

Proposed Plan  
Camp Forsyth Landfill Area 2, Operable Unit 9  
MRS: FTRI-003-R-01  
Fort Riley, Geary County, Kansas  
September 2019

**Underlined and bolded** text is included in the glossary at the end of this **Proposed Plan**. A list of acronyms and referenced figures are also provided following the glossary.

## Introduction

The public is invited to review and comment on this Proposed Plan that proposes a final remedy for addressing hazards associated with the Camp Forsyth Landfill Area 2 (CFLFA2) **Munitions Response Site** (MRS), Operable Unit 09, (FTRI-003-R-01) located at Fort Riley, Kansas. The **Department of the Army** (Army) is proposing Alternative 4, Munitions and Explosives of Concern (MEC) Clearance for Republican River and Breakneck Creek and Land Use Controls (LUCs) for the CFLFA2 MRS.

The Department of Defense (DoD) established the **Military Munitions Response Program** (MMRP), authorized by the United States (U.S.) Congress under the **Defense Environmental Restoration Program** (DERP) to address DoD sites suspected of containing **munitions and explosives of concern** (MEC) or **munitions constituents** (MC). The MMRP follows the requirements of the **Comprehensive Environmental Response, Compensation, and Liability Act** (CERCLA) and the **National Oil and Hazardous Substances Pollution Contingency Plan** (NCP).

The Army is the lead agency for conducting environmental response activities at the MRS, the U.S. Environmental Protection Agency (USEPA) is the lead regulatory agency, and the Kansas Department of Health and the Environment (KDHE) is the support regulatory agency for site activities.

During review of the draft Proposed Plan, regulatory comments were received that resulted in re-evaluation of the remedial alternatives for the MRS and the ultimate

### **MARK YOUR CALENDARS!**

#### **PUBLIC COMMENT PERIOD:**

October 7, 2019 through November 7, 2019. The Army invites comments on the Proposed Plan during this public comment period (30-day minimum). Comment letters must be postmarked or emailed by midnight on November 7, 2019 and should be submitted to:

U.S. Army–Fort Riley

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**PUBLIC MEETING:** A public meeting will be held for the Army to explain the preferred remedial alternative and Proposed Plan to the public and address questions and comments. The **public meeting will be held on October 23, 2019, at Fort Riley’s Community Center, Fort Riley, Kansas.**

**PROJECT INFORMATION REPOSITORY:** This Proposed Plan is available in the project **information repositories**, which are physically located at the Dorothy Bramlage Public Library, 230 West Seventh Street, Junction City, Kansas, and the Manhattan Public Library located at 629 Poyntz Avenue, Manhattan, Kansas. The repositories contain a copy of the **Administrative Record file** for the project.

selection of Alternative 4 as the preferred alternative.

The purpose of this Proposed Plan is to satisfy the requirements of Section 117(a) of CERCLA and Section 300.430(f)(2) of the NCP to facilitate public participation in the remedy selection process. Background

information, site characteristics, description of all remedial alternatives considered, and the results of evaluation are contained herein to provide rationale for the proposal of Alternative 4 to address MEC hazards identified at this MRS. A final remedy will be selected for the CFLFA2 MRS after considering all public comments. The Army, in consultation with USEPA and KDHE, may modify Alternative 4 or select another remedial alternative described in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all aspects of this Proposed Plan.

Under the MMRP, an MRS is addressed for its potential or established **explosive hazard** related to MEC, in addition to human health and/or ecological risks relative to MC in environmental media.

This Proposed Plan summarizes information that can be found in greater detail in the MMRP **Remedial Investigation** Report (RI), **Feasibility Study** (FS), and other documents contained in the project information repositories. The project information repositories are available at the Dorothy Bramlage Public Library, located at 230 West Seventh Street, Junction City, Kansas, and the Manhattan Public Library, located at 629 Poyntz Avenue, Manhattan, Kansas. The repositories are identical and provide copies of documents included in the Administrative Record file for this MRS. The official Administrative Record file for the CFLFA2 MRS is stored at the Directorate of Public Works, Environmental Division, IMRL-PWE, 407 Pershing Court, Fort Riley, Kansas 66442-8016, and can be viewed during normal hours of operation. Monday-Friday, 9 AM to 2 PM.

The Army encourages the public to review these documents to better understand the MRS and the investigation activities conducted for the MRS.

The Army will respond in writing to comments in a responsiveness summary that will be part of the final **Record of Decision** (ROD). The Army will also announce the selected remedy in local newspapers and will place a copy of the final ROD in the Administrative Record file

and information repositories listed on **Page 13**.

## Site Background

Fort Riley is an Army Post occupying 101,733 acres in portions of Clay, Geary, and Riley Counties in northeast Kansas. Fort Riley is located directly north and east of Junction City, Kansas, and lies 10 miles southwest of Manhattan, Kansas. Portions of Fort Riley are bounded by the cities of Ogden, Riley, and Junction City, Kansas (see **Figure 1**). The CFLFA2 MRS lies along the lower southwestern boundary of Fort Riley and extends into the Republican River and the Republican Flats floodplain (Bay West LLC [Bay West], 2018).

The CFLFA2 MRS originally covered approximately 27 acres and was located between Camp Forsyth on the east and the Republican River on the west. The 2006 **Site Inspection** (SI) recommended expanding the MRS footprint to 34.9 acres including off-installation sandbars and the banks of the Republican River to the southwest. Additional investigations have expanded the area to approximately 108 acres (Bay West, 2017). Following review of initial regulatory comments received on the draft Proposed Plan, the proposed MRS boundary has been modified as shown on **Figures 2 and 3**. Please note that the property lines and proposed remediation areas drawn on the figures in this Proposed Plan are approximate and will be further refined during the remedial design. The proposed MRS area includes an expansion to the north up to the Breakneck Lake dam. With the inclusion of this new expansion 75 feet to either side of the Breakneck Creek, the proposed MRS area is now 123.4 acres.

Reasonably anticipated future land use of most of the MRS is expected to remain the same as the current land use, which is primarily active military training with compatible recreational use (e.g., fishing, hiking, and boating). Expansion or contraction of the industrial use of privately-owned portions of the MRS currently used for

farming (crop production), sand and gravel supply, dredging operations, and construction support is possible in some locations. The MRS, which extends into the Republican River and on to southwestern riverbanks and sandbars, is accessible to the public. The Breakneck Creek area of the MRS is accessible to personnel with Fort Riley base access.

**History of Camp Forsyth Landfill Area**

A brief history of the CFLFA2 MRS, including investigative reporting, is presented in **Table 1** and described below. Additional details can be found in the Administrative Record file, copies of which are available for public review at the project information repository locations during the available times shown on **Page 13**.

<b>Table 1 Historical Timeline</b>	
<b>Date</b>	<b>Activity</b>
1930s-current	Approximate time frame for training and maneuver area activity
1944 – 1960	Approximate time frame for Camp Forsyth Landfill activities
1990	Fort Riley placed on National Priorities List (NPL)
1991	Fort Riley entered into Federal Facility Agreement with USEPA and KDHE
1993	Installation-Wide Site Assessment
2001	Removal Action Plan-Republican River Bank Stabilization.
2006	SI Report
2011	CFLFA2 RI Technical Memo
2012	CFLFA2 Historical Records Review (HRR)
2017	CFLFA2 RI Report
2018	CFLFA2 FS Report

The Camp Forsyth Landfill appears to have been active in the area adjacent to the northeast of the CFLFA2 MRS from at least 1944 through 1957, as supported by

evidence of activity on aerial photos from this period. The Camp Forsyth Landfill, inactive since the 1960s, was officially closed under the Resource Conservation and Recovery Act (RCRA) by KDHE in 2007 (Bay West 2018). The HRR indicated that there are no records or indications of incineration, hazardous wastes, or evidence of munitions disposal during active use of the landfill (Bay West, 2012).

Solid waste debris was identified along the bank of the Republican River following a regional flooding event in 1993. In 1994, approximately 700 feet downstream from the original Camp Forsyth Landfill footprint a sandbar was found to contain MEC, which was addressed by the Fort Riley 774th Explosive Ordnance Disposal (EOD) Detachment (Bay West, 2018). Aerial photographs and land surveys have demonstrated that the Republican River has eroded an approximate 800-by-100-foot area along the riverbank of the original Camp Forsyth Landfill footprint. From 1998 through 2001, approximately 1,500 feet of revetment was constructed to prevent further erosion of riverbank and subsequent exposure of solid wastes from the landfill margin (Bay West, 2018).

Historical maneuver and training areas appear to have been conducted on and around the CFLFA2 MRS from at least the 1930s through current. In addition, the munition types identified on the sandbars in 1994 and subsequent investigations since 2000 correspond to munition types which would have been utilized within that timeframe. See **Figure 4** for locations of historical training areas, former Republican River channels, and the Camp Forsyth Landfill location (Bay West, 2018).

**Installation-Wide Site Assessment (Louis Berger & Associates Inc., 1993)**—This assessment identified the Camp Forsyth Landfill as a potential area of environmental concern (PAOC). Visual inspections identified uneven topography and evidence of human activity. Interviews conducted indicated that dumping may have occurred

throughout the areas on either side of the Republican River. As a result, the landfill area and other locations were combined into a single PAOC.

**Removal Action Plan (RAP)-Republican River Bank Stabilization (Wenck Associates, Inc., 2001)**—The RAP summarized bank stabilization revetment activities implemented along approximately 1,500 feet of riverbank to prevent erosion of the Republican River bank into the Camp Forsyth Landfill and trenches exposed from the 1993 flooding. **Unexploded ordnance (UXO)** personnel were on-site to identify UXO and the Fort Riley 774th EOD Detachment was responsible for removal and destruction of UXO items. During construction the following items were encountered: blank small arms cartridges; a rifle magazine containing live .30-caliber cartridges; 2.36-inch rocket heads; a 2.36-inch anti-tank rocket; a 2.36-inch rocket motor; a 3.5-inch anti-tank rocket; 4.2-inch mortar primers/igniters; three (3) ounces of dynamite; and, miscellaneous anti-tank round components. An apparent open burn/open detonation (OB/OD) site was also identified 100 feet outside of the active construction area. Numerous 2.36-inch and 3.5-inch anti-tank rockets, two (2) rifle smoke grenades, and other blank small arms cartridges were found. The OB/OD site is likely associated with the MEC disposal activities conducted in 1994.

**Site Inspection Report (Engineering-Environmental Management, Inc., 2006)**—A visual/magnetometer survey of the original MRS was completed in 2005. During this survey **munitions debris** (MD) and MEC items were observed on a sandbar in the Republican River. The items found included: 7.62-millimeter cartridges; .50-caliber cartridges; expended 2.36-inch rocket bodies; 2.36-inch rocket nose cones; smoke grenades; and rifle grenades. Surface soil samples were also collected. Analytical results from the samples did not indicate the presence of explosives constituents at concentrations greater than detection limits.

Analytical results for concentrations of metals did not indicate that levels were greater than KDHE/Bureau of Environmental Remediation Tier 2 Standards, which are based on guidance and directives from the USEPA and various other technical resources. Based on the results of this SI, the CFLFA2 MRS was expanded to include off-installation sandbars and the southwestern banks of the Republican River. The MRS was recommended for further MEC characterization.

**CFLFA2 Technical Memo-Remedial Investigation/ Feasibility Study (Bay West, 2011)**—In 2011, an initial RI field effort identified as Mobilization 1 was performed at the CFLFA2 MRS. The RI field work did not identify a definitive source of the encountered MEC and MD. A large amount of MD was recovered in an area that is not downstream of the Camp Forsyth Landfill. During the RI, the following items were encountered at the bank of the river within the central region of the MRS: three (3) dud M6 rockets; MD such as fins, nose cones and expended motors related to M6 and M7 rockets; trip flares; and landmines. The landmines included practice anti-tank landmines and one (1) live anti-tank landmine.

The Technical Memorandum concluded that it was likely that the area in and around the MRS was a maneuver area that pre-dates the landfill and that further MEC may exist in areas outside of the MRS boundary. Because the course of the river had shifted significantly since Fort Riley was established, it was possible that portions of this former maneuver area were no longer within the Fort Riley boundary. To determine the need for further munitions response actions at the CFLFA2 MRS, the Technical Memorandum recommended:

- Conducting an HRR to refine MRS boundaries (Bay West, 2012);
- Fencing off portions of the nature trail within the MRS;

- Maintaining the newly installed warning signs to prevent public access;
- Re-mapping and intrusive investigation of **anomalies** identified by digital geophysical mapping (DGM); and,
- Intrusive investigation of a large contiguous anomaly identified by DGM within the central sandbar adjacent to the revetment.

These recommendations were implemented in conjunction with RI Mobilization 2.

**CFLFA2 Historical Records Review (Bay West, 2012)**—The HRR included reviewing on-site and off-site repositories, conducting personnel interviews, and reviewing historical photographs and maps (Bay West, 2012). The HRR concluded that munitions utilized in training activities were fired, stored, and/or disposed of in the immediate vicinity of concrete rubble located in the north portion of the CFLFA2 MRS (see **Figure 4**). The concrete rubble appears to have been present since at least 1940 and was originally located on the northern portion of the former oxbow land as shown on **Figure 5**.

The oxbow land was utilized for maneuver training until it was severed from Fort Riley when the Republican River **avulsed** in 1945. The river appears to have encroached upon the concrete rubble circa 1950 and the concrete remained submerged within the river channel until sometime between 1994 and 2000 (see **Figure 4**). Munitions were first discovered at the CFLFA2 MRS in the spring of 1994, following regional flooding of the Republican River. More than 200 MD items and at least 10 MEC items were encountered at the MRS during SI and initial RI activities.

The majority of MD identified during initial RI field work in 2011 was clustered on the sandbar along the south side of the Republican River, in the immediate vicinity of the concrete rubble. Additionally, a large continuous geophysical anomaly was identified on a sandbar approximately 100 feet southeast of the concrete rubble, adjacent to the revetment, during the 2011 geophysical survey. This anomaly was

suspected to represent a high concentration of MD and MEC buried in the sandbar. Conversely, very few MD items had been encountered upstream of the concrete rubble and these few items were located immediately upstream of the concrete rubble.

However, tracks leading through the CFLFA2 MRS and to disturbed areas along the Republican River have been identified in historic aerial photos and installation maps suggesting that training munitions may have been dumped on land and/or in the Republican River in the area at locations other than the vicinity of the concrete rubble during the 1930s through the 1970s. If these training munitions were dumped there, they should have been inert or have had their energetic material expended or removed because the Army has prohibited disposal of live munitions (explosives or ammunition) in waste disposal areas, pits, wells, marshes, shallow streams, and inland waterways since at least the 1920s.

Based on this information, the HRR concluded that the primary source of the MEC and MD at the CFLFA2 MRS was likely to be in the immediate vicinity of the concrete rubble.

**CFLFA2 Remedial Investigation Report (Bay West, 2017)**—In addition to RI Mobilization 1 in 2011, Mobilizations 2 and 3 were performed between 2014 and 2015. The goal of RI activities was to delineate the nature and extent of MEC at the CFLFA2 MRS. The follow-on RI mobilizations covered an expanded RI area, including underwater locations and a portion of Breakneck Creek. Fourteen (14) MEC items were recovered. The average MEC density for the area investigated (48.7 acres) was 0.29 MEC items per acre. In general, the MEC encountered were located adjacent to or in the Republican River at depths up to 2 feet. Concentrated areas of MD were encountered in sediments and sandbars within the Republican River, primarily within the northern portions of the MRS. Pits of debris were excavated to depths of up to 9 feet below ground surface.

A trash pit was encountered during the follow-on RI effort. The pit was characterized using earth moving machinery and was densely packed with household waste and MD. Although the pit was determined to be a potential source of MEC and MD in the Republican River, it was concluded that it did not appear to be the only source. Geophysical surveying completed to the north of the pit indicate additional anomalies that may represent MEC are located upstream of the pit. These targets were not scoped for investigation under follow-on RI activities. In addition, the MEC and MD encountered in Breakneck Creek indicate that MEC and MD may be more widespread than originally anticipated.

**CFLFA2 Feasibility Study (Bay West, 2018)**—An FS based on the results of the previous investigations was finalized in 2018 and is the focus for the remaining portions of this Proposed Plan.

**WHAT ARE THE HAZARDS ASSOCIATED WITH MEC?**

A person could encounter MEC that represents an explosive hazard lying on the ground surface or during any activities that involve subsurface digging.

## Site Characteristics

The MRS is a mix of private commercial, public, and Fort Riley property. Land types consists of river shoreline, sandbars, the Republican River, and heavily wooded areas. The Republican River is a very dynamic area affected by storm events and flow conditions within the river, which affects water level, sediment deposition and movement of sediment within and adjacent to the river.

In 1997, the Army entered into a licensing agreement with Junction City, Kansas, allowing construction of a pedestrian trail and recreational access along the Republican River adjacent to the original Camp Forsyth Landfill footprint. The river shoreline, a relatively flat area, is used for the nature trail maintained by the City of Junction City

through an easement with Fort Riley. The nature trail is currently open to the public. In May of 2002, Fort Riley posted a series of UXO warning signs between the riverbank stabilization area and the nature trail stating the following: “Caution Potential Unexploded Ordnance May Be Present in the Area, Avoid Entry”. The purpose of the signs is to notify the public of the site conditions. There are currently no known plans to change the land use at the CFLFA2 MRS.

### ***Nature and Extent of Munitions-Related Contamination***

MEC and MD were identified on land and underwater at the surface and subsurface within soil and sediment during all RI mobilization efforts. A specific source area has not been identified. The results of RI activities support the findings of the HRR, indicating that the landfill itself is not the source of MEC and MD. MEC that are present in site media may be associated with the historical maneuver areas or active training areas. **Figure 6** indicates areas associated with the historical maneuver areas and active training areas that may have MEC present. In addition, areas downstream from the historical maneuver areas, relative to both the current location of the Republican River and the historical alignment of the river, may have MEC present.

MEC, specifically discarded military munitions and UXO, may be considered a principal threat due to the acute nature of hazard associated with these types of munitions. If MEC is found, the Federal Facility Agreement parties will consult to make a determination as to whether the material should, as defined by CERCLA, the NCP and USEPA guidance, be classified as principal threat waste. If the material is determined to be a principal threat waste, the Army will take all necessary actions to ensure protectiveness of human health and the environment to address the risks posed by the material designated as a principal threat waste.

Based on the findings from the RI, an FS for MEC hazards was recommended for the portions of the areas investigated that are not part of the active training areas or landfill (areas hatched in red within the orange circles on **Figure 6**). These are considered the suspected source areas for MEC.

Detonation, damage on impact, or degradation of munitions may release the chemicals that are associated with the composition of munitions to the environment. These chemicals are called MC and include metals and explosive compounds. Primary sources of potential MC are the residue of munitions and their filler materials remaining in the environment because of munitions firing, detonation, or disposal.

During RI activities, environmental samples were collected from the following media: soil, surface water, sediment, and groundwater. Environmental media samples were analyzed for MC. A total of eight (8) metals and one (1) explosive compound were detected in eight (8) of the characterization samples collected. In all cases, suspected MC were compared to their most conservative media-specific human health and ecological screening levels. Analytical results were below respective screening levels and/or background levels.

## Scope and Role of the Response Action

Remedial action is proposed at the MRS to address MEC. This MRS falls within Operable Unit 9 at Fort Riley. As presented below in the Summary of Site Risks, explosive hazards may remain at the MRS based on the results of RI activities. No unacceptable MC risks to human health or ecological receptors were identified during the RI activities. Based on the information collected at the MRS to-date, the Army anticipates that this will be the final remedial action needed for the MRS. The preferred alternative in this Proposed Plan applies only to the CFLFA2 MRS and not any other portion of Fort Riley.

## Summary of Site Risks

### *MEC Risk Summary*

By nature, MEC explosive hazards are acute and are therefore evaluated as present or not present. The following three components are used to evaluate the potential for explosive hazard incidents:

- **Severity** - The potential consequences of the effect on human receptors (i.e., initiating and secondary human receptors) should a MEC item detonate.
- **Accessibility** - The likelihood that a human receptor will be able to encounter a MEC item.
- **Sensitivity** - The likelihood that a human receptor will be able to interact with a MEC item such that it will detonate.

Using the findings of all information gathered and RI field data collected, the CFLFA2 MRS MEC risks are characterized as follows:

- **Severity:** The potential consequence, should a MEC item detonate is loss of life, limb, and/or livelihoods to those in the immediate vicinity of the detonation.
- **Accessibility:** MEC and MD have been encountered within and along the banks of the Republican River and Breakneck Creek and have been reported at the sand dredging operations. A pedestrian (nature) trail is present in the area investigated, and schools and housing are nearby. The areas investigated are publicly accessible. Warning signs are present in some areas.
- **Sensitivity:** Some of the MEC encountered function using a point-detonating **fuze**. Others, if armed, are pressure- or trip-sensitive. An adult or child could kick, step on, or pick up one of these items and cause it to function.

A MEC hazard, including sensitive munitions that are accessible to the public, may be present at this site. Therefore, it is the lead agency's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is

necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

### **MC Risk Summary**

Approximately 50 analytical samples collected from environmental media (soil, sediment, surface water, and groundwater) were obtained within the MRS to evaluate any adverse risks to human health and ecological receptors. A human health risk assessment (HHRA) and screening-level ecological risk assessment (SLERA) were completed and documented in the Final CFLFA2 Remedial Investigation Report (Bay West, 2017). The following conclusions were made:

- **HHRA:** Because the detected analytes were reported at concentrations below their respective human health screening levels and/or background concentrations in soil, sediment and groundwater, no contaminants of concern were identified. Investigative area soil, sediment, surface water, and groundwater at the CFLFA2 do not contain MC in concentrations that would pose an increased risk (i.e., greater than the risk management range of  $10^{-6}$  to  $10^{-4}$  for adverse cancer effects or a hazard index greater than 1 for noncarcinogens) to residents, Fort Riley personnel, recreational users, trespassers, and authorized contractors.
- **SLERA:** Although selenium was detected and is considered a contaminant of potential ecological concern in surface water, dilution and mixing will minimize ecological exposure through existing pathways. No other chemicals were detected in investigative area soil, sediment, surface water and groundwater at concentrations above risk-based ecological screening levels. Based on the results of the SLERA, no MC released to soil, sediment, surface water and groundwater was determined to create a potentially unacceptable risk to ecological receptors.

## **Remedial Action Objectives**

Per Code of Federal Regulations (CFR) at 40 CFR 300.430(e)(2)(i), the FS shall establish remedial action objectives (RAOs) specifying contaminants and media of concern, potential exposure pathways, and remediation goals. The RAOs are defined to assist with remedial alternative design, and to determine the effectiveness of the remedial actions. The HHRA and SLERA demonstrated that soil, sediment, surface water and groundwater at the CFLFA2 MRS does not pose a threat to human health or the environment. Therefore, RAOs for MC were not developed.

To address the explosive hazard present due to MEC, the RAO for the CFLFA2 MRS established in the FS is:

- To minimize Fort Riley residents, recreational users (including residents walking on the nature trail adjacent to the site), Fort Riley personnel, authorized contractors, and trespassers contact with MEC in the top 2 feet of the Republican River and Breakneck Creek and surrounding banks while maintaining the intended future land use which is primarily recreational use.

## **Summary of Remedial Alternatives**

In the 2018 FS, five alternatives were initially screened to address MEC hazards at the CFLFA2 MRS. Due to initial feedback from stakeholders, changes were made to the alternatives as presented in the FS. A substantial change has been made to enlarge the MRS area to the north to include Breakneck Creek up to the Breakneck Lake dam. Each alternative is summarized and the revisions to the alternatives are presented below. Revised cost estimates are attached to this Proposed Plan.

### **Alternative 1: No Action**

*Estimated Capital Cost: \$0*  
*Total 30-Year O&M Cost: \$0*  
*Total Present Worth Cost: \$0*



No action leaves the MRS in its present condition. It is required by the NCP for comparisons to other remedial alternatives that offer a greater level of response.

### **Alternative 2: LUCs**

*Estimated Capital Cost: \$400,000*  
*Total 30-Year O&M Cost: \$357,000*  
*Total Present Worth Cost: \$757,000*

The use of LUCs on Army-owned portions of the MRS would provide a means for Fort Riley to reduce munitions encounters and handling by site users through education and training. Components of a LUC alternative would include administrative mechanisms such as updating the installation master plan, dig permit restrictions/requirements, contractor training, and construction support. Sign placement along the boundary of impacted areas, shown conceptually on **Figure 7A** and **Figure 7B**, would be used to convey information on hazards. Development and distribution of public awareness information and educational materials would also be included.

Due to the dynamic nature of the Republican River, surface sweeps would be recommended to locate and remove any items that have become exposed at the surface. The survey area is the section of the Republican River within the MRS, within the blue and white dashed line, and from the junction of Breakneck Creek and the Republican River upstream to the Breakneck Lake dam (**Figure 7A** and **Figure 7B**). These surveys would initially be conducted annually after initiation of the remedial action and then evaluated annually thereafter based on data obtained from the previous survey(s) to determine the need for inspection interval increases or decreases. Additional survey(s) may be required during drought years should it be determined that the river height has been lowered or after heavy rain events (i.e. related to flooding), potentially exposing items. The low flow and high river flow rates that trigger out-of-cycle surveys would be calculated from historical data and determined in the remedial design phase. Detailed specifications for implementation

and monitoring of LUCs would be determined during the remedial design phase and would be consistent with the Army's area development plans. This alternative was retained following the initial screening assessment for detailed analysis.

### **Alternative 3: Surface and Subsurface Removal of Military Munitions in Breakneck Creek and Implementation of LUCs**

*Estimated Capital Cost: \$1,417,000*  
*Total 30-Year O&M Cost: \$357,000*  
*Total Present Worth Cost: \$1,774,000*

MEC would be removed using primarily land-based methods from Breakneck Creek in the area from the junction of Breakneck Creek and the Republican River upstream to the Breakneck Lake Dam as shown on **Figure 7A** and **Figure 7B**. The removal area would be at least 75 feet on either side of Breakneck Creek and all anomalies would be investigated. Because Breakneck Creek is an intermittent stream, removal activities would be performed during the dry season. Any area with remaining standing water would be cleared by a **UXO Technician**. LUCs would also be implemented as described under Alternative 2. This alternative was retained following the initial screening assessment for detailed analysis.

### **Alternative 4: MEC Clearance for Republican River and Breakneck Creek and LUCs**

*Estimated Capital Cost: \$4,325,000*  
*Total 30-Year O&M Cost: \$357,000*  
*Total Present Worth Cost: \$4,682,000*

MEC would be removed from Breakneck Creek as described under Alternative 3, with additional MEC removal within the Republican River inside the MRS as shown in **Figure 7A** and **Figure 7B**. Within the deeper sections of the Republican River, UXO divers would be utilized for MEC removal. LUCs would also be implemented as described under Alternative 2. This alternative was retained following the initial screening assessment for detailed analysis.

**Alternative 5: Surface and Subsurface Removal of Military Munitions to Support Unlimited Use/Unrestricted Exposure (UU/UE) – Initial Screening Assessment Only.** The Republican River would be diverted, and the sediments dried such that MEC could be located and removed using terrestrial methods. This would enable the location and removal of MEC to a deeper depth than water-based techniques. Although this alternative would be effective at reducing the risks by removing MEC at the MRS, achieving unlimited use/restricted exposure, the alternative was not retained after the initial screening due to implementability, and cost. The remedy was determined to not be implementable as the properties located southwest of the MRS, through which the river would need to be diverted, are privately-owned and commercially used. In addition, the capital cost of this alternative was considered very high in comparison with the other alternatives evaluated. Therefore, Alternative 5 was not retained for detailed analysis following the initial screening assessment.

## Evaluation of Alternatives

The evaluation of alternatives entails performing a detailed analysis of each alternative independently, followed by a comparative analysis of the results. Nine (9) criteria are required by the NCP to be used for the detailed and comparative analyses, 40 CFR §300.430(e)(9)(iii). The criteria are separated into three (3) groups. Each group and criterion are described below.

Threshold criteria are required to be met for selection, including: overall protection of human health and the environment; and, compliance with applicable, or relevant and appropriate requirements (ARARs).

Balancing criteria are used to weigh major trade-offs between alternatives including: long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and costs.

Modifying criteria includes state acceptance and community acceptance, which can only be fully evaluated following the public comment period for a Proposed Plan.

A comparison of the results of the detailed analysis of Alternatives 1 through 4 with regard to the required NCP criteria is summarized in **Table 2** and described below. A detailed description of this evaluation is provided in the final FS (Bay West, 2018).

For compliance with ARARs, the following was documented in the final FS. No ARARs or to be considered information were identified for Alternative 1. For Alternatives 2, 3 and 4, location-specific and action-specific ARARs were identified, and all three alternatives were determined to be able to be comply with these ARARs. No chemical-specific ARARs were identified. Therefore, none of the alternatives were evaluated to be better or worse at compliance with ARARs. The identified ARARs for Alternatives 2, 3 and 4 are three applicable federal location-specific ARARs, including the Federal Endangered Species Act (16 USC 1531), the Migratory Bird Treaty Act (16 USC 703 et seq.), and the Bald and Golden Eagle Protection Act (16 USC 668 et seq.). One applicable state location-specific ARAR was identified: the Kansas Threatened and Endangered Species Regulations (K.S.A. 32-963, Kansas Non-game and Endangered Species Conservation Action). Also, one federal action-specific ARAR was identified as appropriate and relevant: Subpart X of RCRA for miscellaneous units (40 CFR 264.601).

**Alternative 1** – No Action has no costs and no implementability issues, but the alternative would not be effective in the long-term as no actions to address MEC would be taken.

**Alternative 2** – LUCs would be easy to implement on installation property. Ease of implementation off installation property would be dependent on private landowners' willingness to coordinate implementation with the Army. Alternative 2 may not meet the RAOs of minimizing exposure to MEC while maintaining current land use. LUCs would be effective over the long-term so long as the

LUCs are maintained. However, no MEC would be removed from the MRS except that found during periodic surface sweeps.

**Alternative 3** – Military munitions removal in Breakneck Creek with LUCs is more expensive than Alternative 2 but would provide an additional level of protection as MEC would be removed from Breakneck Creek. It would be moderately difficult to implement and would be effective over the long-term so long as LUCs are maintained.

**Alternative 4** – Military munitions removal for the Republican River and Breakneck Creek with LUCs would be the most effective as MEC would be removed from the MRS. It would also minimize the potential for movement of MEC into areas previously cleared. However, due to the dynamic nature of the Republican River, it would be the most difficult to implement, and would take the longest amount of time to achieve the RAO. This alternative would be the most protective and effective over the long-term based on the increased area that would be addressed by removal activities, so long as LUCs are maintained.

## Preferred Alternative

Based on the information available, the preferred alternative is Alternative 4, MEC Clearance for Republican River and Breakneck Creek and LUCs. The remediation area is depicted **Figure 7A** and **Figure 7B**. Please note that the property lines and remediation areas drawn on **Figures 7A** and **7B** are approximate and will be further refined during the remedial design. In addition, the Army's MRS boundary depiction is approximate with respect to hazards. As such, during the remedial design and with stakeholder approval, the Army may further delineate the affected area to increase or decrease the size of the MRS area as it applies to implementation of Alternative 4. The Army will work with affected private property landowners regarding implementation of Alternative 4. Successful implementation of Alternative 4 is subject to private property landowner approvals where applicable.

Alternative 4 can be implemented to achieve the RAO in a cost-effective manner while providing the highest level of overall protectiveness relative to current and reasonably anticipated future land use at the MRS. Alternative 4 would comply with ARARs. The total cost estimated for Alternative 4 over a 30-year period is \$4,366,000 (rounded to nearest thousand dollars). The USEPA and KDHE support the Army's selection of Alternative 4.

The Army believes the preferred alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The Army expects the preferred alternative to satisfy the following statutory requirements of CERCLA §121(b): (1) be protective of human health and the environment; (2) comply with ARARs; (3) be cost effective; and, (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) satisfy the preference for treatment as a principal element.

The NCP at 40 CFR 300.430(f)(4)(ii) requires reviews no less than every five (5) years in cases where a remedial action results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for UU/UE. Because Alternative 4 would not allow for UU/UE at this time, a statutory review would be conducted within five (5) years after initiation of the remedial action to ensure that the remedy is protective of human health and the environment. After the initial five (5) year review, the risk would be evaluated, along with historical data, to determine the need to continue with additional five (5) year reviews.

## Community Participation

The Army provides information regarding the investigations and remedial decision-making for the MRS to the public through this Proposed Plan, the Administrative Record file, local information repositories, and

announcements published in the *Junction City Daily Union News* and the *Manhattan Mercury*.

The Army, in consultation with the USEPA and KDHE, will evaluate the public's reaction to the preferred remedial alternative during the public comment period before deciding on the final remedy. Based on new information or public comments received, the Army may modify the proposed remedial alternative or select another alternative outlined in this Proposed Plan.

The Army encourages the public to gain a more comprehensive understanding of the MRS, including the RI activities and FS performed that lead to this proposal for Alternative 4, MEC Clearance for Republican River and Breakneck Creek and LUCs. The public has until November 7, 2019 to comment on this Proposed Plan.

See the information on **Page 1** to find out how your opinion can be heard. The Army will respond in writing to comments in a responsiveness summary that will be part of the final ROD. The Army will announce the selected remedy in the local newspapers and will place a copy of the final ROD in the Administrative Record file and information repositories.

**Table 2 Comparison Summary of Remedial Alternatives**

MRS	Type	Screening Criterion	Alternative 1: No Action	Alternative 2: LUCs	Alternative 3: Surface and Subsurface Removal of Military Munitions in Breakneck Creek and LUCs	Alternative 4: MEC Clearance for Republican River and Breakneck Creek and LUCs
CFLFA2	Threshold	Overall Protection of Human Health and the Environment	No	No	Yes	Yes
		Compliance with ARARs	Yes	Yes	Yes	Yes
	Balancing	Long-Term Effectiveness	○	◇ (Effective Not Permanent)	◇ (Effective Not Permanent)	● (Effective Not Permanent)
		Reduction of Toxicity, Mobility and Volume through Treatment	○	◇	◇	●
		Short-Term Effectiveness	●	●	●	●
		Implementability	●	●	●	●
		-Technical Feasibility	●	●	●	●
		-Administrative Feasibility	●	●	●	●
		-Availability of Materials and Services	●	●	●	●
		Cost <sup>1</sup>	\$0	\$757,000	\$1,774,000	\$4,682,000
	Modifying <sup>2</sup>	Regulatory Agency Acceptance	TBD	TBD	TBD	TBD
		Community Acceptance	TBD	TBD	TBD	TBD

● Complies with criteria.

◇ Partially complies with criteria.

○ Does not comply with criteria.

<sup>1</sup> Costs have been rounded to the nearest thousand dollars and estimates are expected to be accurate within a range of +50% to -30%. 30-Year present worth costs assuming a 0.7% escalation factor (OMB, 2016). Costs are detailed in Attachment 1.

<sup>2</sup> The modifying criteria of regulatory agency and community acceptance are to be determined (TBD) following review and input from these parties and will be evaluated in the ROD.

**For further information on the Camp Forsyth Landfill Area 2 MRS, please contact:**

U.S. Army – Fort Riley  
Name: David P. Jones  
Title: Project Manager  
Address: Environmental Division  
Directorate of Public Works  
Building 407 Pershing Court  
Fort Riley, KS 66442  
Email: david.p.jones124.civ@mail.mil

**Or visit and review a copy of the Administrative Record file and other project documentation at the following local information repositories:**

**Administrative Record file**

Directorate of Public Works  
Environmental Division  
IMRL-PWE  
Address: 407 Pershing Court  
Fort Riley, Kansas 66442  
Hours: Mon–Fri: 9am–2pm  
Phone: (785) 239-8619

**Dorothy Bramlage Public Library**

Address: 230 West 7th Street  
Junction City, Kansas 66441  
Hours: Mon–Thur: 9am–9pm  
Fri: 9am–6pm  
Sat: 9am–5pm  
Sun: 1pm–5pm

**Manhattan Public Library**

Address: 629 Poyntz Avenue  
Manhattan, Kansas 66502  
Hours: Mon–Thur: 9am–9pm  
Fri: 9am–9pm  
Sat: 9am–6pm  
Sun: 1pm–6pm

## Glossary of Terms

Specialized terms used in this Proposed Plan are defined below:

**Administrative Record file:** The documents that form the basis for the selection of a response action compiled and maintained by the lead agency (40 CFR 300.800). A copy of this file is available for public review at the locations listed on **Page 13** of this Proposed Plan.

**Anomaly(ies):** Any item that is seen as a subsurface irregularity after geophysical investigation. This irregularity will deviate from the expected subsurface ferrous and non-ferrous material at a site (e.g., pipes, power lines).

**Avulsion:** Lateral displacement of a stream from its main channel into a new course across its floodplain. [Oxford Dictionary of Geology and Earth Sciences, 4<sup>th</sup> Edition, Allaby 2013]

**Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA):** A Federal law passed in 1980 and commonly referred to as the Superfund Program; provides for cleanup and emergency response in connection with inactive hazardous waste disposal sites that endanger public health and safety or the environment. CERCLA was modified in 1986 by the Superfund Amendments and Reauthorization Act.

**Defense Environmental Restoration Program (DERP):** Under DERP, DoD conducts environmental remediation at active installations, Formerly Used Defense Sites, and Base Realignment and Closure (BRAC) locations. The Army, Navy, Air Force, and Defense Logistics Agency manage the programs at their active installations and BRAC locations. The Army oversees execution of the cleanup program. The Office of the Secretary of Defense, through the Deputy Under Secretary of Defense for Installations and Environment, Environment, Safety, and Occupational Health Directorate, manages and oversees DERP and provides program guidance.

**Explosive Hazard:** A condition where danger exists because explosives are present that may react (e.g., detonate, deflagrate) in a mishap with potential unacceptable effects (e.g., death, injury, damage) to people, property, operational capability, or the environment. [Department of the Army Office of the Assistant Secretary Installations and Environment, Memorandum for the Assistant Chief of Staff For Installation Management,

Subject: Munitions Response Terminology, 21 April 2005.] The potential for an explosive safety hazard depends on the presence of three critical elements: a source (presence of MEC), a receptor or person, and an interaction between the source and the receptor (such as picking up the item or disturbing the item by digging). There is no explosive hazard if any one element is missing.

**Feasibility Study (FS):** A study undertaken by the lead agency to develop and evaluate options for remedial action if unacceptable risks and hazards exist. The RI data are used to define the objectives of the response action, to develop remedial action alternatives, and to undertake an initial screening and detailed analysis of the alternatives. The term also refers to a report that describes the results of the study.

**Fuze:** A mechanical or electrical detonating device for setting off the bursting charge of a projectile, bomb, or torpedo.

**Information Repository:** A repository, generally located at libraries or other publicly accessible locations in or near the community affected by the project area, which contains accurate and up-to-date documents reflecting the ongoing environmental restoration activities. Two information repositories were established for the project at the locations identified on **Pages 1 and 13** of this Proposed Plan.

**Military Munitions Response Program (MMRP):** In 2001, DoD established the MMRP to address sites (referred to as MRSs) known or suspected to contain UXO, discarded military munitions, or MC. Through the MMRP, DoD complies with environmental remediation laws, such as CERCLA.

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

**Munitions Debris (MD):** Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal. [Department of the Army Office of the Assistant Secretary Installations and Environment, Memorandum for the Assistant Chief of Staff For Installation Management,

Subject: Munitions Response Terminology,  
21 April 2005]

**Munitions and Explosives of Concern (MEC):**

Specific categories of military munitions that may pose unique explosives safety risks, specifically composed of (a) UXO, (b) discarded military munitions, or (c) MC (e.g., trinitrotoluene [TNT], hexahydro-1,3,5-trinitro-1,3,5-triazine [RDX]) present in high enough concentrations to pose an explosive hazard.

**Munitions Response Site (MRS):** A discrete location that is known to require a munitions response due to suspected or known UXO, discarded military munitions, or MC. Examples include former ranges and munitions burial areas.

**National Oil and Hazardous Substances**

**Pollution Contingency Plan (NCP):** The plan revised pursuant to 42 USC 9605 and found at 40 CFR 300 that sets out the plan for hazardous substance remediation under CERCLA.

**Proposed Plan:** A document that presents a proposed remedial alternative, including rationale for selection, and requests public comments regarding the proposed alternative.

**Record of Decision (ROD):** A legal public document, completed for NPL sites, that certifies that the remedy selection process was carried out in accordance with CERCLA and the NCP; provides a substantive summary of the technical rationale and background information in the Administrative Record file; provides information necessary in determining the conceptual engineering components to achieve the remedial action objective established for a site; and serves as a key communication tool for the public that explains the identified hazards that the selected

remedy will address and the rationale for remedy selection. The ROD will be maintained in the Administrative Record file.

**Remedial Investigation (RI):** A process undertaken to determine the nature and extent of potential human health and/or environmental concern(s). The RI emphasizes data collection and site characterization and is generally performed concurrently and in an interactive fashion with the FS. The RI includes sampling and monitoring, as necessary, and the gathering of sufficient information to determine the necessity for remedial action and to support the evaluation of remedial alternatives

**Site Inspection (SI):** An on-site investigation to determine whether there is a release or potential release and the nature of the associated threats. The purpose is to augment the data collected during the Archive Search Report and to generate, if necessary, sampling and other field data to determine whether further action or investigation is appropriate.

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

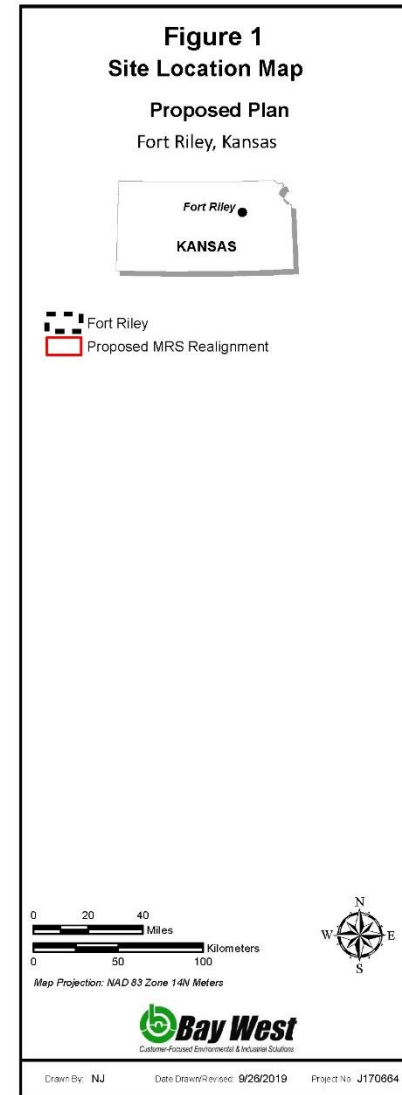
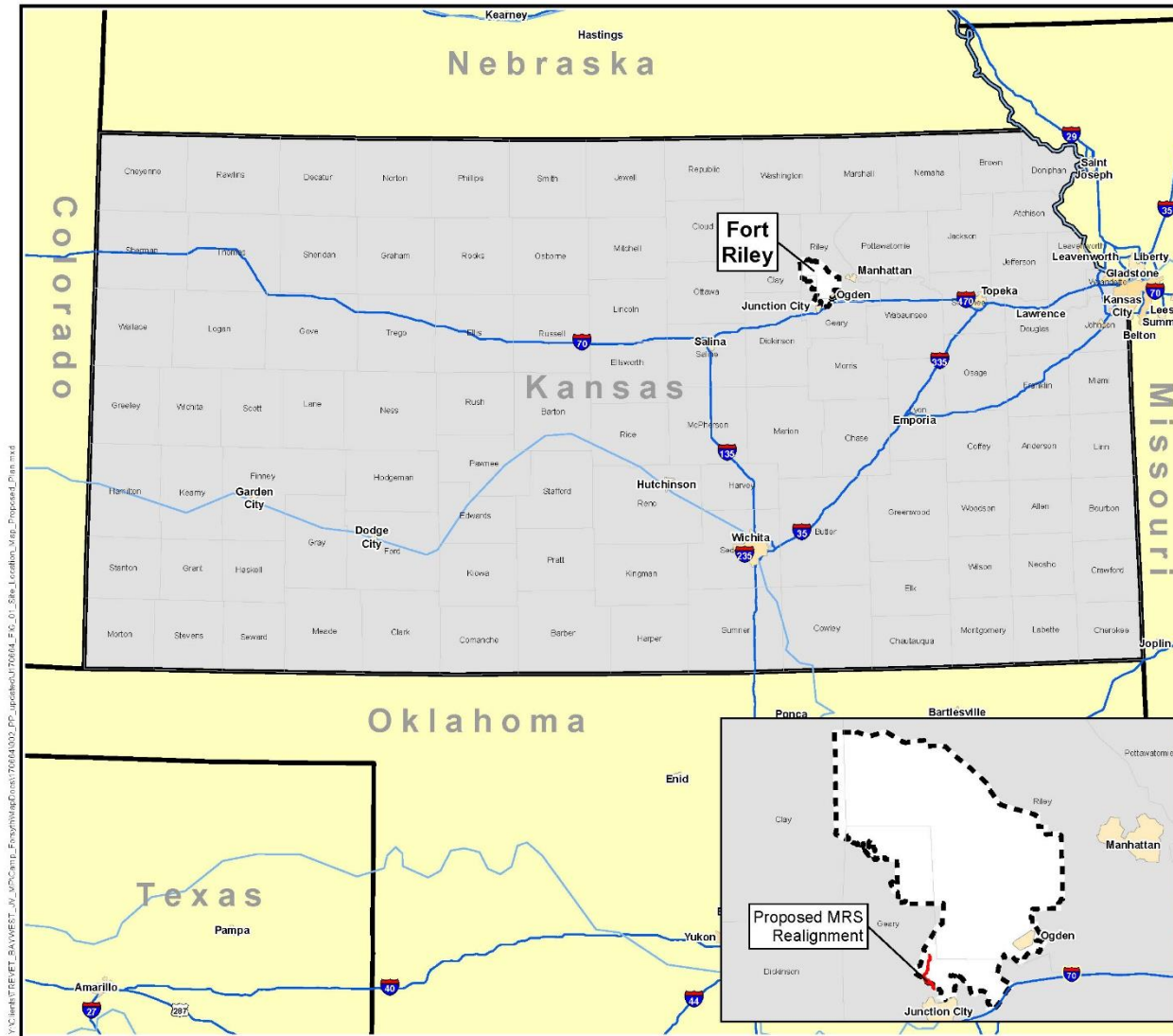
**UXO Technician:** Personnel who are qualified for and are filling Department of Labor, Service Contract Act, and Directory of Occupations contractor positions of UXO Technician I, UXO Technician II, and UXO Technician III.



## Acronyms and Abbreviations

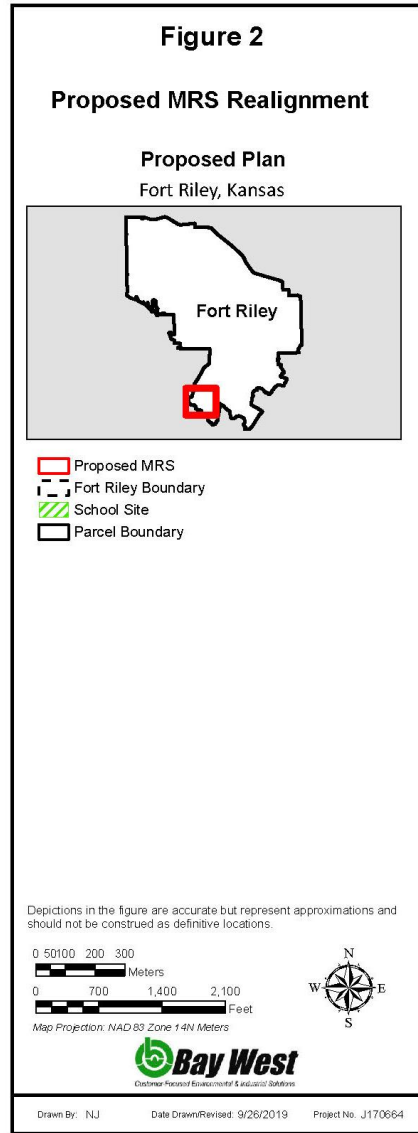
ARAR .....	applicable or relevant and appropriate requirement	MRS.....	munitions response site
Army.....	Department of the Army	NCP .....	National Oil and Hazardous Substances Pollution Contingency Plan
Bay West..	Bay West LLC	NPL.....	National Priorities List
BRAC .....	Base Realignment and Closure	OB/OD .....	open burn/open detonation
CERCLA ..	Comprehensive Environmental Response, Compensation, and Liability Act	PAOC .....	potential area of environmental concern
CFLFA2...	Camp Forsyth Landfill Area 2	RAB .....	Restoration Advisory Board
CFR.....	Code of Federal Regulations	RAO.....	remedial action objective
DERP .....	Defense Environmental Restoration Program	RAP .....	Removal Action Plan
DGM.....	digital geophysical mapping	RCRA .....	Resource Conservation and Recovery Act
DoD.....	Department of Defense	RDX .....	hexahydro-1,3,5-trinitro-1,3,5-triazine
EOD .....	Explosive Ordnance Disposal	RI .....	Remedial Investigation
FS.....	Feasibility Study	SI .....	Site Inspection
HRR .....	Historical Records Review	SLERA.....	screening level ecological risk assessment
HHRA .....	human health risk assessment	TBD .....	to be determined
KDHE .....	Kansas Department of Health and Environment	TNT.....	trinitrotoluene
LUCs .....	land use controls	U.S.....	United States
MC .....	munitions constituents	USEPA ...	U.S. Environmental Protection Agency
MD .....	munitions debris	UU/UE .....	Unlimited Use/Unrestricted Exposure
MEC.....	munitions and explosives of concern	UXO.....	unexploded ordnance
MMRP .....	Military Munitions Response Program		

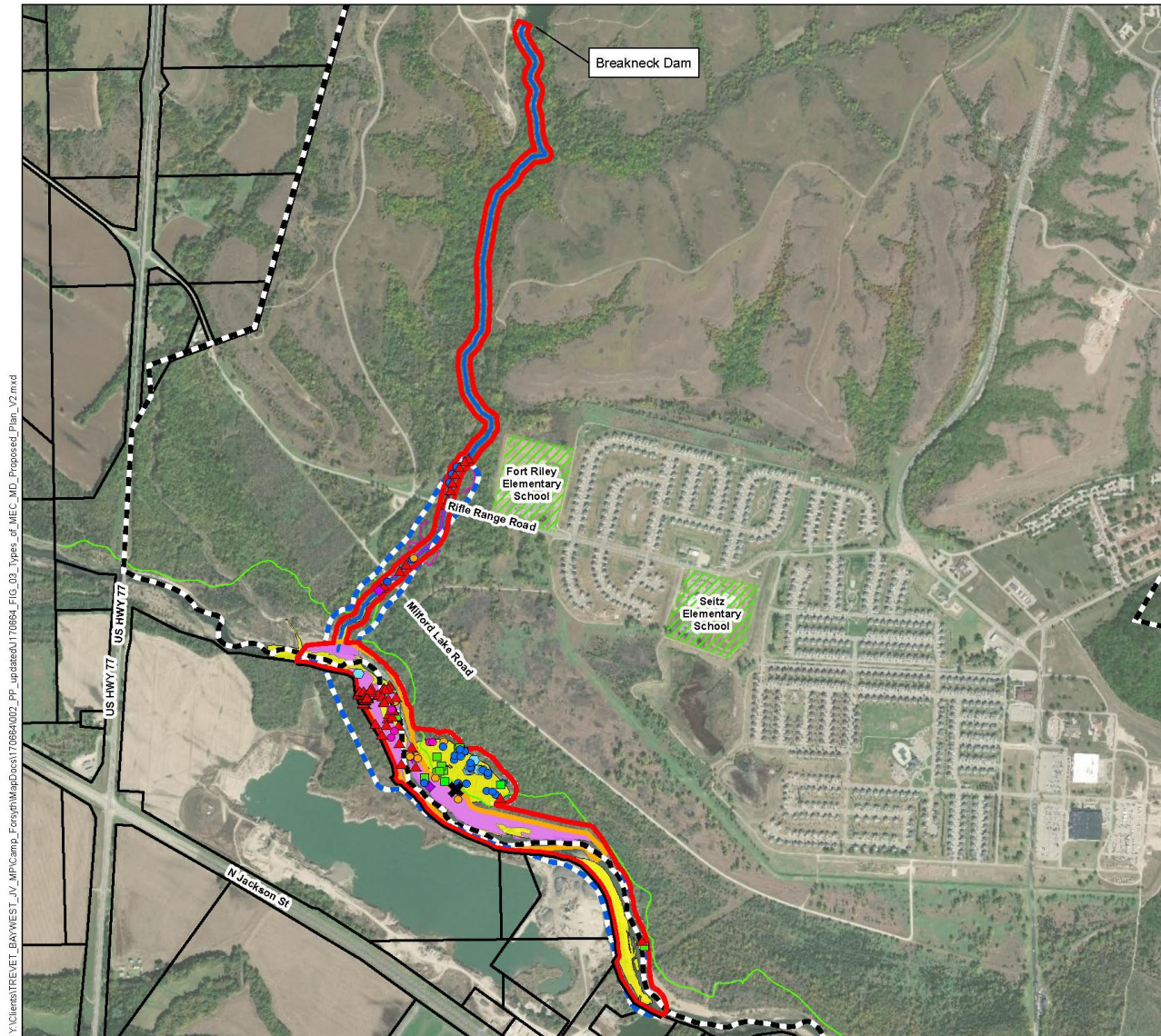
## Figures





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**Figure 3**  
**Types of Munitions or**  
**Components Recovered,**  
**Mobilizations 1, 2, and 3**  
**Proposed Plan**  
**Fort Riley, Kansas**

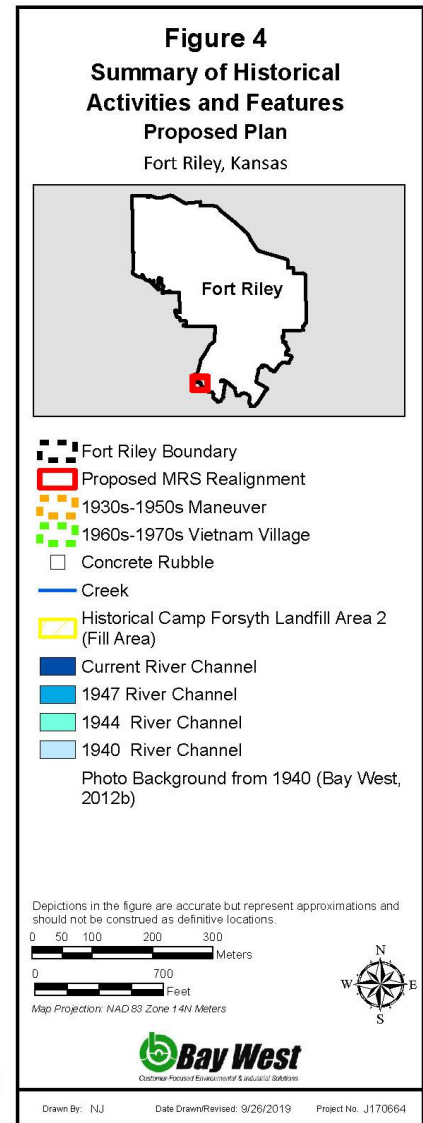
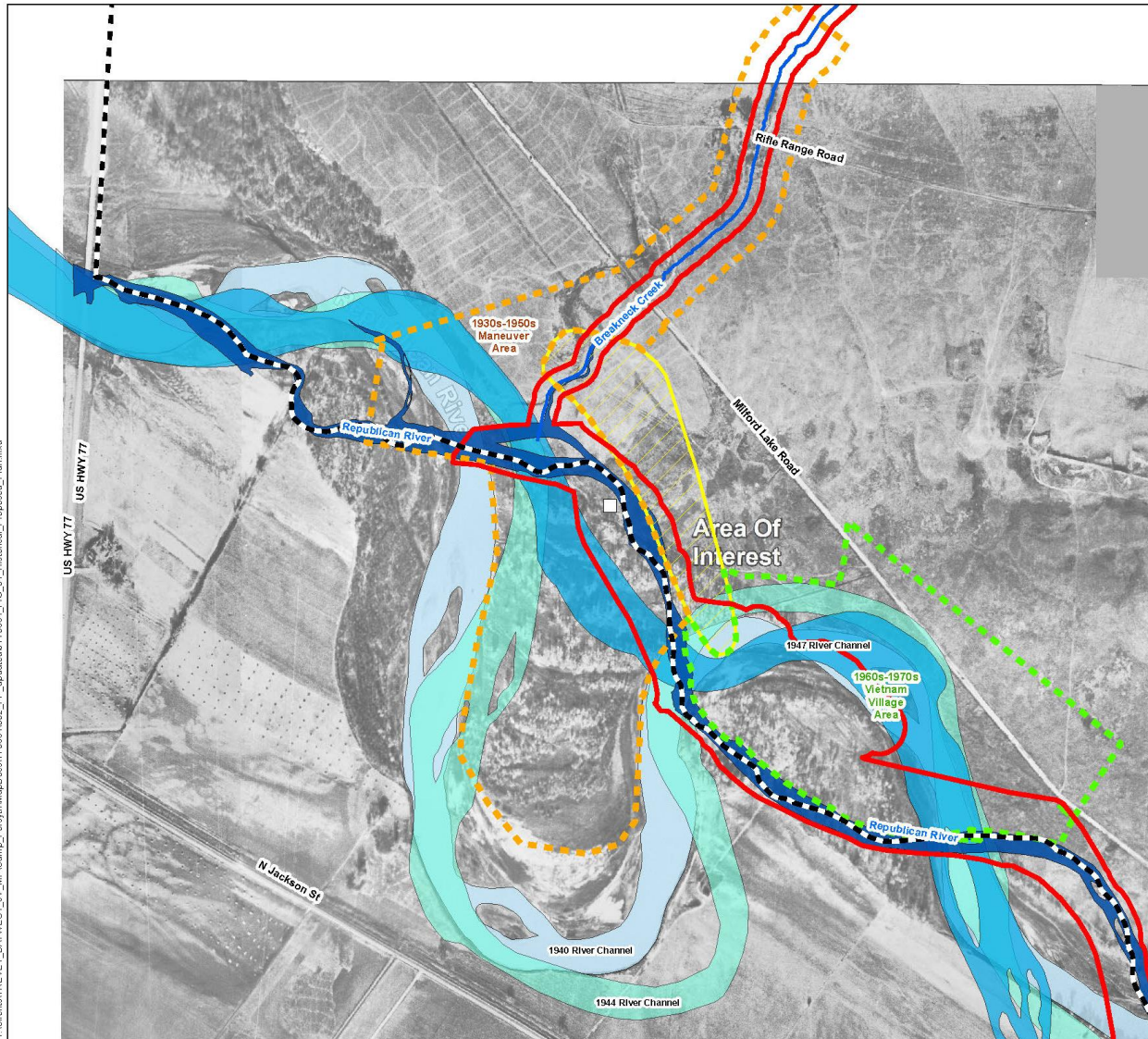


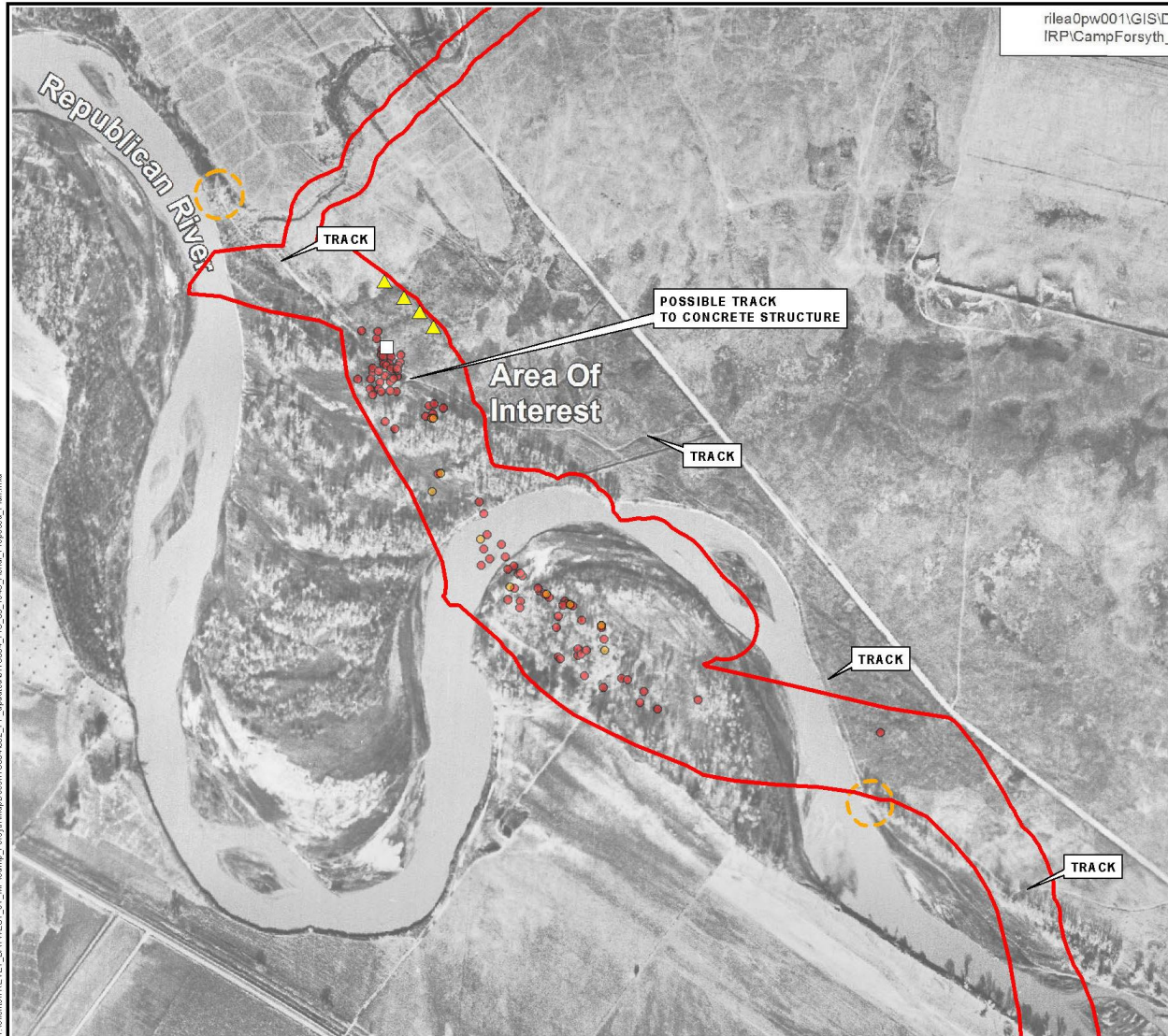
- ✱ Bulk Explosives
- ▲ Rocket
- Grenade
- Mines
- ◆ Mortars
- Trip Flare
- Smoke Rifle
- AT Rifle Grenade
- ▭ Proposed MRS Realignment
- ▭ Overall Investigative Area, ESS (Bay West, 2008), Amendment 1 ESP (Bay West, 2013), and Amendment 2 ESP (Bay West, 2015)
- ▭ Analog Area Investigated during Mob 3, 0.8 acres
- ▭ Fort Riley Boundary
- ▭ CFLFA2 Boundary, 34.9 acres
- ▭ Nature Trail
- ▭ Creek
- ▭ Area Investigated during Mob 1, 18.7 Acres
- ▭ Area Investigated during Mob 2, 44.0 acres
- ▭ School Site
- ▭ Parcel Boundary

Depictions in the figure are accurate but represent approximations and should not be construed as definitive locations.



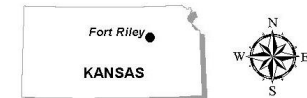
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**Figure 5**  
**Republican River Floodplain**  
**Historic Photo 1940**

Proposed Plan  
Camp Forsyth Landfill Area 2 MRS  
Fort Riley, Kansas



Map Projection: NAD 83 Zone 14 NAD 83 Meters  
1934 Map, CFLFA-0299



**Legend**

- MEC Location (Identified in 2011)
- MD Location (Identified in 2011)
- ▲ Approximate Location of Trenches Exposed in River Bank
- Concrete Rubble
- Disturbed Area
- Proposed MRS Realignment

Depictions in the figure are accurate but represent approximations and should not be construed as definitive locations.

Contract No.: W9128F-11-D-0033  
Task Order: 0001

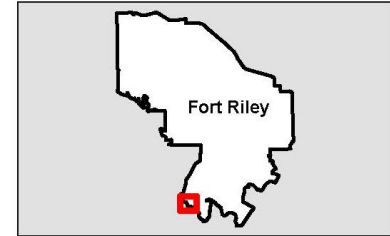


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**Figure 6**  
**Historical Maneuver and Training Areas**  
**Proposed Plan**  
Fort Riley, Kansas



- Proposed MRS Realignment
- MEC Item
- Feasibility Study Areas
- Overall Investigative Area, ESS (Bay West, 2008), Amendment 1 ESP (Bay West, 2013), and Amendment 2 ESP (Bay West, 2015)
- Fort Riley Boundary
- Historical Camp Forsyth Landfill Area 2 (Fill Area)
- Historical Maneuver Areas
- Nature Trail
- Creek
- Active Training Area
- School Site

Depictions in the figure are accurate but represent approximations and should not be construed as definitive locations.

0 50 100 200 300 Meters

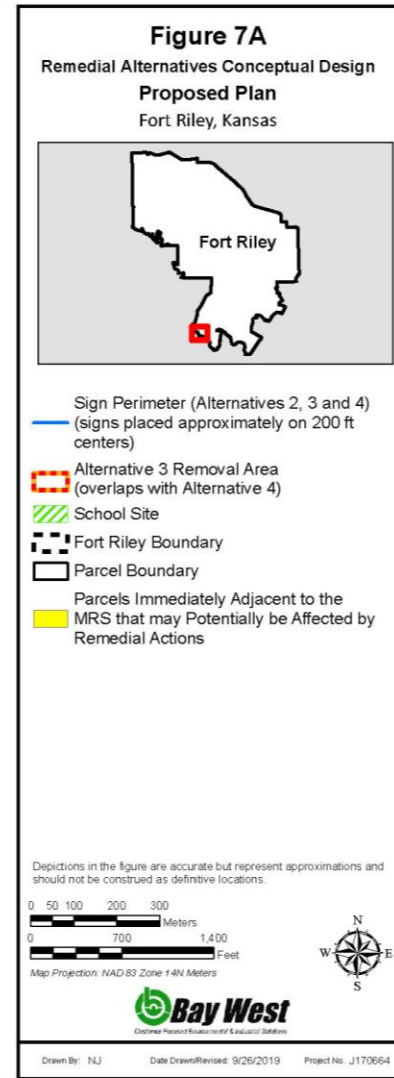
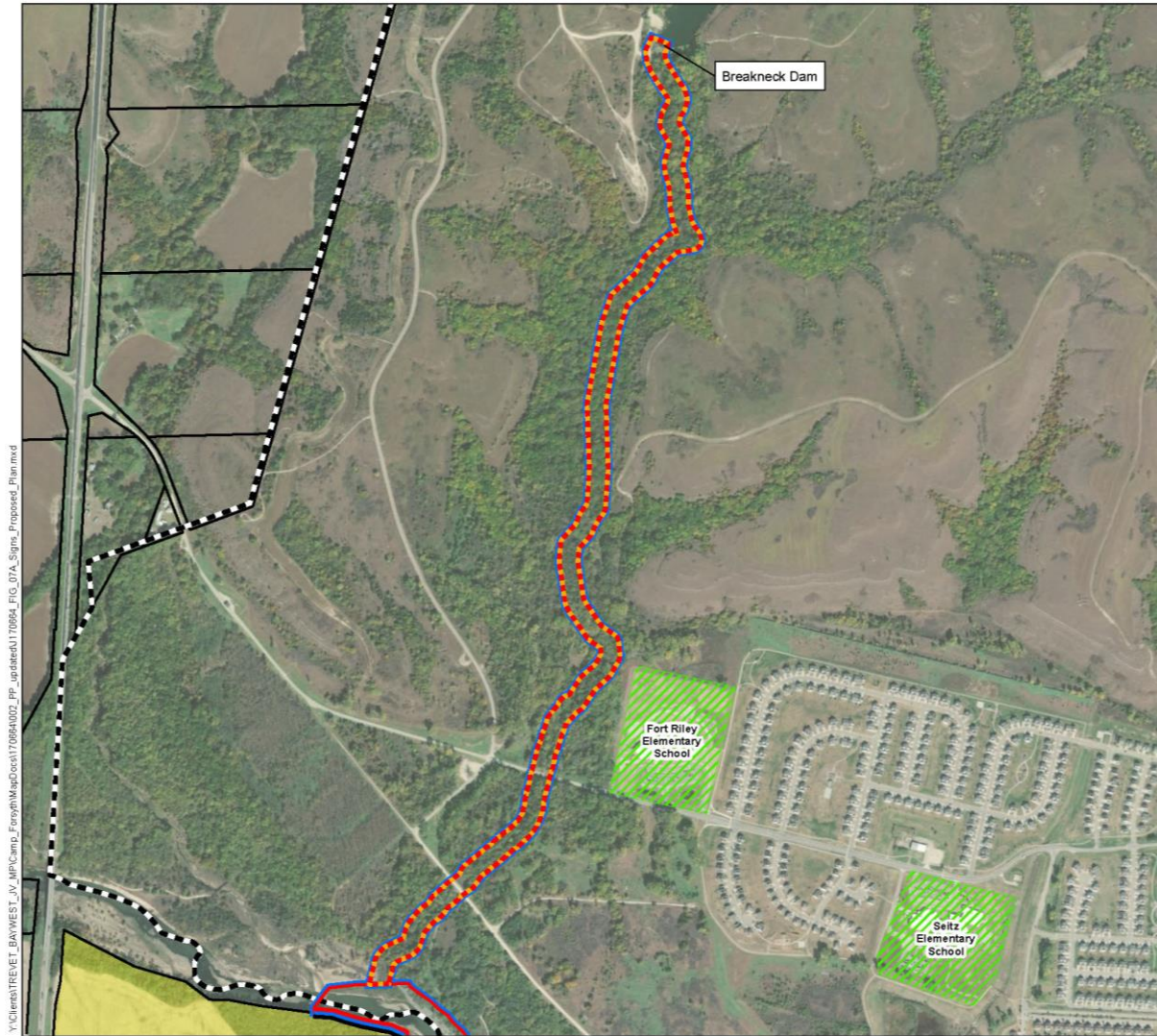
0 700 1,400 Feet

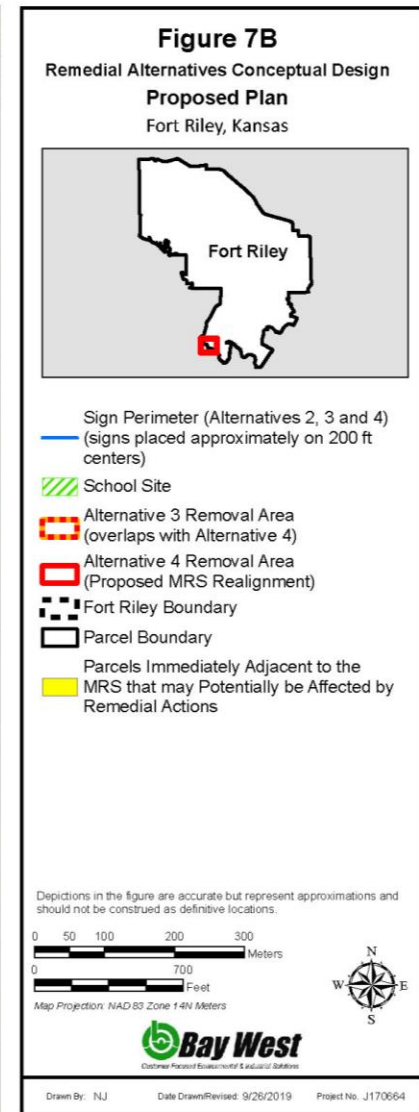
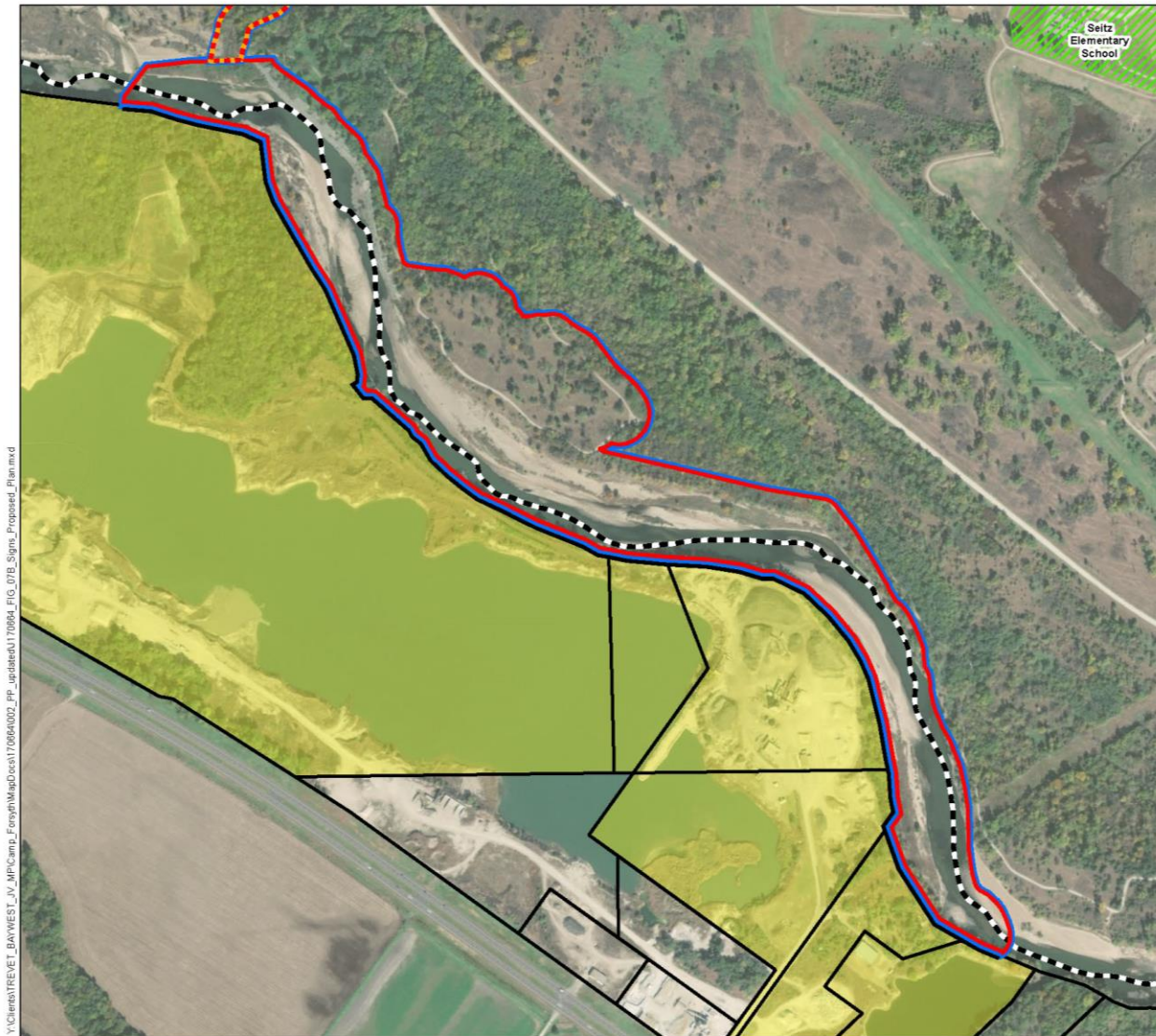
Map Projection: NAD 83 Zone 14N Meters



Drawn By: NJ Date Drawn/Revised: 9/26/2019 Project No. J170664







## References

- Bay West, 2011. *Technical Memorandum, Military Munitions Response Program Remedial Investigation/Feasibility Study, Fort Riley, Camp Forsyth Landfill Area 2, Junction City, Kansas*. December.
- Bay West, 2012. *Draft Final MMRP Historical Records Review, Camp Forsyth Landfill Area 2 MRS, Fort Riley, Kansas*. October.
- Bay West, 2017. *Final Remedial Investigation Report, Camp Forsyth Landfill Area 2 MRS, Fort Riley, Kansas*. September.
- Bay West, 2018. *Final Feasibility Study, Camp Forsyth Landfill Area 2 MRS, Fort Riley, Kansas*. August.
- Engineering-Environmental Management, Inc., 2006. *Final Site Inspection Report Fort Riley, Kansas, Military Munitions Response Program*. June.
- Louis Berger & Associates, 1993. *Installation Wide Assessment, Fort Riley, Kansas*. February.
- U.S. Environmental Protection Agency (USEPA), 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Office of Emergency and Remedial Response, EPA/540/G-89/004, OSWER Directive 9355.3-01*. October.
- USEPA, 1999. *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*. EPA 540-R-98-031. OSWER 9200-1-23P.
- Wenck Associates, Inc., 2001. *Draft Final Removal Action Report: Republican River Bank Stabilization, Camp Forsyth Former Landfill Area 2 Fort Riley, Kansas*, Prepared for U.S. Army Corps of Engineers, Kansas City District. December.



# Follow the 3Rs

## Recognize

Recognize when you may have encountered a munition.

Recognizing when you may have encountered a munition is the most important step in reducing the risk of injury or death. Munitions may be encountered on land or in the water. They may be easy or hard to identify. To avoid risk of injury or death:

- Never move, touch, or disturb a munition or suspect munition.
- Be aware that munitions do not become safer with age, in fact, they may become more dangerous.
- Don't be tempted to take or keep a munition as a souvenir.

Munitions come in many sizes, shapes, and colors. Some may look like bullets or bombs while others look like pipes, small cans or even a car muffler. Whether whole or in parts, new or old, shiny or rusty, munitions can still explode.



M8 anti-personnel land mine

## Retreat

Do not touch, move, or disturb it, but carefully leave the area.

Avoid death or injury by recognizing that you may have encountered a munition and promptly retreating from the area.

If you encounter what you believe is a munition, do not touch, move, or disturb it. Instead, immediately and carefully leave the area by retracing your steps, leaving the same way you entered. Once safely away from the munition, mark the path (e.g., with a piece of clothing or global positioning system (GPS) coordinates) so response personnel can find the munition.



3.5-inch and 2.36-inch rocket parts and pieces

## Report

Immediately notify the police.

Protect yourself, your family, your friends, and your community by immediately reporting munitions or suspected munitions to the police.

Help the police by providing as much information as possible about what you saw and where you saw it. This information will help the police and the military or civilian explosives ordnance disposal personnel find, evaluate, and address the situation.

If you believe you may have encountered a munition, call and report the following:

- The area where you encountered it.
- Its general description. Remember: do not approach, touch, move, or disturb it.
- When possible, provide:
  - Its estimated size
  - A photograph
  - Its shape
  - Any visible markings, including coloring

**CALL 911!**



3Rs Explosives Safety  
Education Website

[www.denix.osd.mil/uxosafety](http://www.denix.osd.mil/uxosafety)

**R**ecognize  
**R**etreat  
**R**eport

**Attachment 1**

**Cost Estimates**

## COST ESTIMATE SUMMARY

Alternative 1  
No Action

Site: Camp Forsyth Landfill Area 2 (FTRI-003-R-01)  
 Location: Fort Riley, KS  
 Phase: Feasibility Study  
 Base Year: 2019

Capital Costs					
Description	QTY	UNIT	UNIT COST	TOTAL	NOTES
None	0	LS	\$0	\$0	Baseline for comparison
<b>TOTAL CAPITAL COST</b>				<b>\$0</b>	

Annual Operation and Maintenance (O&M) Costs					
Description	QTY	UNIT	UNIT COST	TOTAL	NOTES
None	0	EA	\$0	\$0	Baseline for comparison
<b>TOTAL ANNUAL COST</b>				<b>\$0</b>	

Periodic Costs					
Description	QTY	UNIT	UNIT COST	TOTAL	NOTES
None	0	EA	\$0	\$0	Baseline for comparison
<b>TOTAL PERIODIC COST</b>				<b>\$0</b>	

TOTAL COST \$0

  Total Present Worth Cost: \$0

Alternative 2  
Land Use Controls

# COST ESTIMATE SUMMARY

Site: Camp Forsyth Landfill Area 2 (FTRI-003-R-01)  
 Location: Fort Riley, KS  
 Phase: Feasibility Study  
 Base Year: 2019

**Capital Costs**

Description	QTY	UNIT	UNIT COST	TOTAL	NOTES
Public meeting, LUCIP, Admin Record Update	1	LS	\$ 22,850	\$ 22,850	Update LUC Plan & travel
Master Plan Input	1	LS	\$ 2,500	\$ 2,500	Update Installation-wide planning
Signs	155	EA	\$ 110	\$ 17,050	Engr's Est; 30,925 LF, signs every 200 ft
Sign Installation/Survey	1	LS	\$ 225,580	\$ 225,580	See Cost Worksheet
Training/Education Materials	1	LS	\$ 7,500	\$ 7,500	Engineer's Estimate
Deed Notification and Recording	1	LS	\$ 10,000	\$ 10,000	Engineer's Estimate
Project Contingency	25%			\$ 71,370.00	10% scope +15% bid
Program Management	15%			\$ 42,822.00	
<b>TOTAL CAPITAL COST</b>				<b>\$ 400,000</b>	

**Annual Operation and Maintenance (O&M) Costs**

Description	QTY	UNIT	UNIT COST	TOTAL	NOTES
Annual Sign Maintenance	30	EA	\$ 10,191	\$ 305,726	Replace avg of 2 signs/yr-MRS; 30 yrs
<b>TOTAL ANNUAL COST (30 YEARS)</b>				<b>\$ 306,000</b>	

**Periodic Costs**

Description	QTY	UNIT	UNIT COST	TOTAL	NOTES
Five Year Review	6	EA	\$ 12,000	\$ 72,000	Update every 5 years for 30 years (one report)
<b>TOTAL PERIODIC COST</b>				<b>\$ 72,000</b>	

**TOTAL 30-YEAR O&M COST 1.5% DISCOUNT \$ 357,000**

**TOTAL PRESENT WORTH COST (1.5% DISCOUNT) \$ 757,000**



Alternative 2  
Land Use Controls

## PRESENT WORTH SUMMARY

Site: Camp Forsyth Landfill Area 2 (FTRI-003-R-01)  
Location: Fort Riley, KS  
Phase: Feasibility Study  
Base Year: 2019

**Present Value Analysis**

Annual Percentage Rate 0.7%

YR	Capital	O&M Annual	Periodic Cost	Total Costs	Present Worth
0	\$400,000	-	-	\$400,000	\$400,000
1	-	\$10,191	-	\$10,191	\$10,120
2	-	\$10,191	-	\$10,191	\$10,085
3	-	\$10,191	-	\$10,191	\$10,050
4	-	\$10,191	-	\$10,191	\$10,015
5	-	\$10,191	\$ 12,000	\$22,191	\$21,732
6	-	\$10,191	-	\$10,191	\$9,946
7	-	\$10,191	-	\$10,191	\$9,911
8	-	\$10,191	-	\$10,191	\$9,877
9	-	\$10,191	-	\$10,191	\$9,843
10	-	\$10,191	\$ 12,000	\$22,191	\$21,360
11	-	\$10,191	-	\$10,191	\$9,776
12	-	\$10,191	-	\$10,191	\$9,742
13	-	\$10,191	-	\$10,191	\$9,709
14	-	\$10,191	-	\$10,191	\$9,675
15	-	\$10,191	\$ 12,000	\$22,191	\$20,996
16	-	\$10,191	-	\$10,191	\$9,609
17	-	\$10,191	-	\$10,191	\$9,576
18	-	\$10,191	-	\$10,191	\$9,544
19	-	\$10,191	-	\$10,191	\$9,511
20	-	\$10,191	\$ 12,000	\$22,191	\$20,640
21	-	\$10,191	-	\$10,191	\$9,447
22	-	\$10,191	-	\$10,191	\$9,415
23	-	\$10,191	-	\$10,191	\$9,383
24	-	\$10,191	-	\$10,191	\$9,351
25	-	\$10,191	\$ 12,000	\$22,191	\$20,293
26	-	\$10,191	-	\$10,191	\$9,288
27	-	\$10,191	-	\$10,191	\$9,256
28	-	\$10,191	-	\$10,191	\$9,225
29	-	\$10,191	-	\$10,191	\$9,194
30	-	\$10,191	\$ 12,000	\$22,191	\$19,953
<b>TOTALS</b>	<b>\$400,000</b>	<b>\$305,726</b>	<b>\$72,000</b>	<b>\$777,726</b>	<b>\$756,521</b>

Alternative 2  
Land Use Controls

# COST WORKSHEET

Site: Camp Forsyth Landfill Area 2 (FTRI-003-R-01)  
Location: Fort Riley, KS  
Phase: Feasibility Study  
Base Year: 2019

## Cost Analysis

### Sign Installation

Description	QTY	UNIT	COST	TOTAL	NOTES
<b>Planning Documents</b>					
Work Plan/APP	1	EA	\$ 45,000	\$ 45,000	
<b>Field Work</b>					
Truck	30	Day	\$ 175	\$ 5,250	
Fuel/Maintenance	300	Gallon	\$ 5	\$ 1,500	
Sales Tax			5%	\$ 338	
<b>Materials and Subcontractors</b>					
Analog metal detector	56	Day	\$ 18	\$ 1,008	
Survey Equipment	28	Day	\$ 200	\$ 5,600	
Misc Equipment/Supplies	1	LS	\$ 5,500	\$ 5,500	
<b>Personnel</b>					
Mob/demob/Lodging/M&IE	82	EA	\$ 156	\$ 12,854	Lodging and M&IE
Air Fare (2)	2	EA	\$ 750	\$ 1,500	RT airline tickets
Project Management	1	LS	\$ 36,700	\$ 36,700	Project mgmt, coordination and procurement
UXO Tech 3 (1)	296	HR	\$ 95	\$ 28,120	Install signs, 30 days incl. mob/demob
UXO Tech 2 (1)	296	HR	\$ 85	\$ 25,160	Install signs, 30 days incl. mob/demob
Surveyor	60	HR	\$ 225	\$ 13,500	Survey Signs and MRS Boundary
Sign Subcontractor	155	EA	\$ 250	\$ 38,750	Engr's Est; drill holes, pour concrete, place signs
Memo Report	1	LS	\$ 4,800.00	\$ 4,800	Includes figures and survey data
<b>TOTAL COST</b>				<b>\$ 225,580</b>	

**Fort Riley**

Alternative 3  
 Surface and Subsurface Removal of Military Munitions in  
 Breakneck Creek and Implementation of LUCs

**COST ESTIMATE SUMMARY**

Site: Camp Forsyth Landfill Area 2 (FTRI-003-R-01)  
 Location: Fort Riley, KS  
 Phase: Feasibility Study  
 Base Year: 2019

<b>Capital Costs</b>						
<b>Description</b>	<b>QTY</b>	<b>UNIT</b>	<b>UNIT COST</b>	<b>TOTAL</b>		<b>NOTES</b>
Public meeting, Admin Record Update	1	LS	\$ 22,850	\$ 22,850		Update LUC Plan & travel
Master Plan Input	1	LS	\$ 2,500	\$ 2,500		Update Installation-wide planning
Signs	155	EA	\$ 110	\$ 17,050		Engr's Est; 30,925 LF, signs every 200 ft
Field Work (MEC Clearance and Sign Install)	1	LS	\$ 952,104	\$ 952,104		See Cost Worksheet
Training/Education Materials	1	LS	\$ 7,500	\$ 7,500		Engineer's Estimate
Deed Notification and Recording	1	LS	\$ 10,000	\$ 10,000		Engineer's Estimate
Project Contingency	25%			\$ 253,000.98		10% scope +15% bid
Program Management	15%			\$ 151,800.59		
<b>TOTAL CAPITAL COST</b>				<b>\$ 1,417,000</b>		

<b>Annual Operation and Maintenance (O&amp;M) Costs</b>						
<b>Description</b>	<b>QTY</b>	<b>UNIT</b>	<b>UNIT COST</b>	<b>TOTAL</b>		<b>NOTES</b>
Annual Sign Maintenance	30	EA	\$ 10,191	\$ 305,726		Replace avg of 2 signs per year-MRS; 30 yrs
<b>TOTAL ANNUAL COST</b>				<b>\$ 306,000</b>		

<b>Periodic Costs</b>						
<b>Description</b>	<b>QTY</b>	<b>UNIT</b>	<b>UNIT COST</b>	<b>TOTAL</b>		<b>NOTES</b>
Five Year Review	6	EA	\$ 12,000	\$ 72,000		Update every 5 years for 30 years (one report)
<b>TOTAL PERIODIC COST</b>				<b>\$ 72,000</b>		

<b>TOTAL 30-YEAR O&amp;M COST 1.5% DISCOUNT</b>	<b>\$ 357,000</b>
<b>TOTAL PRESENT WORTH COST (1.5% DISCOUNT)</b>	<b>\$ 1,774,000</b>

**Fort Riley**

Alternative 3  
 Surface and Subsurface Removal of Military Munitions in  
 Breakneck Creek and Implementation of LUCs

**PRESENT WORTH SUMMARY**

Site: Camp Forsyth Landfill Area 2 (FTRI-003-R-01)  
 Location: Fort Riley, KS  
 Phase: Feasibility Study  
 Base Year: 2019

**Present Value Analysis**

Annual Percentage Rate 0.7%

YR	Capital	O&M Annual	Periodic Cost	Total Costs	Present Worth
0	\$1,417,000	-	-	\$1,417,000	\$1,417,000
1	-	\$10,200	-	\$10,200	\$10,129
2	-	\$10,200	-	\$10,200	\$10,094
3	-	\$10,200	-	\$10,200	\$10,059
4	-	\$10,200	-	\$10,200	\$10,024
5	-	\$10,200	\$ 12,000	\$22,200	\$21,741
6	-	\$10,200	-	\$10,200	\$9,955
7	-	\$10,200	-	\$10,200	\$9,920
8	-	\$10,200	-	\$10,200	\$9,886
9	-	\$10,200	-	\$10,200	\$9,852
10	-	\$10,200	\$ 12,000	\$22,200	\$21,369
11	-	\$10,200	-	\$10,200	\$9,784
12	-	\$10,200	-	\$10,200	\$9,751
13	-	\$10,200	-	\$10,200	\$9,717
14	-	\$10,200	-	\$10,200	\$9,684
15	-	\$10,200	\$ 12,000	\$22,200	\$21,005
16	-	\$10,200	-	\$10,200	\$9,618
17	-	\$10,200	-	\$10,200	\$9,585
18	-	\$10,200	-	\$10,200	\$9,552
19	-	\$10,200	-	\$10,200	\$9,520
20	-	\$10,200	\$ 12,000	\$22,200	\$20,649
21	-	\$10,200	-	\$10,200	\$9,455
22	-	\$10,200	-	\$10,200	\$9,423
23	-	\$10,200	-	\$10,200	\$9,391
24	-	\$10,200	-	\$10,200	\$9,359
25	-	\$10,200	\$ 12,000	\$22,200	\$20,301
26	-	\$10,200	-	\$10,200	\$9,296
27	-	\$10,200	-	\$10,200	\$9,265
28	-	\$10,200	-	\$10,200	\$9,233
29	-	\$10,200	-	\$10,200	\$9,202
30	-	\$10,200	\$ 12,000	\$22,200	\$19,961
<b>TOTALS</b>	<b>\$1,417,000</b>	<b>\$306,000</b>	<b>\$72,000</b>	<b>\$1,795,000</b>	<b>\$1,773,780</b>

Alternative 3  
 Surface and Subsurface Removal of Military Munitions in  
 Breakneck Creek and Implementation of LUCs

# COST WORKSHEET

Site: Camp Forsyth Landfill Area 2 (FTRI-003-R-01)  
 Location: Fort Riley, KS  
 Phase: Feasibility Study  
 Base Year: 2019

**Cost Analysis**

**Breakneck Creek MEC Clearance and Sign Installation**

Description	QTY	UNIT	COST	TOTAL	NOTES
<b>Planning Documents</b>					
UFP-QAPP and ESS	1	EA	\$ 105,000	\$ 105,000	
<b>Field Work</b>					
Truck (x 3)	126	Day	\$ 175	\$ 22,050	
Fuel/Maintenance	1,260	Gallon	\$ 5	\$ 6,300	
Sales Tax			5%	\$ 1,418	
<b>Materials and Subcontractors</b>					
Analog metal detector (x 7)	266	Day	\$ 18	\$ 4,788	
Survey Equipment	58	Day	\$ 200	\$ 11,600	
Misc Equipment/Supplies	1	LS	\$ 11,400	\$ 11,400	
<b>Personnel</b>					
Mob/demob/Lodging/M&IE	386	EA	\$ 156	\$ 60,278	Lodging and M&IE
Air Fare (7)	7	EA	\$ 750	\$ 5,250	RT airline tickets
Project Management	1	LS	\$ 86,000	\$ 86,000	Project mgmt, coordination and procurement
UXO Tech 2 (2)	912	HR	\$ 85	\$ 77,520	Install 155 signs; mag and dig 30.5 acres
UXO Tech 1 (2)	912	HR	\$ 75	\$ 68,400	Mag and dig 30.5 acres
UXO Tech 3 (1)	596	HR	\$ 95	\$ 56,620	Install 155 signs; mag and dig 30.5 acres
UXOSO/QCS	376	HR	\$ 110	\$ 41,360	Mag and dig 30.5 acres
SUXOS	376	HR	\$ 120	\$ 45,120	Mag and dig 30.5 acres
Vegetation Removal	30.5	ACRE	\$ 5,500	\$ 167,750	30.5 acres and mob/demob
Sign Subcontractor	155	EA	\$ 250	\$ 38,750	Engr's Est; drill holes, pour concrete, place signs
MDAS Recycling	1	LS	\$ 22,500	\$ 22,500	Engineer's Estimate
Explosives and Mag	1	LS	\$ 12,500	\$ 12,500	Engineer's Estimate
Surveyor	100	HR	\$ 225	\$ 22,500	Survey Signs and MRS Boundary
SSFR Report	1	LS	\$ 85,000.00	\$ 85,000	Includes figures and survey data
<b>TOTAL COST</b>				<b>\$ 952,104</b>	

**Fort Riley**

Alternative 4

Surface and Subsurface Removal of Military Munitions in Republican River and Breakneck Creek and Implementation of LUCs

**COST ESTIMATE SUMMARY**

Site: Camp Forsyth Landfill Area 2 (FTRI-003-R-01)  
 Location: Fort Riley, KS  
 Phase: Feasibility Study  
 Base Year: 2019

Capital Costs						
Description	QTY	UNIT	UNIT COST	TOTAL		NOTES
Public meeting, Admin Record Update	1	LS	\$ 22,850	\$ 22,850		Update LUC Plan & travel
Master Plan Input	1	LS	\$ 2,500	\$ 2,500		Update Installation-wide planning
Signs	155	EA	\$ 110	\$ 17,050		Engr's Est; 30,925 LF, signs every 200 ft
Field Work (MEC Clearance and Sign Install)	1	LS	\$ 3,029,397	\$ 3,029,397		See Cost Worksheet
Training/Education Materials	1	LS	\$ 7,500	\$ 7,500		Engineer's Estimate
Deed Notification and Recording	1	LS	\$ 10,000	\$ 10,000		Engineer's Estimate
Project Contingency	25%			\$ 772,324.14		10% scope +15% bid
Program Management	15%			\$ 463,394.49		
<b>TOTAL CAPITAL COST</b>				<b>\$ 4,325,000</b>		

Annual Operation and Maintenance (O&M) Costs						
Description	QTY	UNIT	UNIT COST	TOTAL		NOTES
Annual Sign Maintenance	30	EA	\$ 10,191	\$ 305,726		Replace avg of 2 signs per year-MRS; 30 yrs
<b>TOTAL ANNUAL COST</b>				<b>\$ 305,726</b>		

Periodic Costs						
Description	QTY	UNIT	UNIT COST	TOTAL		NOTES
Five Year Review	6	EA	\$ 12,000	\$ 72,000		Update every 5 years for 30 years (one report)
<b>TOTAL PERIODIC COST</b>				<b>\$ 72,000</b>		

<b>TOTAL 30-YEAR O&amp;M COST 1.5% DISCOUNT</b>	<b>\$ 357,000</b>
<b>TOTAL PRESENT WORTH COST (1.5% DISCOUNT)</b>	<b>\$ 4,682,000</b>

**Fort Riley**

Alternative 4

Surface and Subsurface Removal of Military Munitions in Republican River and Breakneck Creek and Implementation of LUCs

**PRESENT WORTH SUMMARY**

Site: Camp Forsyth Landfill Area 2 (FTRI-003-R-01)  
 Location: Fort Riley, KS  
 Phase: Feasibility Study  
 Base Year: 2019

**Present Value Analysis**

Annual Percentage Rate 0.7%

YR	Capital	O&M Annual	Periodic Cost	Total Costs	Present Worth
0	\$4,325,000	-	-	\$4,325,000	\$4,325,000
1	-	\$10,191	-	\$10,191	\$10,120
2	-	\$10,191	-	\$10,191	\$10,085
3	-	\$10,191	-	\$10,191	\$10,050
4	-	\$10,191	-	\$10,191	\$10,015
5	-	\$10,191	\$ 12,000	\$22,191	\$21,732
6	-	\$10,191	-	\$10,191	\$9,946
7	-	\$10,191	-	\$10,191	\$9,911
8	-	\$10,191	-	\$10,191	\$9,877
9	-	\$10,191	-	\$10,191	\$9,843
10	-	\$10,191	\$ 12,000	\$22,191	\$21,360
11	-	\$10,191	-	\$10,191	\$9,776
12	-	\$10,191	-	\$10,191	\$9,742
13	-	\$10,191	-	\$10,191	\$9,709
14	-	\$10,191	-	\$10,191	\$9,675
15	-	\$10,191	\$ 12,000	\$22,191	\$20,996
16	-	\$10,191	-	\$10,191	\$9,609
17	-	\$10,191	-	\$10,191	\$9,576
18	-	\$10,191	-	\$10,191	\$9,544
19	-	\$10,191	-	\$10,191	\$9,511
20	-	\$10,191	\$ 12,000	\$22,191	\$20,640
21	-	\$10,191	-	\$10,191	\$9,447
22	-	\$10,191	-	\$10,191	\$9,415
23	-	\$10,191	-	\$10,191	\$9,383
24	-	\$10,191	-	\$10,191	\$9,351
25	-	\$10,191	\$ 12,000	\$22,191	\$20,293
26	-	\$10,191	-	\$10,191	\$9,288
27	-	\$10,191	-	\$10,191	\$9,256
28	-	\$10,191	-	\$10,191	\$9,225
29	-	\$10,191	-	\$10,191	\$9,194
30	-	\$10,191	\$ 12,000	\$22,191	\$19,953
<b>TOTALS</b>	<b>\$4,325,000</b>	<b>\$305,726</b>	<b>\$72,000</b>	<b>\$4,702,726</b>	<b>\$4,681,521</b>

**Fort Riley**

Alternative 4

**COST WORKSHEET**

Surface and Subsurface Removal of Military Munitions in Republican River and Breakneck Creek and Implementation of LUCs

Site: Camp Forsyth Landfill Area 2 (FTRI-003-R-01)  
 Location: Fort Riley, KS  
 Phase: Feasibility Study  
 Base Year: 2019

**Cost Analysis**

**Breakneck Creek and Republican River MEC Clearance and Sign Installation**

Description	QTY	UNIT	COST	TOTAL	NOTES
<b>Planning Documents</b>					
UFP-QAPP and ESS	1	EA	\$ 125,000	\$ 125,000	Includes Dive Plan
<b>Field Work</b>					
Boat/Dive Equipment	1	MTH	\$ 60,000	\$ 60,000	Dive Equipment
Truck (x 4)	406	Day	\$ 175	\$ 71,085	
Fuel/Maintenance	4,062	gallon	\$ 5	\$ 20,310	
Sales Tax			5%	\$ 7,570	
<b>Materials and Subcontractors</b>					
Analog metal detector (x 7)	917	Day	\$ 18	\$ 16,506	
Underwater Metal Detector (x 7)	140	Day	\$ 50	\$ 7,000	
Survey Equipment	151	Day	\$ 200	\$ 30,200	
Misc Equipment/Supplies	1	LS	\$ 46,100	\$ 46,100	
<b>Personnel</b>					
Mob/demob/Lodging/M&IE	1,321	EA	\$ 156	\$ 206,125.92	Lodging and M&IE
Air Fare (7)	7	EA	\$ 750	\$ 5,250	RT airline tickets
Project Management	1	LS	\$ 211,640	\$ 211,640	Project mgmt, coordination and procurement
UXO Tech 2, diver (3)	4,018	HR	\$ 85	\$ 341,530	Mag and dig 108.5 acres; clear 14.9 acres water
UXO Tech 3, diver (2)	2,772	HR	\$ 95	\$ 263,340	Mag and dig 108.5 acres; clear 14.9 acres water
UXOSO/QCS	1,492	HR	\$ 110	\$ 164,120	Mag and dig 108.5 acres; clear 14.9 acres water
SUXOS	1,492	HR	\$ 120	\$ 179,040	Mag and dig 108.5 acres; clear 14.9 acres water
Vegetation Removal	108.5	ACRE	\$ 5,500	\$ 596,750	108.5 acres and mob/demob
Sign Subcontractor	155	EA	\$ 250	\$ 38,750	Engr's Est; drill holes, pour concrete, place signs
MDAS Recycling	1	LS	\$ 50,000	\$ 50,000	Engineer's Estimate
Explosives and Mag	1	LS	\$ 50,000	\$ 50,000	Engineer's Estimate
DGM	14.9	ACRE	\$ 10,000	\$ 149,000	Engineer's Estimate
Surveyor	220	HR	\$ 225	\$ 49,500	Survey Signs and MRS Boundary
LUC Implementation	1	LS	\$ 225,580	\$ 225,580	Engineer's Estimate
SSFR Report	1	LS	\$ 115,000.00	\$ 115,000	Includes figures and survey data
<b>TOTAL COST</b>				<b>\$ 3,029,397</b>	