC score of 3, indicating a moderate risk (Ref. 8).

2008 Site Investigation Report Fort Huachuca, Cochise County, Arizona. 2008 – The *Final Site Investigation Report* for Fort Huachuca was completed in January 2008 by USACE, Sacramento District (Ref. 7). The site investigation was conducted primarily on the active Fort Huachuca but included an assessment of **Former Fort Huachuca MRS01** consisting of the collection of three composite surface soil samples, a visual survey, and a magnetometer-assisted survey. No explosives were detected in the surface soil samples, and the analytical results for metals were below selected screening levels. The *Final Site Investigation Report* recommended no further action at **Former Fort Huachuca MRS01** for MEC and MC. The Munitions Response Site Prioritization Protocol score for **Former Fort Huachuca MRS01** was "No Known or Suspected Hazard" (Ref. 7).

Final Site Inspection Report, Fort Huachuca, (FUDS J09AZ106701), Cochise County, Arizona. 2010 – In January 2010, USACE completed the *Final Site Inspection Report* (Final SI Report) for Former Fort Huachuca (Ref. 8). The SI was performed to determine if **Former Fort Huachuca MRS01** or **Former Fort Huachuca MRS02** warranted further evaluation under CERCLA beyond the SI phase, which was done by evaluating each MRS for the presence of MEC, MD, and MC. To accomplish this objective, qualitative reconnaissance and MC sampling were performed at each MRS. Soil samples were collected and analyzed from locations where there was the greatest likelihood of MEC presence or of MC contamination (Ref. 8). The recommendations made for each MRS were based on the analytical results of the samples and the presence or absence of MD and/or MEC identified within each MRS. The following recommendations were made with regard to each MRS (Ref. 8):

- **Former Fort Huachuca MRS01**: Recommendation was to proceed to an RI/FS based on the confirmed presence of small arms MD and the current land use.
- **Former Fort Huachuca MRS02** (now delineated as MRS02, MRS03, and MRS04): Recommendation was to proceed to an RI/FS based on the confirmed presence of MD and MEC and the current land use.

2012 Remedial Investigation / Feasibility Study Site Reconnaissance – Bristol performed a non-intrusive Site Reconnaissance to support the preparation of the *RI/FS Work Plan* on 20-24 May 2012. The Site Reconnaissance included 8.6 line miles of visual survey at **Former Fort**

Huachuca MRS01 and 58.3 line miles of visual survey at **Former Fort Huachuca MRS02**. The goal of this Site Reconnaissance was to better define the terrain and vegetation to support the development of a geophysical survey approach and plan. During the Site Reconnaissance at **Former Fort Huachuca MRS02**, a live 2.36-inch high explosive (HE) anti-tank (HEAT) rocket was identified, in the portion of the MRS now referred to as MRS03, and reported to BLM Law Enforcement. The field team escorted BLM Law Enforcement to the item, and BLM with support from the Cochise County Hazardous Device Squad performed disposal of the rocket. In addition to the live item identified, various types of MD were identified at **Former Fort Huachuca MRS02**; including fragmentation from mortars and artillery rounds, and expended 155mm illumination rounds. No MEC or MD was identified at **Former Fort Huachuca MRS01**.

DERP-FUDS Revised INPR for Property No. J09AZ106701, Fort Huachuca, Fort Huachuca, Arizona. 2014 – In July 2014, USACE revised the *INPR* for the Former Fort Huachuca FUDS (Ref. 6). This revision was primarily an administrative change to realign the existing Military Munitions Response Program (MMRP) project into two separate MMRP projects; one for each MRS. As a result, the existing FUDS project number (J09AZ106701) was assigned to **Former Fort Huachuca MRS01** and a new number (J09AZ106702) was assigned to **Former Fort Huachuca MRS02**, which was also renamed as Artillery, Mortar Ranges and Maneuver Area.

2014 *INPR* revision adjusted / expanded the boundary for **Former Fort Huachuca MRS01** from 53 acres to 72 acres based on the recommendations presented in the 2010 SI. **Figure 3** depicts the revised site boundary.

Munitions Find not related to Investigations – As reported by the *Sierra Vista Herald* on January 1, 2013, the Cochise County Sheriff's Office's bomb technician successfully detonated a 60mm mortar round on December 29, 2012, after it was discovered by a hiker near the old Charleston town site near the San Pedro River. Based on further analysis of the find and discussion with Fort Huachuca Range Control, the item appears to have been found in **Former Fort Huachuca MRS03** near one of the concrete walls that may have been used for targets during past military training. See Section 2.5.8 in the *Final RI/FS Report* for a detailed overview of the 2013 munitions find (Ref. 5).

2016 *INPR* revisions resulted in MRS02 being subdivided into three new MRSs: MRS02, MRS03, and MRS04, which were referred to as MRS02c, MRS02a, and MRS02b, respectively, in the *Final RI/FS Report* (Ref. 5).

SUMMARY OF REMEDIAL INVESTIGATION RESULTS

Remedial Investigation / Feasibility Study Report. 2015 – The RI was performed to characterize the nature and extent of MEC and MC, fill data gaps, and assess potential explosives safety hazards for the **Former Fort Huachuca MRSs**. The FS evaluated remedial alternatives for their ability to reduce the potential explosives safety hazards to property owners and the general public (Ref. 5).

Bristol conducted the RI/FS on behalf of USACE, Los Angeles District, at the **Former Fort Huachuca MRSs**. The RI field work was conducted from October 30, 2013 through January 29, 2014.

The tasks conducted during the MEC and MC characterization effort at the **Former Fort Huachuca MRSs** during the RI included the following: obtaining ROEs; geophysical surveys with man-portable equipment; analog geophysical surveys (also known as real-time mag and dig); Digital Geophysical Mapping (DGM); intrusive anomaly investigations; and environmental sampling to collect data to characterize the nature and extent of potential MEC, MD, potential target areas, and MC.

Soil sampling for MC was performed at selected locations in **Former Fort Huachuca MRS03 and MRS04** where intrusive investigation results indicated potential target areas (the presence of the densest MD and/or MEC). These samples were analyzed to evaluate whether MC (i.e., explosives or selected metals [antimony, barium, copper, lead, nickel, and zinc]) remained at the **Former Fort Huachuca MRSs** as a result of prior military actions and if they would contribute to an environmental risk / hazard to site visitors, agricultural workers, construction workers, residents, recreational users, and trespassers as well as ecological receptors. A background metals survey was conducted to determine the levels of the selected metals naturally occurring in the **Former Fort Huachuca MRS03 and MRS04**.

A detailed description of the RI field operations can be found in Sections 4.1 and 4.2 of the *Final RI/FS Report* (Ref. 5).

Munitions and Explosives of Concern Characterization

Results of the RI field effort for MEC characterization confirmed the munitions information gleaned from past historical use, investigations, and site visits. Recovered MD items and small arms debris in **Former Fort Huachuca MRS01** included fragments from mortars and hand grenades, and small arms projectiles and casings; though, the limited amounts of MD and the distribution of the MD was such that no potential target areas were suspected. Historical data, site conditions indicating DoD use, and the presence and distribution of MD items suggests the use of this area as a maneuver training area.

After the RI field operations were completed, USACE processed an update to the 1999 *INPR* to expand / realign the boundary of **Former Fort Huachuca MRS01** based on the recommendations presented in the 2010 *SI Report* (Ref. 8). As a result, the site acreage was increased from 53 acres to 72 acres as presented in the *2014 INPR* revision (Ref. 6). Additional information regarding the boundary modification is presented in Section 5.2.3 of the *Final RI/FS Report* (Ref. 5).

Recovered MD items and small arms debris in **Former Fort Huachuca MRS02, MRS03, and MRS04** included remnants of various projectiles, expended fuzes, and hundreds of pieces of unidentifiable munitions fragmentation, and small arms projectiles and casings of various sizes. Historical data, site conditions indicating DoD use, and the presence and distribution of MD items suggests the use of portions of **Former Fort Huachuca MRS02, MRS03, and MRS04** as potential target areas and range safety buffer areas, as described below. A complete list of

Unexploded Ordnance (UXO) and MD reported at the site is included in the geophysical report database (see Appendix H of the *Final RI/FS Report* [Ref. 5]).

Based on the results of the RI, **Former Fort Huachuca MRS02** was divided into new MRSs to facilitate the evaluation of the potential hazards to human health posed by the potential presence of MEC in these areas. The three MRSs are based on the density / distribution of MD/UXO across the MRS.

- **Former Fort Huachuca MRS02** consisting of 569 acres was developed because the area has a low density of MD/UXO based on statistical evaluation results of RI data (average density of 9 geophysical targets per acre as described in Section 5.3 of the *Final RI/FS Report*). As no MEC was recovered during field operations and the MD items recovered from the MRS were not of sufficient quantity and distribution to suggest the use of the MRS as a potential target area, the MRS has been delineated as a range safety buffer area.
- **Former Fort Huachuca MRS03** consisting of 548 acres was developed because the area has the highest density of MD/UXO based on statistical evaluation results of RI data (greater than 100 geophysical targets per acre as described in Section 5.3 of the *Final RI/FS Report*). MEC and MD items were recovered in sufficient quantity and distribution to suggest the use of the MRS as a potential target area. This area includes an additional 18 acres along the southeastern portion of the MRS in which MD was observed.
- **Former Fort Huachuca MRS04** consisting of 316 acres was developed because the area has a medium density of MD/UXO based on statistical evaluation results of RI data (50 to 100 geophysical targets per acre as described in Section 5.3 of the *Final RI/FS Report*). Although no MEC was recovered during field operations, MD items were recovered in sufficient quantity and distribution to suggest the use of the MRS as a potential target area.

Refer to Sections 5.2 and 5.3 of the *Final RI/FS Report* for detailed analyses of MEC characterization results for each MRS.

A complete detailed listing of the intrusive results for the project is contained in Appendix H of the *Final RI/FS Report* (Ref. 5). **Table 1**, below, presents a summary of the findings from previous investigations and findings of the RI field effort including UXO items for the MRSs.

Table 1 Historical and Remedial Investigation Findings at Former Fort Huachuca MRSs

Site	Description	Previous Historical Findings	Remedial Investigation Findings
Former Fort Huachuca MRS01	***Charleston Maneuver Area*** The 72-acre range was reportedly used for combat training from approximately January 1944 until July 1946. Only small arms fire is believed to have occurred at, and in the vicinity of, the old Charleston Ruins (also identified as Charleston Combat City). However, the types of munitions used throughout the remainder of the site are not indicated in the historical records.	2001 *ASR*: During the site visit, no MEC items were located, but small arms debris was observed. The *ASR* reported that in December 1998, hikers discovered two intact World War II (WWII)-era 155mm illumination rounds within the FUDS boundary; however, the exact location is unknown. The two rounds were removed by Army EOD personnel.	Both MD and small arms debris were observed at the surface during the performance of analog surveys at **Former Fort Huachuca MRS01**. During the RI field effort the following MD was encountered in this area: • (4) 60mm HE mortar fragments. • (6) 81mm HE mortar fragments. • (3) MkII grenade fragments. • (17) Fragmentation unknown munition type • (20) Assorted small arms debris. Consistent with the Incremental Sampling Approach for this RI/FS, no soil samples were collected at **Former Fort Huachuca MRS01** because no source or potential target area (source of potential MC contamination) was identified during field operations.
Former Fort Huachuca MRS02	***Artillery/Mortar Ranges, Range Safety Buffer Area*** Historical information indicates that **Former Fort Huachuca MRS02**, which encompasses 1,433 acres, consists of three overlapping ranges: Artillery Range (Safety Fan); Mortar Range; and Maneuver Area (Figure 2). The MRS is located on land that was leased from Boquillas from 1943 through 1947; therefore, this is the estimated period of use for this MRS. MD and UXO associated with artillery firing, mortar training, and maneuver training have been identified within the MRS boundary.	The following information is also applicable to MRS03 and MRS04. 2001 *ASR*: During the site visit, no MEC items were located, but the following items were observed: M15 WP grenade fragments; 60mm and 81mm mortar round fragments; .30-caliber cartridge cases dating from WWII; clips from M1 rifles; fragments from artillery projectiles possibly as large as 8-inch Howitzers; and target debris. Refer to MRS01 for *ASR* December 1998 hikers' discovery. 2012 Munitions Finds Not Related to Investigations: The Cochise County Sheriff's Office's bomb technician successfully detonated a 60mm mortar round after it was discovered by a hiker near the old Charleston town site near the San Pedro River. Based on further analysis of the find and discussion with Fort Huachuca Range Control, the item appears to have been found in **Former Fort Huachuca MRS03** near one of the concrete walls that may have been used for targets during past military training. 2012 Site Reconnaissance: Various types of MD were identified at **Former Fort Huachuca MRS02, MRS03, and MRS04**; including fragmentation from mortars and artillery rounds, and expended 155mm illumination rounds.	During the RI field effort the following UXO and MD were encountered in **Former Fort Huachuca MRS02**: • (1) 37mm HE fragments • (1) 57mm AP fragments • (1) 60mm Mortar HE fragments • (4) 155mm Projectile HE fragments • (8) Fuze, M48 fragments • (132) Fragmentation unknown munition type Consistent with the Incremental Sampling Approach for this RI/FS, no soil samples were collected at **Former Fort Huachuca MRS02** because no source or potential target area (source of potential MC contamination) was identified during field operations.
Former Fort Huachuca MRS03	***Artillery/Mortar Ranges, Potential Target Area A*** See MRS02 for site description.	***See MRS02 for a complete summary of previous investigations.*** 2001 *ASR*: During the site visit, no MEC items were located, but the following items were observed: M15 white phosphorous (WP) grenade fragments; 60mm and 81mm	Within **Former Fort Huachuca MRS03**, recovered small arms debris (.30-06 and 7.62-caliber) and MD items including remnants of various projectiles, expended fuzes, and hundreds of pieces of unidentifiable munition fragments are consistent with historical use as an artillery range, a mortar range, and a maneuver area.

Table 1 Historical and Remedial Investigation Findings at Former Fort Huachuca MRSs

Site	Description	Previous Historical Findings	Remedial Investigation Findings
	.	mortar round fragments; .30-caliber cartridge cases dating from WWII; clips from M1 rifles; fragments from artillery projectiles possibly as large as 8-inch Howitzers; and target debris. 2012 Site Reconnaissance: During the Site Reconnaissance at **Former Fort Huachuca MRS03**, a live 2.36-inch HEAT rocket was identified and reported to BLM Law Enforcement. The field team escorted BLM Law Enforcement to the item, and BLM with support from the Cochise County Hazardous Device Squad performed disposal on the rocket.	During the RI field effort the following UXO and MD were encountered in **Former Fort Huachuca MRS03**: • **(2) UXO – 2.36-inch HEAT Rocket and M49A2 HE 60mm Mortar** • (1) 155mm Illumination shell fragments • (3) 2.36-inch Practice Rocket fragments • (7) 37mm HE fragments • (4) 37mm low explosive (LE) fragments • (2) 37mm Practice fragments • (16) 60mm Mortar HE fragments • (29) 81mm Mortar HE fragments • (5) 81mm Mortar WP fragments • (3) 105mm Projectile HE fragments • (2) 155mm Projectile HE fragments • (1) 155mm Shrapnel fragments • (1) 175mm Projectile fragments • (1) Rifle Grenade fragments • (43) Fuze, M48 fragments • (1) Hand Grenade, WP fragments • (1) Hand Grenade, MK 2 fragments • (2,268) Fragmentation unknown munition type Results of the RI MC soil sampling and subsequent risk assessments, indicate there is no indication of explosives constituents release in the MRS03 and no expectation of unacceptable risk to human or ecological receptors from MC metals (*Final RI/FS Report* [Ref. 5]).
Former Fort Huachuca MRS04	***Artillery/Mortar Ranges, Potential Target Area B*** See MRS02 for site description.	***See MRS02 for a complete summary of previous investigations.***	During the RI field effort the following UXO and MD were encountered in **Former Fort Huachuca MRS 04**: • (2) 155mm Illumination shell fragments • (6) Fuze, M48 fragments • (355) Fragmentation unknown munition type Results of the RI MC soil sampling and subsequent risk assessments, indicate there is no indication of explosives constituents release in MRS04 and no expectation of unacceptable risk to human or ecological receptors from MC metals (*Final RI/FS Report* [Ref. 5]).

Munitions Constituents Characterization

During the RI, incremental surface soil sampling for MC was performed at **Former Fort Huachuca MRS03 and MRS04** in selected locations where intrusive investigation results indicated potential target areas (the presence of the densest MD and/or UXO). The sample locations were placed randomly within the potential target areas. Samples were analyzed for explosives (using SW-846 Method 8330B Modified) and selected metals (antimony, barium, copper, lead, nickel, and zinc) (using U.S. Environmental Protection Agency [USEPA] SW-846 Method 6010B, Metals by Inductively Coupled Plasma-Mass Spectrometry). A background metals survey was conducted to determine the levels of the selected metals naturally occurring in the MRS.

Analytical results for explosives were non-detect for all soil samples collected in **Former Fort Huachuca MRS03 and MRS04**.

Analytical results for all the selected metals in soil samples indicated concentrations above laboratory Limits of Detection. The detected concentrations of each metal analyte were compared statistically to background concentrations to determine if a potential release of MC had occurred. For the contaminant concentrations exceeding the background levels, field sample results were compared to the soil screening levels.

None of the metals results exceed the soil screening levels for human health risk; therefore, there is no expectation of potential risk to human receptors from the presence MC in the portions of the **Former Fort Huachuca MRS** that were sampled. Conclusions regarding no potential human health risk were further extrapolated to the unsampled portions of the MRS in accordance with the Incremental Sampling Approach (Appendix M of the *Final RI/FS Report* [Ref. 5]).

Although some metals results from the MC soil sampling exceeded the ecological screening levels for the project, subsequent risk assessments indicate there is no expectation of potential risk to ecological receptors from the presence of MC in the portions of the **Former Fort Huachuca MRS** that were sampled. The results and conclusions were extrapolated to the unsampled portions of the MRS in accordance with the Incremental Sampling Approach.

Refer to Section 5.3 in the *Final RI/FS Report* for a detailed analysis of the soil sampling results. Refer to Section 7.0 in the *Final RI/FS Report* for a description of the ecological risk assessments (Ref. 5).

Remedial Investigation Results / Conclusions

The project objective was to characterize the nature and extent of MEC and MC, fill data gaps, and assess potential explosives safety hazards for the **Former Fort Huachuca MRSs**.

The results of the RI field investigation supported the expectation of the presence of munitions types previously identified as being used on the **Former Fort Huachuca MRSs** in historical records and previous investigations. A detailed summary of the investigation results for **Former Fort Huachuca MRS01** and **Former Fort Huachuca MRS02, MRS03, and MRS04** follows.

Findings of the RI with regard to MEC were as follows:

During the RI, 19.8 lines miles of analog geophysical survey were completed with **Former Fort Huachuca MRS01** and 32.8 lines miles of analog geophysical survey and 53.1 line miles of DGM were completed with **Former Fort Huachuca MRS02, MRS03 and MRS04**.

Former Fort Huachuca MRS01 – Historical records and previous investigations indicated this MRS was used as a combat training area. The **Former Fort Huachuca MRS01** boundary was revised from 53 acres to 72 acres in July 2014 as a programmatic revision to incorporate the area included in the 2008 Site Investigation (19 acres to the south and east of **Former Fort Huachuca MRS01**). The addition of this acreage to the MRS was recommended in the 2010 *SI Report*.

The RI field investigation revealed 30 MD items and 20 small arms debris. The MD fragments were not localized to a specific area and their pattern of distribution does not suggest a potential target area. Historical data, site conditions indicating DoD use, and the presence and distribution of MD items suggest the use of this MRS as a maneuver training area. Refer to **Figure 5** for detailed maps of the density distribution and location of the MD items. The MEC exposure pathway is considered potentially complete for **Former Fort Huachuca MRS01** based on the presence and distribution of MD items. There were no UXO items found at **Former Fort Huachuca MRS01** during RI field operations.

Former Fort Huachuca MRS02 – consisting of 569 acres was developed because the area has a low density of MD/UXO (average density of 9 geophysical targets per acre).

The RI field investigation revealed 147 MD items (including 132 fragmentation of unknown munition type) and various small arms debris (see **Table 1**). These finds are consistent with past use but, because they were not observed in sufficient quantity and distribution, in **Former Fort Huachuca MRS02**, they are difficult to correlate directly to a specific target area. Refer to **Figure 6** for a detailed map of the density distribution and location of the MD items. Current and future land use for **Former Fort Huachuca MRS02** is expected to remain unchanged and continue to be used mainly for recreation purposes. Exposure pathways for human receptors to encounter MEC are considered potentially complete for **Former Fort Huachuca MRS02** where MD has been identified.

Former Fort Huachuca MRS03 –consisting of 548 acres was developed because the area has the highest density of MD/UXO (over 100 geophysical targets per acre). This area includes an additional 18 acres along the southeastern portion of the MRS in which MD was observed.

The RI field investigation revealed 2 UXO items, 2,388 MD items (including 2,268 fragmentation of unknown munition type), and various small arms debris (see **Table 1**). The UXO and MD finds in **Former Fort Huachuca MRS03** are sufficient in quantity and distribution to correlate with potential target areas. Refer to **Figure 7** for a detailed map of the density distribution and location of the UXO and MD items. Current and future land use for **Former Fort Huachuca MRS03** is expected to remain unchanged and continue to be used mainly for recreation purposes. Therefore, exposure pathways for human receptors to encounter MEC are considered potentially complete for **Former Fort Huachuca MRS03** where MEC was

identified and destroyed by detonation during the RI field operations and MD have been identified.

Former Fort Huachuca MRS04 –consisting of 316 acres was developed because the area has a medium density of MD/UXO (50-100 geophysical targets per acre).

The RI field investigation revealed 363 MD items (including 355 fragmentation of unknown munition type) and various small arms debris (see **Table 1**). The MD finds in **Former Fort Huachuca MRS03** are sufficient in quantity and distribution to correlate with potential target areas. Refer to **Figure 8** for a detailed map of the density distribution and location of the MD items. Current and future land use for **Former Fort Huachuca MRS03** is expected to remain unchanged and continue to be used mainly for recreation purposes. Therefore, exposure pathways for human receptors to encounter MEC are considered potentially complete for **Former Fort Huachuca MRS03** where MD has been identified.

Findings of the RI with regard to MC were as follows:

Former Fort Huachuca MRS01 – Based on the results of the RI, no samples were collected within **Former Fort Huachuca MRS01** because no source (MEC and/or potential target area) was observed during the RI field operations. Without a potential source (i.e., MEC or potential target area), all human health and ecological exposure pathways for MC at **Former Fort Huachuca MRS01** are considered incomplete.

Former Fort Huachuca MRS03 and **Former Fort Huachuca MRS04** – Based on the results of the RI, surface soil samples were collected from **Former Fort Huachuca MRS03** and **Former Fort Huachuca MRS04**. Two Decision Units were identified representing two potential target areas. Decision Unit 1 is located with the boundary of **Former Fort Huachuca MRS03** and Decision Unit 2 is located within the boundary of **Former Fort Huachuca MRS04**. In accordance with the Field Chance Request and based on the results of the RI, no samples were collected within **Former Fort Huachuca MRS02** because no source (MEC and/or potential target area) was observed during the RI field operations.

No explosives were detected in soil samples collected from Decision Unit 1 or Decision Unit 2; therefore, there is no indication of explosives constituents release in the MRSs and no explosive constituents have been retained as contaminants of potential concern (COPC).

At Decision Unit 1, mean and median soil concentration of both copper and nickel appear to be elevated compared to background. The metals determined to be above background indicating a release may have occurred were retained as COPCs and further evaluated in screening level risk assessments. None of the metals concentrations exceeded the human health screening criteria. Concentrations for copper and nickel were also below the ecological screening levels. Results from the MC soil sampling, screening, and subsequent risk assessments, indicate there is no expectation of unacceptable risk to human or ecological receptors from the concentrations of metals in the portions of **Former Fort Huachuca MRS03** that were sampled. Samples were collected in areas of the highest density of MEC/MD and areas defined as potential target areas; therefore, the conclusion that there is no unacceptable risk in these areas has been extrapolated to areas where no samples were collected. Refer to Section 5.0 of the *Final RI/FS Report* for a

detailed analysis of the soil sampling results. Refer to Section 7.0 of the *Final RI/FS Report* for a discussion of the ecological risk assessments (Ref. 5).

At Decision Unit 2, antimony, barium, copper and nickel appear to have elevated mean and median soil concentrations compared to background. None of the metals concentrations exceeded the human health screening criteria. Concentrations for barium, copper, and nickel were also below the ecological screening levels; however, antimony results exhibited concentrations that exceeded the ecological screening criteria. A subsequent Screening Level Ecological Risk Assessment for antimony indicated no expectation of unacceptable risks to ecological receptors.

Results from the MC soil sampling, screening, and subsequent risk assessments, indicate there is no expectation of unacceptable risk to human or ecological receptors from the concentrations of metals in the portions of **Former Fort Huachuca MRS04** that were sampled. As sample locations were collected in areas of the highest density of MEC/MD and are defined as potential target areas, the conclusion that there is no unacceptable risk in these areas has been extrapolated to areas where no samples were collected. Refer to Section 5.0 of the *Final RI/FS Report* for a detailed analysis of the soil sampling results. Refer to Section 7.0 of the *Final RI/FS Report* for a discussion of the ecological risk assessments (Ref. 5).

FIGURE 5 – RESULTS OF THE INVESTIGATIONS AT FORMER FORT HUACHUCA MRS01

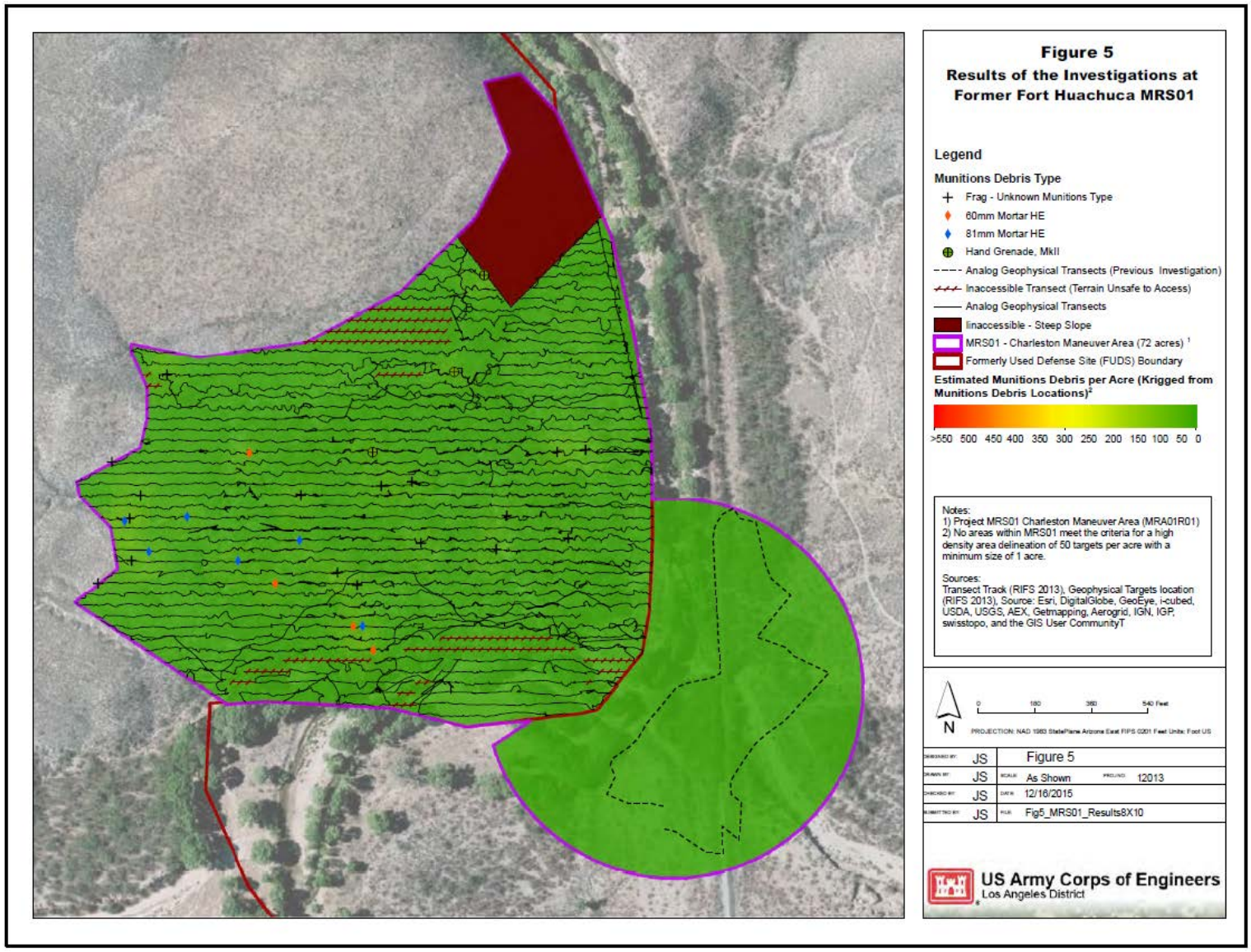


FIGURE 6 – RESULTS OF THE INVESTIGATIONS AT FORMER FORT HUACHUCA MRS02

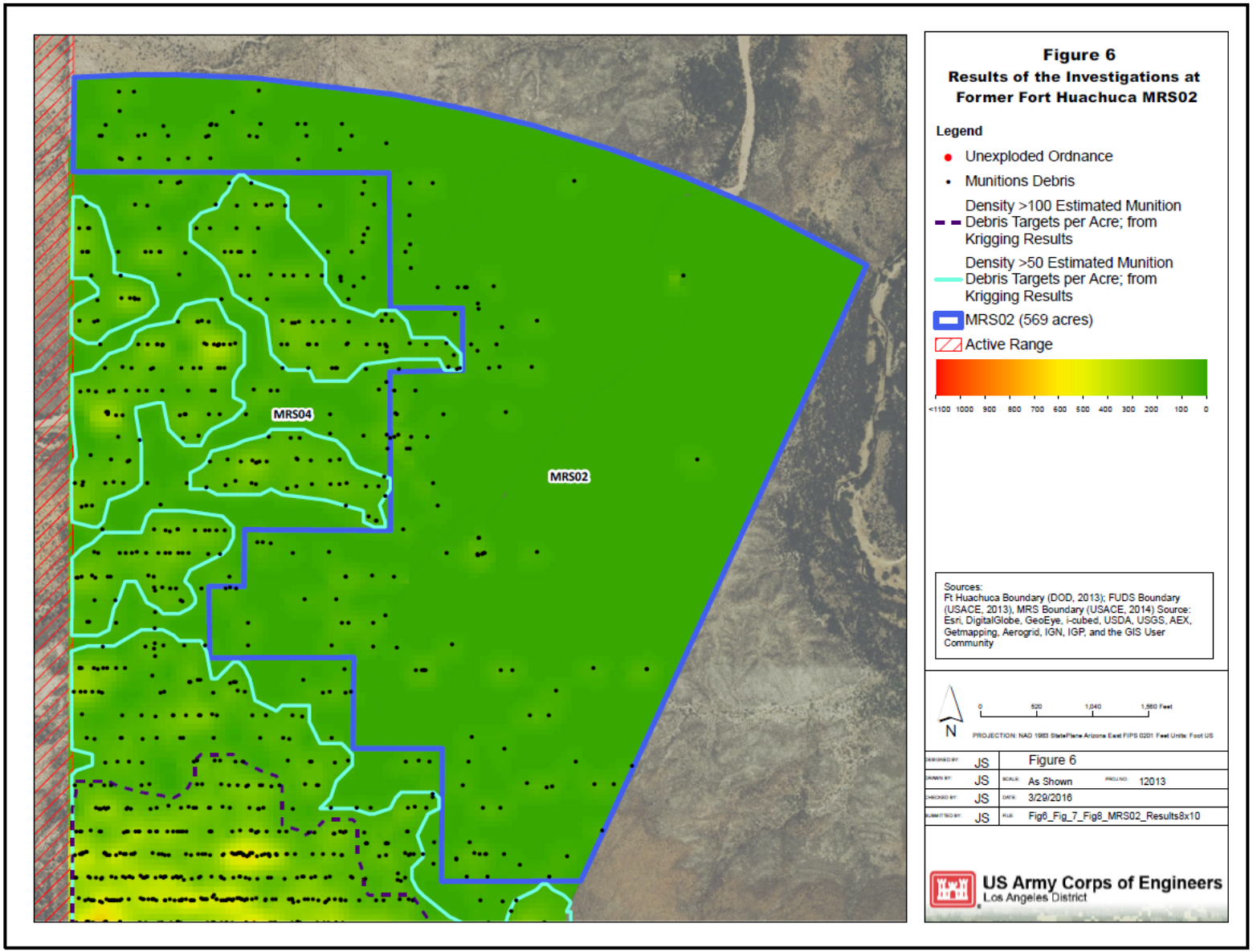


FIGURE 7 – RESULTS OF THE INVESTIGATIONS AT FORMER FORT HUACHUCA MRS03

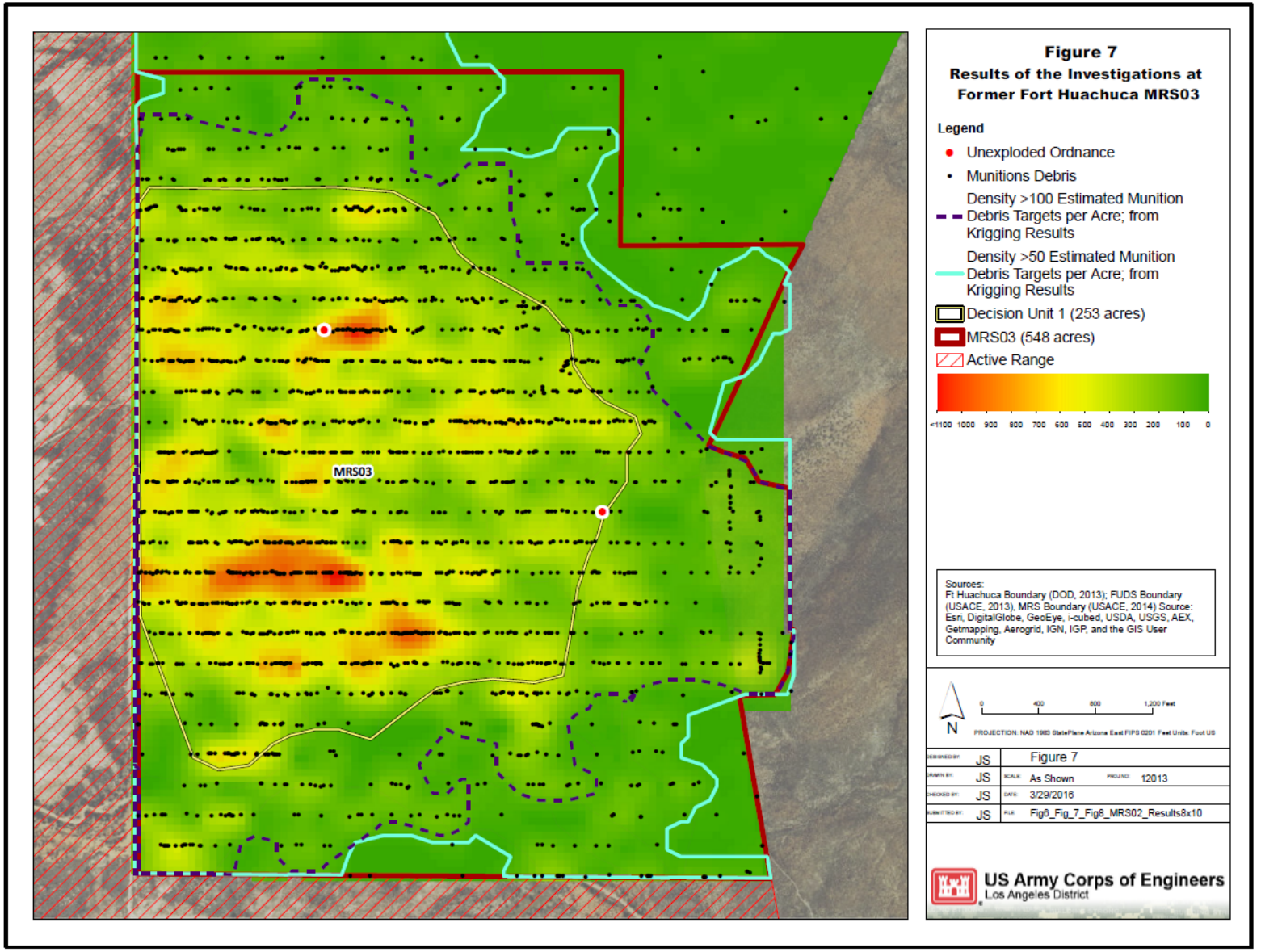
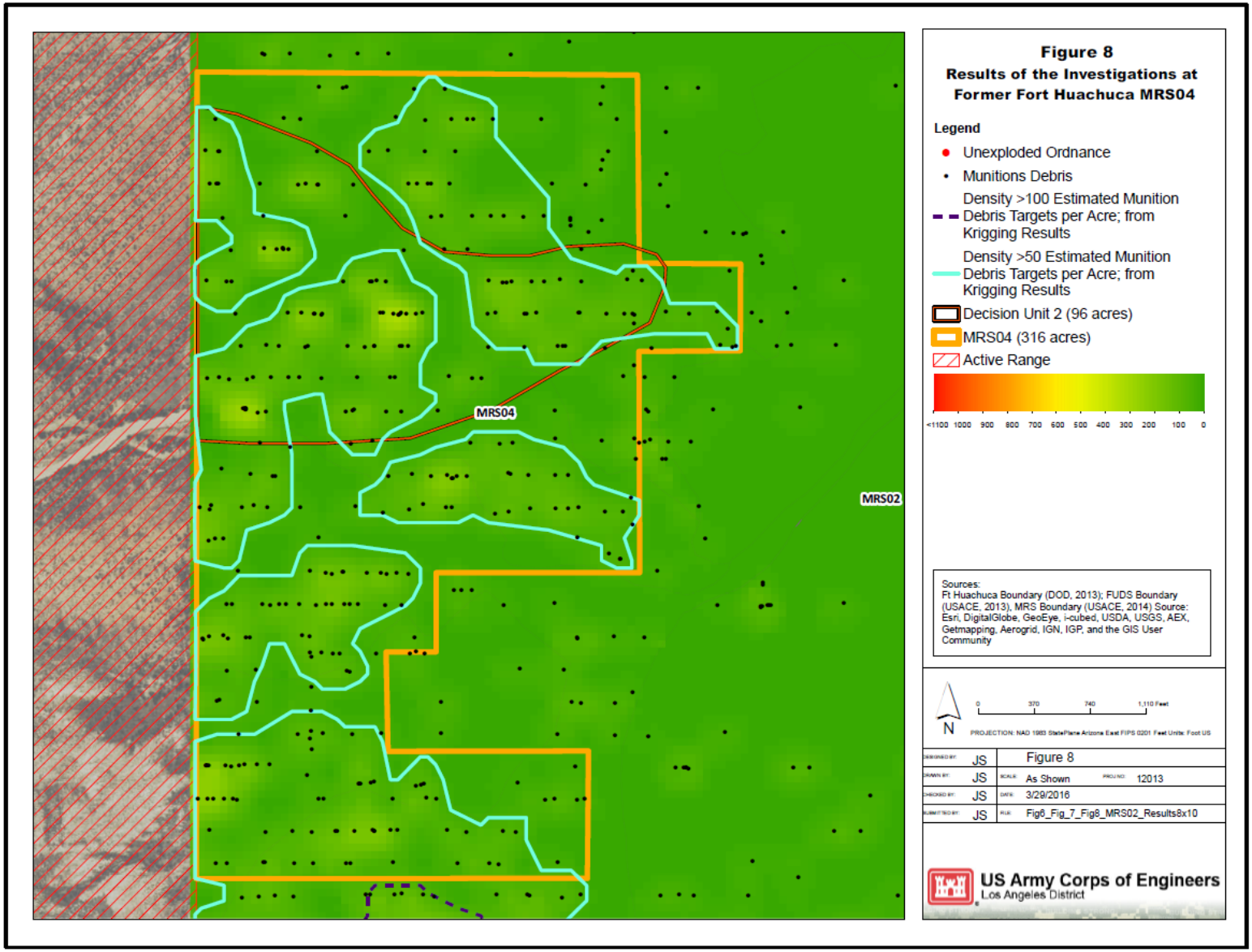


FIGURE 8 – RESULTS OF THE INVESTIGATIONS AT FORMER FORT HUACHUCA MRS04



SCOPE AND ROLE OF THE RESPONSE ACTION

USACE is developing a response plan and/or action to address contaminants at the **Former Fort Huachuca MRSs**. The scope of the response action is to address the potential explosive safety hazard posed by the potential presence of MEC at the **Former Fort Huachuca MRSs**, ultimately removing or reducing such hazard for the current and future site users.

The alternatives being presented in this Proposed Plan complement USACE's overall strategy, following the USEPA guidance, for addressing MEC at the property and allowing for the current use of the land to continue.

SUMMARY OF POTENTIAL SITE RISKS / HAZARDS

Results of the RI MC soil sampling, analytical result screening, and subsequent risk assessments, indicate there is no indication of explosives constituents release in the MRS and no expectation of unacceptable risk to human or ecological receptors from MC metals. Detailed information on analytical results can be found in the *Final RI/FS Report* (Ref. 5).

Former Fort Huachuca MRSs were assessed using the USEPA MEC Hazard Assessment (MEC HA) based on the results of the RI and the historical information available from prior studies. For a detailed summary of the MEC HA scoring, see Section 7.1.6 and Appendix J in the *Final RI/FS Report* (Ref. 5).

REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAO) drive the formulation and development of response actions. The aim is to achieve the USEPA's threshold criteria of "Overall Protection of Human Health and the Environment" and "Compliance with Applicable or Relevant and Appropriate Requirements."

Because no evidence of MC release related to historical DoD operations was found within the **Former Fort Huachuca MRSs**, the RAOs do not address chemical contamination and, instead, focus on MEC-related explosive safety hazards. Unlike RAOs for most hazardous chemical contaminants, for which cleanup levels have been set by USEPA or state agencies based on a specified acceptable risk, at present no regulatory guidelines have been promulgated specifying an acceptable hazard level associated with MEC contamination.

RAOs address specific goals for reducing the explosive hazards for MRSs to ensure protection of human health and the environment. One factor that is considered in the RAOs is the depth of intrusion that is anticipated within the MRS based on current and future land uses and the depth to which UXO may be present. It is not anticipated that current or future land uses within the MRSs will exceed an intrusive depth of two feet bgs. The depths to which various potential MEC may be present are based on previous investigations and are tabulated in **Table 2**.

Table 2 Potential MEC Summary for Former Fort Huachuca MRSs

Former Fort Huachuca MRSs				Potential MEC	Description[1]	Maximum Depth For Items Recovered During RI Field Operations
MRS01	MRS02	MRS03	MRS04			
		✓		2.36-inch HEAT Rocket	Rocket Motor, 2.36-inch (M7 Propellant, Igniter, Electric Squib) Rocket, Warhead (Pentolite) Fuze, Rocket, Base Detonating (Tetryl, Primer Mixture)	UXO (0-3 inches bgs)
		✓		M49A2 HE 60mm Mortar	Fuze, Projectile, Point Detonating (Booster, Detonator) Projectile (TNT) Propelling Assembly (Propellant, M9, Black Powder, Primer Mix No.70, Propellant, M8)	UXO (0-3 inches bgs)
✓	✓	✓		M49A2 60mm HE Mortar	Fuze, Projectile, Point Detonating (Booster, Detonator) Projectile (TNT) Propelling Assembly (Propellant, M9, Black Powder, Primer Mix No.70, Propellant, M8)	MD (0-3 inches bgs)
✓		✓		M43 81mm HE Mortar	Fuze, Projectile, Point Detonating (RDX, Tetryl) Projectile (TNT or Comp B) Propelling Assembly (Propellant, M9, Black Powder, Primer Mix No.70, Propellant, M8)	MD (0-3 inches bgs)
✓		✓		MkII Hand Grenade	Filler (Smokeless powder-Nitrocellulose, Potassium nitrate, Barium nitrate)	MD (surface)
	✓	✓		M63 37mm HE	Filler (TNT)	MD (0-2 inches bgs)
	✓			M70 57mm AP	Filler (Comp B)	MD (surface)
	✓			M107 155mm Projectile HE	Fuze, Projectile, Point Detonating (Black Powder, Tetryl, TNT) Projectile, 155mm, HE (Comp B or TNT or 50/50 Amatol)	MD s (surface)
	✓	✓	✓	Fuze, M48	Fuze, Projectile, Point Detonating (Booster, Detonator, Primer Mixture, Relay)	MD (0-8 inches bgs)
		✓	✓	M118 155mm Illumination shell	Fuze, Projectile, Point Detonating (Delay Element, Detonator) Fuze, Projectile, Mechanical Time Super Quick [MTSQ] (Primer Mixture, Lead Charge, Relay Charge)	MD (0-24 inches bgs)
		✓		2.36-inch Practice Rocket	Rocket Motor, 2.36-inch (M7 Propellant, Igniter, Electric Squib) Rocket, Warhead (Plaster)	MD (0-3 inches bgs)

Table 2 Potential MEC Summary for Former Fort Huachuca MRSs

Former Fort Huachuca MRSs				Potential MEC	Description[1]	Maximum Depth For Items Recovered During RI Field Operations
MRS01	MRS02	MRS03	MRS04			
		✓		MkIIA1 37mm LE	Cartridge Case (FHN Powder) Fuze, Projectile, Base Detonating (Tetryl) Projectile, 37mm, Practice [LE] (Black Powder)	MD (1-2 inches bgs)
		✓		M57 81mm Mortar WP	Fuze, Projectile, Point Detonating (RDX, Tetryl) Projectile, 81mm, Smoke, WP (White Phosphorus, Tetryl) Propelling Assembly (Propellant, M9, Black Powder, Primer Mix No.70, Propellant, M8)	MD (0-3 inches bgs)
		✓		M1 105mm Projectile HE	Cartridge Case (Propelling Charge, Primer Mixture) M48 Fuze, Projectile, Point Detonating (Booster, Detonator, Primer Mixture, Relay) M51 Fuze, Projectile, Point Detonating (Primer Mixture, Tetryl) Projectile, 105mm, HE (Comp B or TNT or 50/50 Amatol)	MD (0-6 inches bgs)
		✓		M107 155mm Projectile HE	Fuze, Projectile, Point Detonating (Black Powder, Tetryl, TNT) Projectile, 155mm, HE (Comp B or TNT or 50/50 Amatol)	MD (surface)
		✓		Mk I 155mm Shrapnel	Shrapnel Filler (Expelling Charge, Lead Balls, Primer Mixture) Fuze, Time (Black Powder, Primer Mixture) Propellant (Igniter, Primer Mixture, Propellant)	MD (0-1 inches bgs)
		✓		M437 175mm Projectile	Fuze, Projectile, Point Detonating (Booster, Detonator, Primer Mixture, Relay) Filler (TNT or Comp B)	MD (surface)
		✓		M9A1 Rifle Grenade	Pentolite, Lead azide, TNT, Tetryl	MD (surface)
		✓		M15 Hand Grenade, WP	Fuze, Pyrotechnic Delay (Delay, Detonator, Primer Mixture Filler (WP)	MD (surface)

[1] Specific nomenclature regarding recovered UXO and MD is not universally available from investigations; therefore, a best-match determination is made from the current Fragmentation Database (dated September 22, 2015).

No regulatory guidelines have been promulgated specifying an acceptable risk level associated with UXO contamination. In lieu of such guidelines, the acceptable risk level is defined herein as achieving any one of the acceptable end-states described below. Each is developed for the protection of human health and the environment at Fort Huachuca MRSs and is based on the current Conceptual Site Model (CSM), which depicts the relationship between potential site hazards, pathways for receptors to encounter hazards, and potential current and future human and ecological receptors. The acceptable end states correspond to the intent of the RAOs (presented in the approved Final RI/FS Report): to prevent human interaction with surface UXO (if present) (MRS01) and surface and subsurface UXO, to a depth of two feet bgs, (if present) (MRS02, MRS03, and MRS04). The remedial action should be implemented without disturbing sensitive environments (e.g., culturally significant sites, habitat and/or identified endangered species), as appropriate. During the development of this Proposed Plan, each alternative has been evaluated against the end states to determine if it meets the proposed RAOs.

- Acceptable end state #1: If a physical search for UXO is performed over 100% of the MRS and the vertical CSM (see Note below) for all recovered UXO is within the reliable detection depth ranges for each specific munitions type (**Table 2**), then the likelihood of a potential UXO encounter is negligible. Based on the post remediation data analysis, this end state may achieve Unlimited Use / Unrestricted Exposure (UU/UE).
- Acceptable end state #2: If a physical search for UXO is performed over all accessible areas with the same vertical findings as #1, but the horizontal UXO distribution indicates UXO may exist under inaccessible areas (e.g., [1] where existing slope / terrain make portions of the site inaccessible to remedial action field personnel, [2] where dense vegetation is impenetrable to field personnel and equipment, [3] where impacts to the desert riparian ecosystem protected by SPRNCA exceed limitations imposed upon field operations by project stakeholders during the remedial action development phase, and/or [4] where impact upon cultural resources would force field operations out of compliance with ARARs [i.e., Archaeological Resources Protection Act]), then user behavior modification is required to achieve a low likelihood a user would be seriously injured during a potential UXO encounter.
- Acceptable end state #3: If a physical search is performed but the vertical CSM for one or more recovered UXO extends deeper than the reliable detection depth range for that specific munition type (**Table 2**), then user behavior modification is required to achieve a low likelihood a user would be seriously injured during a potential UXO encounter.
- Acceptable end state #4: If a physical search is performed in lifts to a depth that illustrates all UXO can be detected to two feet bgs, then the likelihood a UXO remains in the top two feet is negligible.
- Acceptable end state #5: If all previous investigations indicate that the likelihood a UXO remains is negligible, but MD has been recovered at the site (in a quantity / distribution such that no potential target areas are suspected), then user behavior modification is required to achieve a low likelihood a user would be seriously injured during a potential UXO encounter.

Note: The vertical CSM provides a detailed description of the munitions types suspected at an

MRS, including the maximum vertical depth at which munitions items may be expected to be present. It also depicts the potential vertical distribution of MEC/MD compared with historical depths of detections for recovered MEC/MD at the MRS, depth of detection of geophysical survey equipment, and depth of detection of advanced classification equipment. Section 5 of the *Final RI/FS Report* provides a distribution and vertical depth of MEC and MD identified during field activities (for detailed descriptions, see Sections 5.2 and 5.3 in the *Final RI/FS Report* [Ref. 5]).

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Section 121(d) of CERCLA [42 USC §9621(d)] states that remedial actions on CERCLA sites must comply with or waive any Applicable or Relevant and Appropriate Requirements (ARAR), which include regulations, standards, criteria, or limitations promulgated under federal environmental, or more stringent state environmental or state facility siting laws. An ARAR may be either applicable or relevant and appropriate, but not both. Substantive requirements of laws and regulations may be designated as ARARs for on-site response actions, but administrative requirements (such as permits or recordkeeping) are not ARARs for on-site response actions.

ARAR identification considers a number of site-specific factors, including the potential remedial action, chemicals at the site, site physical characteristics, and site location. ARARs are generally divided into three categories: chemical-specific, location-specific, and action-specific. The results of the evaluation of potential ARARs for the **Former Fort Huachuca MRSs** are:

Chemical-Specific Applicable or Relevant and Appropriate Requirements

No chemical-specific ARARs have been identified for the **Former Fort Huachuca MRSs**.

Location-Specific Applicable or Relevant and Appropriate Requirements

These ARARs are triggered by the particular location and the proposed remedial activity at the site. Some of these requirements govern activities in certain environmentally sensitive areas. Location-specific ARARs for the **Former Fort Huachuca MRSs** include:

1. ***Endangered Species Act***, 16 USC §1538(a). Prohibits actions that take any species within the United States or the territorial seas of the United States, with take being defined at §1532(19) as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Applicable because critical habitat is identified within **Former Fort Huachuca MRS01**. (Refer to Section 2.2 in the *Final RI/FS Report* for further detail on the extent and type of critical habitat as mapped by the USFWS [Ref. 5]). Note: This ARAR is only associated with critical habitat within **Former Fort Huachuca MRS01**.

2. ***Archaeological Resources Protection Act***, 16 USC §470ee(a). Requires protection of archaeological resources, if discovered. Applicable if remedial activities uncover or disturb cultural resources. Various culturally significant sites are known to exist within the MRSs. May not excavate, remove, damage, or otherwise alter or deface such resources.

Action-Specific Applicable or Relevant and Appropriate Requirements

No action-specific ARARs have been identified for the **Former Fort Huachuca MRSs**.

SUMMARY OF REMEDIAL ALTERNATIVES

To satisfy the RAO, USACE has developed and conducted a detailed analysis of the following four remedial alternatives for the **Former Fort Huachuca MRSs**:

Alternative 1: No Action.

The No Action Alternative assumes no remedial action would be taken to address potential MEC explosive safety hazard for those receptors identified in the RI. No response actions would be taken under Alternative 1; therefore, compliance with the ARARs is not applicable. This alternative is provided as a potential stand-alone alternative and as a baseline for comparison with the other remedial alternatives, as required under CERCLA and the NCP.

Alternative 2: Institutional Controls to Protect Current and Future Site Users.

This alternative assumes that Institutional Controls (IC) would be implemented without MEC removal to address potential hazards associated with intrusive activities (for example, digging, construction, etc.). Alternative 2 would have no affects to cultural and environmental resources; therefore, compliance with the ARARs is not applicable.

ICs are measures undertaken to limit public exposure to residual explosive materials. These measures will include munitions awareness educational programs and printed media awareness programs. Behavior modification depends on the awareness and personal responsibility of the site user. There is negligible potential risk / hazard to a potential receptor if the individual's behavior is appropriate for the site conditions.

ICs considered for the **Former Fort Huachuca MRSs** are listed below:

1. ***Munitions Awareness Educational Program***: A munitions awareness educational program will be implemented by BLM with support from USACE to inform the public about potential hazards associated with the **Former Fort Huachuca MRSs**, facilitating people modifying their behavior through awareness (Ref. 19). Behavior modification is dependent upon the awareness and personal responsibility of the public who have access to the areas of concern. If members of the public are receptive to the awareness programs and willing to modify their behavior appropriately for site conditions, then the risk of exposure to potential explosive hazards can be reduced significantly.

   Munitions awareness and education, acknowledgement of the potential explosive safety hazard involved, and reinforcement of the message will minimize the risk of exposure to potential explosive hazards. The avenue for this education and awareness of MEC is through printed media in the form of brochures and fact sheets in information packages provided and distributed by BLM (Ref. 19). The packages will be made available to the public at the BLM offices in Tucson, the SPRNCA visitor center and BLM trailheads.

2. ***Emergency Contact Information****:* A related communications tree including emergency contact information will be developed by USACE for inclusion in educational awareness materials.

Alternative 3: Munitions and Explosives of Concern Removal from the Surface with Institutional Controls to Protect Current and Future Site Users.

This alternative consists of utilizing specialized UXO personnel to search for and remove any MEC that is visible in part or completely on the surface. Where needed, instrumentation will be used to aid detection of surface MEC in vegetated areas. During the search, qualified UXO personnel will mark each MEC item for removal or disposal. In addition to removal or destruction of MEC, metallic debris would be collected and removed from the site for disposal. Upon completion of the surface removal, ICs as presented in Alternative 2 would be implemented. A surface clearance combined with ICs, discussed in Alternative 2, would provide a broad management strategy. Alternative 3 could affect cultural and natural resources. However, implementation of the alternative could be designed to prevent impact to resources and allow compliance with ARARs. If necessary, archaeologists and/or biologists would be present during any potential activities that may be required in sensitive areas. Coordination with State and Federal agencies during planning stages would lay out site-specific measures to be implemented during clearance activities including areas that may need to be avoided or have restrictions on amount of disturbance that may occur to facilitate surface clearance activities.

Alternative 4: Digital Geophysical Mapping and Surface / Subsurface Removal of Munitions and Explosives of Concern (to a depth of 2 feet bgs) with Institutional Controls to Protect Current and Future Site Users.

This alternative consists of civil surveying, vegetation clearance, surface clearance (as discussed in Alternative 3), DGM, and subsurface removal of MEC. Removal depth would be to a depth of less than two feet as this is the approximate depth at which BLM activities may occur. It is anticipated that the majority, but not all, of the MEC would be detected and removed. Alternative 4 could affect cultural and natural resources. However, implementation of the alternative could be designed to prevent impact to resources and allow compliance with ARARs. If necessary, archaeologists and/or biologists would be present during any potential activities that may be required in sensitive areas. Coordination with State and Federal agencies during planning stages would lay out site-specific measures to be implemented during clearance activities including areas that may need to be avoided or have restrictions on amount of disturbance that may occur to facilitate surface and subsurface clearance activities.

Implementation of this alternative would require reduction and/or removal of vegetation that may impede or limit the effectiveness of the DGM equipment and subsurface removal actions. Upon completion of the civil surveying and vegetation clearing, a surface clearance will be required to remove any MD and other metallic items located on the surface that would interfere with the DGM, thus enhancing the discrimination capability of the geophysical surveying equipment. Any MEC items encountered during the surface sweep will be disposed of appropriately. Metallic debris will be taken off site and turned in to a scrap metal recycler for final disposition.

Once the surface clearance is complete, DGM will be performed on the entire site to identify any subsurface magnetic anomalies. The DGM data will be analyzed by a qualified geophysicist to identify all the potential targets. The DGM data will also provide a permanent record of the geophysical surveying results conducted in these areas. The potential targets will then be provided to the specialized UXO teams to be re-acquired and intrusively investigated, removed, and disposed of appropriately. Upon completion of the surface and subsurface removal, ICs as presented in Alternative 2 would be implemented.

Long-term Management

While not a component of the evaluated remedial alternatives, Long-term Management in the form of Five-Year Reviews may be implemented depending on the chosen alternative. Five-Year Reviews, as outlined in §121(c) of CERCLA (as amended by the Superfund Amendments and Reauthorization Act) and in §300.430 (f) (ii) of the NCP, are required for sites (at least every five years) where hazardous substances, pollutants, or contaminants remain at or above levels that allow unlimited use and unrestricted exposure following the completion of a remedy. Five-Year Reviews are conducted by USACE to: (1) ensure that public health, safety, and the environment are being protected by the response actions implemented; and (2) determine if new information has become available that may warrant further action.

Waste Associated with Alternative Selection

The only waste expected from the implementation of Alternatives 3 and 4 is scrap metal. All scrap metal would be thoroughly inspected to ensure there is no residual explosive hazard and shipped to a local metals recycler.

EVALUATION OF ALTERNATIVES

Nine required criteria were used to evaluate the four remedial alternatives individually and against each other in order to select a remedy. This section of the Proposed Plan presents the relative performance of each alternative against the nine criteria, noting how each alternative compares to the other options under consideration.

The nine criteria fall into three groups: threshold criteria, primary balancing criteria, and modifying criteria (Ref. 17). The purposes of these three groups are provided below.

- Threshold criteria (criteria 1 and 2 below) are requirements that each alternative must meet in order to be eligible for selection.
- Primary balancing criteria (criteria 3 through 7 below) are used to weigh major trade-offs among alternatives.
- Modifying criteria (criteria 8 and 9 below) may be considered to the extent that information is available during the FS, but can be fully considered only after public comment is received on the Proposed Plan.

The nine evaluation criteria are discussed below. The “Detailed Analysis of Alternatives” can be found in the FS.

1. Overall Protection of Human Health and the Environment – Considers ability to eliminate, reduce, or control threats to public health and the environment.

2. Compliance with Applicable or Relevant and Appropriate Requirements – For an alternative to become eligible for selection it must meet cleanup levels or other remedial requirements identified as ARARs, or a waiver should be identified and the justification for invoking it must be provided. An alternative that cannot comply with these ARARs, or for which a waiver cannot be justified, would be eliminated from consideration for further discussions as a potential alternative in the Proposed Plan.

3. Long-Term Effectiveness and Permanence – The ability to maintain protection of human health and the environment over time.

4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment – Use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

5. Short-term Effectiveness – The length of time needed to implement an alternative and the hazards posed to site visitors, agricultural workers, construction workers, residents, recreational users, and trespassers, and the environment during implementation.

6. Implementability – The technical and administrative feasibility to implement the alternative, including factors such as the relative availability of goods and services.

7. Cost – Estimated cost for implementing the alternative.

8. State / Support Agency Acceptance – Considers whether ADEQ agrees with USACE's analyses and recommendation based on the RI/FS and Proposed Plan.

9. Community Acceptance – Considers whether the local community agrees with the USACE's analyses and Preferred Alternative. Public comments on the Proposed Plan are an important indicator of community acceptance.

The four remedial alternatives developed for the **Former Fort Huachuca MRSs** were evaluated and compared to the nine criteria specified above based on the following publications: the United States Army Military Munitions Response Program *Munitions Response Remedial Investigation / Feasibility Study Guidance* (Ref. 18) and the USEPA *Guidance for Conducting Remedial Investigations and Feasibility Studies under Comprehensive Environmental Response, Compensation, and Liability Act* (Ref. 17).

The detailed analysis of alternatives may be thought of as proceeding in two steps: 1) a detailed evaluation of each alternative relative to the nine USEPA criteria; and 2) evaluation of the remedial alternatives relative to each other, based on their ability to achieve the evaluation criteria. A detailed comparison of each alternative to the nine criteria may be found in the *Final RI/FS Report*.

During the detailed analysis, the alternatives are refined, as appropriate, and analyzed in detail with respect to the evaluation criteria. The detailed analysis of alternatives consists of the analysis and presentation of the relevant information needed to allow decision makers to select a site remedy. However, it is not the decision making process. The results of this detailed analysis of alternatives are used to compare the alternatives and identify the key tradeoffs among them. This approach to analyzing alternatives is designed to provide decision makers with sufficient information to adequately compare the alternatives, select an appropriate remedy for a site, and demonstrate satisfaction of CERCLA requirements.

The *Final RI/FS Report* provides a comprehensive analysis of the remedial alternatives for the **Former Fort Huachuca MRSs** based on the alternative's ability to achieve the nine evaluation criteria specified in the United States Army and USEPA guidance documents (Refs. 17 and 16). A more detailed description of the analyses summarized in the tables below can be found in the following sub-sections of the *Final RI/FS Report*:

- MRS01: Section 11.2.1 (Individual Analysis) / Section 11.3.1 (Comparative Analysis);
- MRS02: Section 11.2.4 (Individual Analysis) / Section 11.3.4 (Comparative Analysis);
- MRS03: Section 11.2.2 (Individual Analysis) / Section 11.3.2 (Comparative Analysis); and
- MRS04: Section 11.2.3 (Individual Analysis) / Section 11.3.3 (Comparative Analysis).

The comparative analysis is provided specifically to discuss the strengths and weaknesses of the four alternatives with regard to each other within different MRSs. A summary of the comparison of alternatives relative to each other is provided in **Table 3** for **Former Fort Huachuca MRS01, Table 4** for **Former Fort Huachuca MRS02, Table 5** for **Former Fort Huachuca MRS03**, and **Table 6** for **Former Fort Huachuca MRS04**. In addition during the development of this Proposed Plan, the alternatives were evaluated relative to the acceptable end states to determine their effectiveness for achieving the RAO for each MRS.

TABLE 3 EVALUATION OF REMEDIAL ALTERNATIVES FORMER FORT HUACHUCA MRS01

Evaluation Criteria	Remedial Alternatives			
	Alternative 1 – No Action.	**Alternative 2** – Institutional Controls to Protect Current and Future Site Users.	**Alternative 3** – Munitions and Explosives of Concern Removal from the Surface with Institutional Controls to Protect Current and Future Site Users.	**Alternative 4** – Digital Geophysical Mapping and Surface / Subsurface Removal of Munitions and Explosives of Concern (to a depth of 2 feet bgs) with Institutional Controls to Protect Current and Future Site Users.
Overall Protection of Human Health and the Environment	□	■	■	■
Compliance with Applicable or Relevant and Appropriate Requirements	N/A	■	■	■
Long-term Effectiveness and Permanence	□	♦	♦	◘
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment	□	□	♦	◘
Short-term Effectiveness	□	◘	♦	♦
Implementability	◘	◘	♦	♦
Cost	$0	**$53,312**	$1,059,731	$2,091,239
State Acceptance	To Be Determined (TBD)	TBD	TBD	TBD
Community Acceptance	TBD	TBD	TBD	TBD
RAO Acceptable End State*	N/A	#5	#1, #2	#1, #2

Note:

Ranking: ■ Meets Criteria (i.e., Yes, regarding the first two criteria)
◘ High ability to meet criteria
♦ Moderate ability to meet the criteria
□ Does not meet criteria (i.e., No, regarding the first two criteria)
N/A: Not Applicable
TBD: These criteria will be further evaluated following the comment period for the Proposed Plan.
Preferred Alternative is highlighted and cost is **Bold Underline**.

The estimated costs include costs for operations and maintenance and those for printed educational media (including escalation).
*See RAO Section (pgs. 28-32) for descriptions of the acceptable end states.

**TABLE 4 EVALUATION OF REMEDIAL ALTERNATIVES
FORMER FORT HUACHUCA MRS02**

Evaluation Criteria	Remedial Alternatives			
	Alternative 1 – No Action.	**Alternative 2** – Institutional Controls to Protect Current and Future Site Users.	**Alternative 3** – Munitions and Explosives of Concern Removal from the Surface with Institutional Controls to Protect Current and Future Site Users.	**Alternative 4** – Digital Geophysical Mapping and Surface / Subsurface Removal of Munitions and Explosives of Concern (to a depth of 2 feet bgs) with Institutional Controls to Protect Current and Future Site Users.
Overall Protection of Human Health and the Environment	□	■	■	■
Compliance with Applicable or Relevant and Appropriate Requirements	N/A	■	■	■
Long-term Effectiveness and Permanence	□	♦	♦	◘
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment	□	□	♦	◘
Short-term Effectiveness	□	◘	♦	♦
Implementability	◘	◘	♦	♦
Cost	$0	**$53,312**	$2,053,977	$7,608,432
State Acceptance	TBD	TBD	TBD	TBD
Community Acceptance	TBD	TBD	TBD	TBD
RAO Acceptable End State*	N/A	#5	#1, #2	#1, #2

Note:
Ranking: ■ Meets Criteria (i.e., Yes, regarding the first two criteria)
◘ High ability to meet criteria
♦ Moderate ability to meet the criteria
□ Does not meet criteria (i.e., No, regarding the first two criteria)
N/A: Not Applicable
TBD: These criteria will be further evaluated following the comment period for the Proposed Plan.
Preferred Alternative is highlighted and cost is **Bold Underline**.

The estimated costs include costs for operations and maintenance and those for printed educational media (including escalation).
*See RAO Section (pgs. 28-32) for descriptions of the acceptable end states.

TABLE 5 EVALUATION OF REMEDIAL ALTERNATIVES FORMER FORT HUACHUCA MRS03

Evaluation Criteria	Remedial Alternatives			
	Alternative 1 – No Action.	**Alternative 2** – Institutional Controls to Protect Current and Future Site Users.	**Alternative 3** – Munitions and Explosives of Concern Removal from the Surface with Institutional Controls to Protect Current and Future Site Users.	**Alternative 4** – Digital Geophysical Mapping and Surface / Subsurface Removal of Munitions and Explosives of Concern (to a depth of 2 feet bgs) with Institutional Controls to Protect Current and Future Site Users.
Overall Protection of Human Health and the Environment	□	□**	■	■
Compliance with Applicable or Relevant and Appropriate Requirements	N/A	□**	■	■
Long-term Effectiveness and Permanence	□	□	♦	◘
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment	□	□	♦	◘
Short-term Effectiveness	□	♦	♦	◘
Implementability	◘	◘	♦	♦
Cost	$0	$53,312	$4,058,394	**$9,260,063**
State Acceptance	TBD	TBD	TBD	TBD
Community Acceptance	TBD	TBD	TBD	TBD
RAO Acceptable End State*	N/A	N/A	#1, #2***	#1, #2***

Note:
Ranking: ■ Meets Criteria (i.e., Yes, regarding the first two criteria)
◘ High ability to meet criteria
♦ Moderate ability to meet the criteria
□ Does not meet criteria (i.e., No, regarding the first two criteria)
N/A: Not Applicable
TBD: These criteria will be further evaluated following the comment period for the Proposed Plan.
Preferred Alternative is highlighted and cost is **Bold Underline**.
The estimated costs include costs for operations and maintenance and those for printed educational media (including escalation).
*See RAO Section (pgs. 28-32) for descriptions of the acceptable end states.
**Does not meet the criteria as a stand-alone alternative, although is a component of removal action remedial alternatives.
***Dependent upon site conditions identified in End State #2, ICs for Alternative 4 may not be required as determined by post remediation data analysis.

**TABLE 6 EVALUATION OF REMEDIAL ALTERNATIVES
FORMER FORT HUACHUCA MRS04**

Evaluation Criteria	Remedial Alternatives			
	Alternative 1 – No Action.	**Alternative 2** – Institutional Controls to Protect Current and Future Site Users.	**Alternative 3** – Munitions and Explosives of Concern Removal from the Surface with Institutional Controls to Protect Current and Future Site Users.	**Alternative 4** – Digital Geophysical Mapping and Surface / Subsurface Removal of Munitions and Explosives of Concern (to a depth of 2 feet bgs) with Institutional Controls to Protect Current and Future Site Users.
Overall Protection of Human Health and the Environment	□	□**	■	■
Compliance with Applicable or Relevant and Appropriate Requirements	N/A	□**	■	■
Long-term Effectiveness and Permanence	□	□	♦	◘
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment	□	□	♦	◘
Short-term Effectiveness	□	♦	◘	♦
Implementability	◘	◘	♦	♦
Cost	$0	$53,312	**$2,389,784**	$6,024,184
State Acceptance	TBD	TBD	TBD	TBD
Community Acceptance	TBD	TBD	TBD	TBD
RAO Acceptable End State*	N/A	N/A	#1, #2***	#1, #2***

Note:

Ranking: ■ Meets Criteria (i.e., Yes, regarding the first two criteria)
◘ High ability to meet criteria
♦ Moderate ability to meet the criteria
□ Does not meet criteria (i.e., No, regarding the first two criteria)
N/A: Not Applicable

TBD: These criteria will be further evaluated following the comment period for the Proposed Plan.

Preferred Alternative is highlighted and cost is **Bold Underline**.

The estimated costs include costs for operations and maintenance and those for printed educational media (including escalation).

*See RAO Section (pgs. 28-32) for descriptions of the acceptable end states.

**Does not meet the criteria as a stand-alone alternative, although is a component of removal action remedial alternatives.

***Dependent upon site conditions identified in End State #2, ICs for Alternative 4 may not be required as determined by post remediation data analysis.

SUMMARY OF PREFERRED ALTERNATIVES

Based on a detailed analysis of each alternative and the evaluation comparing the alternatives, it is USACE's current judgment that the alternatives presented in **Table 3** through **Table 6** above, for each MRS are the Preferred Alternatives identified in this Proposed Plan. The Preferred Alternative is considered protective of human health and the environment. In this case, the hazards at the **Former Fort Huachuca MRSs** are due to the potential presence of MEC.

Former Fort Huachuca MRS01 – **Table 3** presents an overview of the evaluation and provides a summary of the comparative alternative analysis for this MRS. Based on the comparative analysis presented in the *Final RI/FS Report,* Alternative 2 is the Preferred Alternative.

Former Fort Huachuca MRS02 – **Table 4** presents an overview of the evaluation and provides a summary of the comparative alternative analysis for this MRS. Based on the comparative analysis presented in the *Final RI/FS Report,* Alternative 2 is the Preferred Alternative.

Former Fort Huachuca MRS03 – **Table 5** presents an overview of the evaluation and provides a summary of the comparative alternative analysis for this MRS. Based on the comparative analysis presented in the *Final RI/FS Report,* Alternative 4 is the Preferred Alternative.

Former Fort Huachuca MRS04 – **Table 6** presents an overview of the evaluation and provides a summary of the comparative alternative analysis for this MRS. Based on the comparative analysis presented in the *Final RI/FS Report,* Alternative 3 is the Preferred Alternative.

Based on information currently available, USACE believes the Preferred Alternatives presented in **Table 7** for the **Former Fort Huachuca MRSs** meet both the threshold criteria and provide the best balance of tradeoffs with respect to the balancing and modifying criteria. USACE expects the Preferred Alternatives to fulfill the following statutory and regulatory requirements of Section 121(b) of CERCLA: (1) be protective of human health and the environment, (2) comply with ARARs, (3) be cost-effective, and (4) provide a permanent remedial solution.

TABLE 7 FORMER FORT HUACHUCA MUNITIONS RESPONSE SITES PREFERRED ALTERNATIVES AND COST

Site	Munitions Response Sites Preferred Alternatives			
	Alternative 1 – No Action.	**Alternative 2 – Institutional Controls to Protect Current and Future Site Users.**	**Alternative 3 – Munitions and Explosives of Concern Removal from the Surface with Institutional Controls to Protect Current and Future Site Users.**	**Alternative 4 – Digital Geophysical Mapping and Surface / Subsurface Removal of Munitions and Explosives of Concern (to a depth of 2 feet bgs) with Institutional Controls to Protect Current and Future Site Users.**
Former Fort Huachuca MRS01	$0	**$53,312**	$1,059,731	$2,091,239
Former Fort Huachuca MRS02	$0	**$53,312**	$2,053,977	$7,608,432
Former Fort Huachuca MRS03	$0	$53,312	$4,058,394	**$9,260,063**
Former Fort Huachuca MRS04	$0	$53,312	**$2,389,784**	$6,024,184

Note:
Preferred Alternative is presented in **Bold Underline**.
The estimated costs include costs for operations and maintenance and those for printed educational media (including escalation).

The state regulatory agency, ADEQ, concurs that the selection of the Preferred Alternatives, as presented above, are appropriate and provide the best balance of tradeoffs.

COMMUNITY PARTICIPATION

USACE provides information regarding the remedial alternatives of the **Former Fort Huachuca MRSs** to the public through public meetings, the Administrative Record file for the site, and announcements published in the *Sierra Vista Herald* [and placeholder for any other newspaper(s)] (local newspaper(s)). USACE encourages the public to gain a more comprehensive understanding of the site and the remedial activities that have been conducted at the site.

Public input is a key element in the CERCLA process. The local community is encouraged to comment on this Proposed Plan and the Preferred Alternatives summarized herein. Comments from the public will be used to help determine what action to take. Members of the public may communicate verbally or in writing at the public meeting on [placeholder for date]. Representatives from USACE, ADEQ, and BLM will be present at the meeting to explain the Proposed Plan, hear concerns, and answer questions.

Members of the public may comment in writing during the public comment period ([date placeholder] to [date placeholder]).

Correspondence should be sent to:

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If special correspondence or public meeting accommodations are needed, please contact Mr. Jesse Laurie at **(520) 584-1677**.

After considering public comments, USACE will select the final remedies for each of the **Former Fort Huachuca MRSs**. The Preferred Alternatives may be modified based on public comment or new information. The final chosen remedies will be described in the Decision Document (the next step after this Proposed Plan). USACE will respond to comments from the public in a responsiveness summary, which will be part of the Decision Document and will be available for review in the Administrative Record file, which may be reviewed at the Information Repository identified on the cover page of this document.

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GLOSSARY OF TERMS

Administrative Record File

The official collection of documents related to investigation and cleanup activities at the **Former Fort Huachuca MRSs** considered, or relied on, in selecting the response action supporting the Proposed Plan for remedial action at the **Former Fort Huachuca MRSs**.

Anomaly

An anomaly is any item that is identified as a subsurface irregularity during geophysical investigation. This irregularity deviates from the expected subsurface ferrous and nonferrous material at a site (pipes, power lines, etc.).

Archives Search Report

An Archives Search Report is a detailed investigation report of past munitions activities conducted on an installation. The principal purpose of the archives search is to assemble historical records and available field data, assess potential ordnance presence, and recommend follow-up actions at a Defense Environmental Restoration Program Formerly Used Defense Site.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980

This Act authorizes federal action to respond to the release or potential release of hazardous substances into the environment or a release or threat of release of a pollutant or contaminant into the environment that may present an imminent or substantial danger to public health or welfare.

Decision Document

Decision Documents serve to provide the reasoning for the selection of, or changes to a site cleanup plan. Decision Documents are required by Section 117 of Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act, for remedial actions taken pursuant to Sections 104, 106, 120, and 122 (42 USC Sections 9604, 9606, 9620, and 9622). 40 CFR 300.430(f)(2) of the National Oil and Hazardous Substances Contingency Plan establishes the regulatory requirements for these Decision Documents.

Formerly Used Defense Sites

A FUDS is defined as a facility or site (property) that was under the jurisdiction of the Secretary of Defense and owned by, leased to, or otherwise possessed by the United States at the time of actions leading to contamination by hazardous substances. By the Department of Defense Environmental Restoration Program (DERP) policy, the FUDS program is limited to those real properties that were transferred from DoD control prior to

17 October 1986. FUDS properties can be located within the 50 States, District of Columbia, Territories, Commonwealths, and possessions of the United States.

Geophysical Survey

A process used to identify subsurface metallic objects utilizing magnetic and electromagnetic technologies.

High Explosive

High explosives are materials that detonate (i.e., the front of the chemical reaction moves faster through the material than the speed of sound). Munitions Constituents (for example, TNT, RDX), as defined in 10 USC 2710(e)(3), posing an explosive hazard can be defined as high explosive or low explosive (i.e., low explosives exhibit deflagration, which is a rapid high energy release combustion event that propagates through a gas or an explosive material at subsonic speeds, driven by the transfer of heat).

Intrusive Investigation

Investigating buried objects or material by excavation and may include excavating, identifying, and removing buried munitions or other metallic debris by an explosives ordnance technician.

Institutional Control

Institutional Controls means Proprietary Controls and state or local laws, regulations, ordinances, zoning restrictions, or other governmental controls or notices that: (i) limit land, water and/or resource use to minimize the potential for human exposure to waste materials at the site; (ii) limit land, water and/or resource use to implement, ensure non-interference with, or ensure the protectiveness of the Remedial Action; and/or (iii) provide information intended to modify or guide human behavior at the site.

Material Documented As Safe

Material Documented as Safe is Material Potentially Presenting an Explosive Hazard that has been assessed and documented as not presenting an explosive hazard and for which the chain of custody has been established and maintained. This material is no longer considered to be Material Potentially Presenting an Explosive Hazard.

Munitions and Explosives of Concern

This term, which distinguishes specific categories of military munitions that may potentially pose unique explosive safety hazards, includes Unexploded Ordnance, as defined in 10 USC 101(e)(5); Discarded Military Munitions, as defined in 10 USC 2710(e)(2); or Munitions Constituents (for example, TNT, RDX), as defined in 10 USC 2710(e)(3), present in high enough concentrations to pose an explosive hazard.

Munitions and Explosives of Concern Hazard Assessment

A tool developed by the United States Environmental Protection Agency to assess the explosive hazards posed by Munitions and Explosives of Concern.

Munitions Constituents

Munitions Constituents include any material originating from Unexploded Ordnance, Discarded Military Munitions, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.

Munitions Debris

Remnants of munitions (for example, fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.

Munitions Response

Response actions, including investigation, removal actions, and remedial actions to address the potential explosives safety, human health, or environmental hazards presented by Unexploded Ordnance, Discarded Military Munitions, or Munitions Constituents, or to support a determination that no removal or remedial action is required.

Munitions Response Area

Any area on a defense site that is known or suspected to contain Unexploded Ordnance, Discarded Military Munitions, or Munitions Constituents. Examples include former ranges and munitions burial areas. A Munitions Response Area is composed of one or more Munitions Response Sites.

Munitions Response Site

A discrete location within a Munitions Response Area that is known to require a munitions response.

National Oil and Hazardous Substances Contingency Plan

The National Oil and Hazardous Substances Contingency Plan provides the regulatory framework (see NCP 40 CFR Part 300) for responses under Comprehensive Environmental Response, Compensation, and Liability Act. The National Oil and Hazardous Substances Contingency Plan provides that the Department of Defense has the responsibility to take actions to respond to releases from or on Department of Defense facilities or vessels [40 CFR 300.175(a)(4)].

Proposed Plan

The Preferred Remedial Alternative for a site is presented to the public in a Proposed Plan. The Proposed Plan briefly summarizes the remedial alternatives studied in the detailed analysis phase of the Remedial Investigation / Feasibility Study, highlighting the key factors that led to identifying the Preferred Alternative. The Proposed Plan, as well as the Remedial Investigation / Feasibility Study and the other information that forms the basis for the lead agency's response selection, is made available for public comment in the Administrative Record file.

Remedial Investigation / Feasibility Study

A Remedial Investigation is performed to collect data to characterize site conditions, delineate the nature and extent of contamination (in this case Materials and Explosives of Concern) and assess potential risk/hazard to human health and the environment. The Feasibility Study is the evaluation process for the development, screening, and detailing alternatives for remedial actions.

Removal Action

A removal action is the cleanup or removal of released hazardous substances from the environment or the taking of such other actions, as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from any exposure to hazardous substances. The term includes, without being limited to, security fencing or other measures to limit access and provide post-removal site control, where appropriate.

Unexploded Ordnance

Unexploded Ordnance includes military munitions that have been primed, fuzed, armed, or otherwise prepared for action; have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installation, personnel, or material; and/or remain unexploded either by malfunction, design, or any other cause.

APPENDIX A

3Rs Safety Slide

Remember the 3Rs of Military Munitions Safety:

- **Recognize:**
  you may have encountered a munitions item.
- **Retreat:**
  from the munitions item. Do not touch or disturb it; instead move away carefully, walking out the same way you entered the area. Do not use two-way radios or cell phones within 100 feet of the items.
- **Report:**
  what you saw and where you saw it by calling 911.

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USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the Proposed Plan for the **Former Fort Huachuca MRSs** is important to United States Army Corps of Engineers. Comments provided by the public are valuable in helping United States Army Corps of Engineers select final remedial alternatives for the site.

You may use the space below to write your comments, then fold and mail. Comments must be postmarked by [date placeholder]. If you have any questions about the comment period, please contact Mr. Jesse Laurie by phone at (520) 584-1677 or by email at jesse.laurie@usace.army.mil.

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Jesse Laurie
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