FINAL
PROPOSED PLAN

MRS-R04 (RANGE VII)
FORMER CONWAY BOMBING AND GUNNERY RANGE
HORRY COUNTY, SOUTH CAROLINA

Prepared for:

U.S. Army Engineering and Support Center
Attn: CEHNC-OE-DC (Mrs. Chris Cochrane)
4820 University Square
Huntsville, Alabama 35816-1822

U.S. Army Corps of Engineers, Charleston District
Attn: Mr. Shawn Boone
69A Hagood Avenue
Charleston, South Carolina 29403-0919

Contract No. W912DY-04-D-0018
Task Order: 0012
Project No. I04SC002501

Prepared by:
Sterling Operations, Inc.
2229 Old Highway 95
Lenoir City, Tennessee 37771

January 03, 2014

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January 03, 2014

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CHAPTER 1
INTRODUCTION

1.1 PURPOSE

1.1.1 This **Proposed Plan[1] (PP)** is being presented by the United States Army Corps of Engineers (USACE)[2] to allow the public the opportunity to review and comment on the preferred remediation alternative to be taken at the Former Conway Bombing and Gunnery Range (BGR)—a **Formerly Used Defense Site (FUDS)** located near Conway in Horry County, South Carolina (Figure 1). This document presents the USACE's preliminary recommendation concerning the best way to address **Unexploded Ordnance (UXO)** related contamination at MRS-R04 (Formerly Range VII) at the Former Conway BGR. **Munitions Constituents (MC)** were evaluated as part of the **Remedial Investigation (RI)**, but were determined not to cause risks to human health or the environment, and are subsequently omitted from further evaluation.

The public is encouraged to comment on this Proposed Plan. Information on how to comment is provided in Chapter 10.

1.1.2 From December 2006 to October 2012, a Remedial Investigation (RI) and a **Feasibility Study (FS)** were conducted on the Former Conway BGR—the information and recommendations contained in this Proposed Plan are a direct result of the information and analysis performed in the RI Report (EODT, 2012a) prepared by Sterling Operations, Inc (Sterling), formerly known as EOD Technology, Inc. (EODT) and the FS Report (EODT, 2012b). The FUDS site was divided into nine **Munitions Response Sites (MRSs)** during the RI and FS to facilitate the investigation and report writing:

- MRS-R01 [Range II]
- MRS-R02 [Range III]
- MRS-R03 [Range IV]
- MRS-R04 [Range VII]
- MRS-R05 [Range XX]
- MRS-R06 [Strafing Range]
- MRS-R07 [Turret Range 1]
- MRS-R08 [Turret Range 2],
- MRS-R09 [Machine Gun (MG)/Rifle Range]

The RI/FS Reports analyzed the information collected during the UXO field investigations, MC

[1] The bolded terms found throughout this Proposed Plan are defined in the Glossary found at the back of this document.
[2] A list of acronyms and abbreviations used in this document is presented following the Glossary at the back of this document.

sampling data (conducted during the RI), and information from the previous UXO field investigations. The designated MRSs were developed according to previous military usage, results of previous investigative activities, and the current and future land use.

Of the nine MRSs developed for the RI, four (MRSs R05, R06, R07, and R08) have been recommended for No Further Action (NFA)[3] in the RI. This is because no credible UXO or MC risk was found in those MRSs. Additionally, four MRSs (MRS R01, R02, R03, and R09) were recommended for additional investigation, because insufficient data were collected during the RI to adequately characterize the nature and extent of UXO contamination. The reason insufficient data were collected was the refusal of various landowners to allow USACE Right-of-Entry (ROE) onto their property and the inaccessibility of certain wetland parcels. This prevented investigation teams from doing an adequate characterization across the four MRSs. The final MRS (MRS-R04) was adequately characterized, and is the subject of this Proposed Plan.

PUBLIC COMMENT PERIOD:

17 November – 18 December, 2013
The Corps will accept written comments on the Proposed Plan during the public comment period.

PUBLIC MEETING:
A public meeting was held on November 21, 2013, from 6:00pm until 9:00pm, at the Courtyard Marriot at Barefoot Landing explaining the Proposed Plan and all of the alternatives presented in the Remedial Investigation / Feasibility Study Report.

Courtyard Marriott at Barefoot Landing
1000 Commons Blvd.
Myrtle Beach, SC 29572

For more information, see the Administrative Record at the following location:
Horry County Memorial Library Conway
801 Main Street.
Conway, SC 29526
843.915.7323

1.1.3 The Proposed Plan is part of USACE's community relations program, which is a component of the requirements of Section 117(a) of the **Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)** (United States Code [USC], 1980). The Proposed Plan follows the requirements from Engineer Regulation (ER) 200-3-1, "FUDS Program Policy" (USACE, 2004), the United States Environmental Protection Agency (USEPA) guidance provided in "A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents", EPA 540-R-98-031 (USEPA, 1999), and the Engineer Pamphlet (EP) 1110-1-18, "Military Munitions Response Process" (USACE, 2006). Although the Department of Defense (DoD) is the lead agency responsible for the FUDS program, the USACE acts on DoD's behalf in implementing the program. Representatives of the South Carolina Department of Health and Environmental Control (SCDHEC) has provided input and regulatory over-site to the RI/FS investigation.

[3] The acronym "NOFA" was used in the Feasibility Document. Within this Proposed Plan, the acronym "NFA" is used with the same meaning.

1.1.4 This Proposed Plan summarizes the remedial alternatives in responding to possible UXO hazards that may be present for MRS-R04. The remedial alternatives are explained further in Chapter 9 of this Proposed Plan.

1.1.5 Remedial alternatives may consist of a single response action or a combination of response actions and techniques. Four remedial alternatives were evaluated in the detailed analysis during the FS. The purpose of the detailed analysis was to assist the decision makers in selecting a preferred remedial alternative for each of the recommended MRSs. The four remedial alternatives were: (1) No Action Alternative (NAA); (2) Land Use Controls (LUCs[4]) in the form of Education and Awareness and Five-Year Reviews; (3) Surface Clearance with LUCs and Five-Year Reviews; and (4) Subsurface Removal with Surface Clearance, with LUCs, and Five-Year Reviews.

1.1.6 Alternative 1: No Action Alternative (NAA) – indicates that no remedy will be performed to reduce potential safety risk posed by UXO. This is a baseline against which all other remedies are compared. Nothing would change regarding current activities at MRS-R04. No recurring reviews will be conducted if this alternative is chosen.

1.1.7 Alternative 2: LUCs and Five-Year Reviews – employ a variety of actions short of actual removal of **Munitions and Explosives of Concern (MEC)** from a specific area. LUCs analyzed for MRS-R04 include public education implemented primarily through the Horry County Government by the use of pamphlets, signage, and kiosk construction. Additionally, recurring reviews would be conducted every five years to ensure that this alternative remains protective of human health and the environment.

1.1.8 Alternative 3: Surface Clearance, LUCs, and Five-Year Reviews – is a combination of response actions which includes actual UXO clearance of the ground surface in specific surface areas of MRS-R04. Additionally, the LUCs and Five-Year Reviews described in Alternative 2 above would also be implemented.

1.1.9 Alternative 4: Subsurface Removal with Surface Clearance, LUCs, and Five-Year Reviews – is similar, yet more comprehensive, to Alternative 3 above. With this alternative, not only is surface UXO physically removed, but subsurface UXO is also removed from MRS-R04.

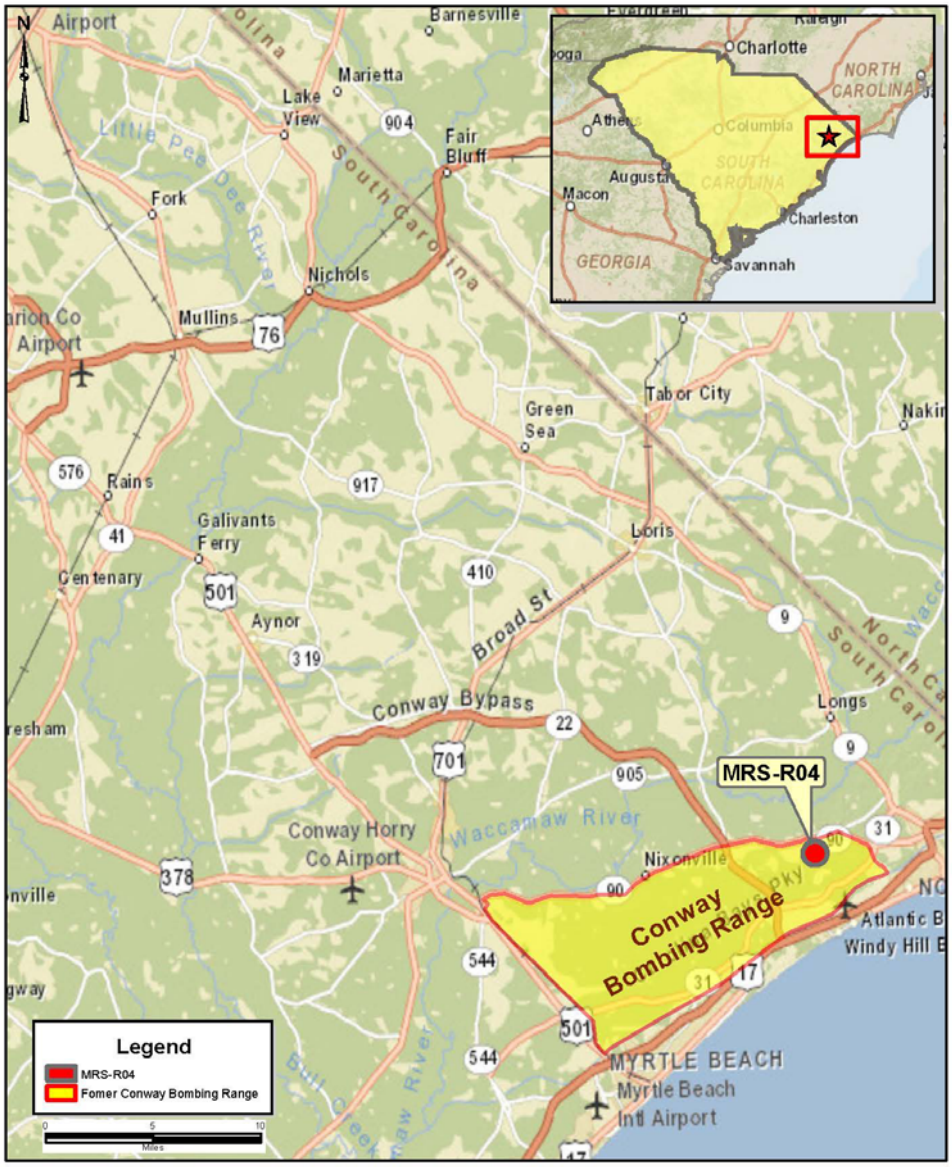
1.1.10 The preferred remedial alternative for MRS-R04 (Range VII) is Alternative 2. The primary reason for selecting this alternative is the fact that during the investigation no evidence

[4] The acronym "IC" was used in the Feasibility Document. Within this Proposed Plan, the acronym 'LUC" is used. "IC" is a subset of "LUC".

of High-Explosive (HE) or fragmentating munitions use in the area was found, although the potential for explosives, including spotting charges, is present. For MRS-R04, additional, long term risk mitigation is prudent.

1.1.11 The Final Former Conway Bombing and Gunnery Range RI Report (EODT, 2012a) and FS Report (EODT, 2012b) are part of the Former Conway Bombing and Gunnery Range **Administrative Record (AR)** file that contains all the documents used in making decisions on remedial projects at the Former Conway BGR. No waivers of any Applicable or Relevant and Appropriate Requirements (ARARs) are required for this site.

FIGURE 1: SITE LOCATION MAP



CHAPTER 2
PROJECT SITE BACKGROUND

2.1 SITE HISTORY

2.1.1 The Former Conway BGR consisted of approximately 55,854 acres and was under military control from June 1940 until September 1948. Throughout the years of operation, several Army Air Fields (AAF) and Army Air Bases (AAB) utilized the Former BGR for various types of airplanes and practice ordnance. Between January 1945 and September 1948, leases of 1,923 acres were terminated. Myrtle Beach AAF closed in 1947 and was declared surplus in February 1948. Land was returned to International Paper Company (34,685 acres) after the leases were terminated. The Conway BGR areas have been developed into recreational, commercial, and/or residential areas with plans for additional development. This project site contains residential, commercial, and industrial properties as well as farming and timbering parcels.

The potential for UXO risk at the Former Conway Bombing and Gunnery Range has been studied extensively. Nomenclature for the various target ranges within the Former Conway BGR have changed and been refined over time as additional historical data have been compiled and analyzed. The object of this Proposed Plan is MRS-R04 (Range VII). MRS-R04 is only one of the nine ranges within the Former Conway BGR. Table 1 represents a cross-walk between the various range identifications.

TABLE 1: CURRENT AND PREVIOUS AREA REFERENCES

Nomenclature		
Current Reference	**EE/CA Reference**	**Original ASR Reference**
MRS-R01	Area A and Area A-1	Range II
MRS-R02	Area B and Area B-1	Range III
MRS-R03	Area C and Area C-1	Range IV
MRS-R04	Area D and Area D-1	Range VII
MRS-R05	Area E and Area E-1	Range XX
MRS-R06	Not evaluated in EE/CA	Strafing Range
MRS-R07	Not evaluated in EE/CA	Turret Range 1
MRS-R08	Not evaluated in EE/CA	Turret Range 2
MRS-R09	Not evaluated in EE/CA	MG/Rifle Range

2.1.2 The RI Report noted that the potential for an exposure pathway is complete, although unlikely for UXO for MRS-R04. However, the historical presence of MEC warrants further assessment. An FS was recommended to assess response action alternatives for managing risk

associated with potential human and environmental receptor interaction (for both current and future land uses) with UXO for MRS-R04 (Range VII).

2.2 CONTAMINATED MEDIA

UXO and **Munitions Debris (MD)** in the Former Conway BGR have been confirmed to exist through past investigations described in Section 2.4 below; however, no UXO has been confirmed at MRS-R04. With respect to MC contamination, no analytes of interest are present at levels which represent risks to ecological or human health. Therefore, MC contamination is not discussed in this Proposed Plan. Chapter 5 of the RI Report (EODT, 2012a) provides a more detailed discussion of the UXO and MC characterization at the Former Conway BGR.

2.3 CONTAMINATION SOURCES

Historical documentation indicates that a variety of munitions were used at the Former Conway BGR as documented in RI Report. UXO associated with these munitions remain at the site. No UXO have been found or reported at MRS-R04, however, MD items have been found. Although MD does not represent an explosive hazard, it could be an indicator that UXO may be present the general vicinity.

2.4 INVESTIGATIONS AND REMOVAL ACTIONS

2.4.1 Final Archives Search Report 1991

In May 1991, TCT-St. Louis prepared a contracted Preliminary Assessment (PA) of ordnance contamination at the Former Conway BGR for U.S. Army Engineering and Support center, Huntsville (USAESCH). The assessment, titled "Final Archives Report" consisted of three volumes: "Final Report," "Conclusion and Recommendations," and "Records Compilation." TCT-St. Louis concluded that MEC contamination potentially exists at the Former Conway BGR, specifically at Ranges II, III, and IV, and recommended a high priority confirmation study at these ranges using visual and geophysical surveys.

2.4.2 Final Environmental Impact Statement 1991

The U.S. Department of Transportation (DOT) and South Carolina Department of Highways and Public Transportation prepared a Final Environmental Impact Statement (EIS) for a proposed bypass in 1991. The proposed bypass runs from Highway 17 through the Former Conway BGR to Highway 501. The EIS acknowledges the site was once used as a bombing range and that it is possible for MEC to exist in the area. Additionally, the EIS predicts the impact of the bypass construction on rare and endangered species, land use, historic and archaeological sites, and wetlands, as well as many other areas.

2.4.3 Preliminary Assessment 1994

A PA was performed in 1994 by the USACE - Charleston District under the Defense Environmental Restoration Program (DERP)/FUDS program. At that time, the "Findings and Determination of Eligibility," dated 4 January 1994, concluded that the 55,854 acre site located in Horry County, South Carolina, had been formerly used by the Army Air Corps. This investigation concluded there is an eligible category of hazard under the DERP/FUDS program due to the fact that the site was used as a bombing and gunnery range by the Army Air Corps. A MEC site investigation was recommended.

2.4.4 Archives Search Report 1995

In 1995, the USACE - Rock Island District conducted a Site Investigation (SI) and archives search of the Former Conway BGR. The final report outlined the nature and degree of MEC recovered from the former ranges, as well as estimated depth at which ordnance may be present (by area), and probable end usage of the land. The Archives Search Report (ASR) concluded that the presence of ordnance is "confirmed" in Area A and Area C based on verifiable historical evidence and direct witness of ordnance items, and "potential" in Areas B, D, E, A-1, B-1, C-1, D-1, and E-1 based on inference from records and indirect witness accounts. Areas F and G were not considered to have any MEC based on a lack of "confirmed" or "potential" ordnance evidence. No historical recorded evidence was located to suggest the presence of Chemical Warfare Materiel (CWM) or radiological waste at the site (USACE, 1995).

2.4.5 Site Visits and Record Search/Review

MEC and MD were encountered across the entire Conway BGR, during a 1997 site visit. Specifically, in MRS-R02 (Range III, Area B), there were several 0.50 caliber (cal) shell casings, bullets, and fragments of 4 pound (lb) incendiary bombs noted at the ground surface. A practice 2.5-inch rocket was also discovered along the edge of the access dirt road.

Aerial photographs depicting site conditions in the early 1950s were reviewed as part of an archival records search to identify specific areas or locations where evidence of MEC can be more adequately assessed during the Engineering Evaluation/Cost Analysis (EE/CA) investigation. The photographs were included in Appendix E of the "Final Engineering Evaluation/Cost Analysis Report" (Parsons Engineering Science, Inc., 2003).

For MRS-R04 in particular, historical records indicate the range was used for Skip Bombing practice.

2.4.6 Engineering Evaluation/Cost Analysis Report 2003

Parsons Engineering Science, Inc., Inc. performed an EE/CA investigation to characterize the

presence of MEC and to perform risk management analysis alternatives for the 10 project areas identified in the ASR. However, under the Performance Work Statement (PWS) only 16 acres of the Former Conway BGR were investigated (Parsons Engineering Science, Inc., 2003). The areas of interest during the EE/CA included:

Area A: Range II Impact Zone	Area A-1: Range II Safety Zone
Area B: Range III Impact Zone	Area B-1: Range III Safety Zone
Area C: Range IV Impact Zone	Area C-1: Range IV Safety Zone
Area D: Range VII Impact Zone	Area D-1: Range VII Safety Zone
Area E: Range XX Impact Zone	Area E-1: Range XX Safety Zone
Area F: Small Arms Range	Area G: Remaining Land

2.4.7 Munitions Constituents Investigation 2006

Under contract to USAESCH, Parsons Engineering Science, Inc. conducted MC sampling at the Goodson site, located within MRS-R02 (Range III) of the Former Conway BGR in 2006. A total of 16 samples (including one duplicate sample and one background sample) were analyzed for explosives and metals associated with munitions use were analyzed. Of these constituents, only lead (Pb), zinc (Zn), cadmium (Cd), and mercury (Hg) were identified as potential constituents from munitions used at the Former Conway BGR. However, based on a limited background investigation and the potential for these constituents to be present as a result of natural or anthropogenic sources, additional sampling was recommended to confirm the presence or absence of MCs at MRS-R02.

2.4.8 2010 Remedial Investigation/Feasibility Study

In 2010, Sterling conducted a RI which included investigation of **Material Potentially Presenting an Explosive Hazard (MPPEH)** and MC sampling of the various media (surface water, surface and subsurface soil, and sediment) to determine whether MCs were present and contributing to environmental impacts at the site as a result of historical DoD operations.

A UXO/MPPEH investigation was performed as part of the RI investigation. A total of 2.99 miles of transects and four each, 50’ by 50’ grids were investigated. The RI investigated 254 individual subsurface anomalies; nine of the anomalies contained 100-lb practice bomb debris (none of which presented an explosive hazard) and the rest contained cultural debris, such as nails, chain, wire, and other non-munitions-related items. See Figure 3 for the results of the RI UXO/MPPEH investigation.

Analytical Soil Samples from various media types (surface soil, surface water, and sediment) were collected and analyzed by Sterling in the same general locations where MEC/MD were

discovered during previous removal activities and current and previous investigations. Soil samples were analyzed for metals, explosives, and perchlorates. The analytical results were compared to the USEPA Regional Screening Levels (RSLs) for residential sites and the Risk Assessment Information System (RAIS) for ecological benchmarks for each constituent (EODT, 2012a). No risk from MC for either human or ecological receptors was indicated at any MRS within the Former Conway BGR.

2.5 PUBLIC INVOLVEMENT

2.5.1 In an effort to keep the public informed, a public meeting relating to activities within the Former Conway BGR was held on December 10, 2008 during the planning and investigation phase. The public meeting was designed to present the previous investigation results and schedule for the site and also to receive comments and questions regarding investigation activities. Another public meeting was held November 21, 2013 designed to report all investigation results and introduce the preferred alternative within the MRS-R04 area only.

2.5.2 The local community members and other interested parties were encouraged to review the Proposed Plan and submit comments. Comments from the public were considered before the final selection and approval of any action. Information on how to comment on this document and the location of the Administrative Record file is provided in Chapter 10 of this Proposed Plan.

2.5.3 Public comments on the Proposed Plan were accepted during a 30-day public review and comment period (i.e., November 17– December 18, 2013). In addition, a public meeting was held to explain this Proposed Plan. The USACE, in consultation with the SCDHEC, has considered public comments received during the public meeting and comment period and made a final decision concerning future action to be taken at the project site. This decision will be presented in a **Decision Document (DD)**. USACE responses to public comments on this Proposed Plan will be enclosed in the "Responsiveness Summary" section of the Decision Document.

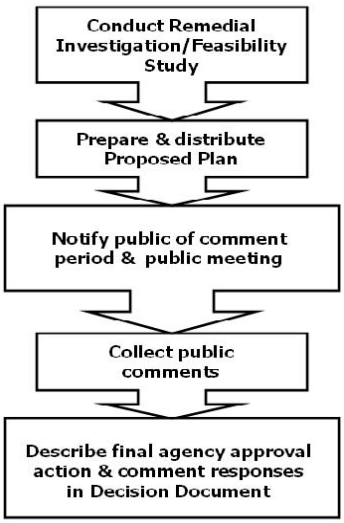


FIGURE 2: DECISION DOCUMENT FLOW CHART

2.5.4 The flow chart shown in Figure 2 summarizes the various steps in the development and approval process of the project Decision Document. USACE is the lead agency for investigating, reporting, making remedial decisions, and taking remedial actions at the Former Conway BGR.

CHAPTER 3
PROJECT SITE CHARACTERISTICS

3.1 PHYSICAL CHARACTERISTICS AND LAND USE

3.1.1 The topography across the Former Conway BGR is characterized as having a maximum relief throughout the project site of less than 100 feet. Potable water is supplied through a public supply system. This water source will likely remain the same in the future. Surface water runoff flows into numerous small bayous and creeks which empty into larger streams. The Former Conway BGR is currently used for various purposes, but primarily residential activities, including some recreational activities (e.g. horseback riding, golfing).

3.1.2 The Former Conway BGR consisted of approximately 55,854 acres. MRS-R04 (Range VII) encompasses approximately 649 acres.

3.2 NATURE AND EXTENT OF CONTAMINATION

3.2.1 Unexploded Ordnance

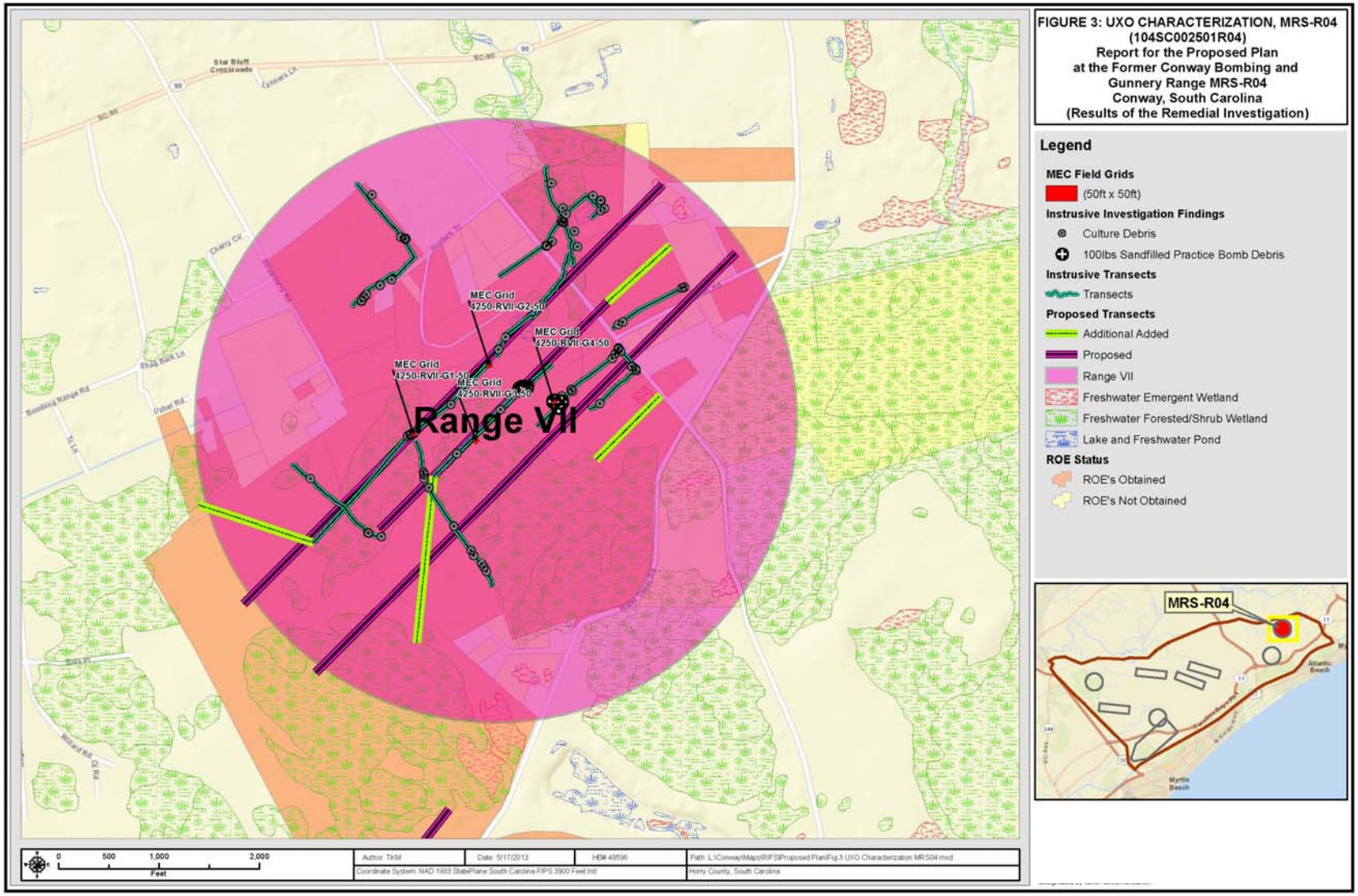
3.2.1.1 Although no UXO was encountered at MRS-R04 during the RI Field Investigation, significant amounts of 100-lb practice bomb (M38) debris was encountered. The amount and distribution of debris during the investigation indicates that 100-lb practice bombs, which contain a 3-lb black-powder spotting charge are potentially present in the MRS. The 3-lb black powder spotting charge is ignited by a 28-gauge blank shotgun shell. Although a detonation of the spotting charge is unlikely to cause life-threatening injuries, it could cause burns, hearing loss, and significant damage to hands and feet depending on their proximity to the detonation.

3.2.1.2 Practice bomb munitions debris has been found in the surface and subsurface in MRS-R04 and evidence of their use was encountered throughout all investigated areas of MRS-R04. Figure 3 shows the location of the practice bomb debris encountered during the RI Investigation at the Conway BGR. Given the distribution pattern of the investigated area, USACE believes that these 100-lb practice bombs can be found across the entire MRS.

3.2.2 Munitions Constituents

3.2.2.1 Munitions Constituents (that is, the chemical components of the munition, which have the potential to leak from a munition and into the ground and water), were evaluated as part of the RI investigation, and found not to be hazardous to humans or ecological receptors, and will not be discussed in this Proposed Plan.

FIGURE 3: UXO CHARACTERIZATION, MRS-R04



CHAPTER 4
SCOPE AND ROLE OF RESPONSE ACTION

4.1 The overall remedial strategy for the project site reflects the public/stakeholder interest to eliminate the potential for munitions-related accidents.

4.2 The problem that must be solved is as follows:
For MRS-R04 (Range VII), the concern is the potential residual practice sandfilled bombs that may be present in the MRS. Because a removal action has not occurred at this site an attempt to increase the awareness level of potential hazards is prudent. The increased awareness reduces the risky interaction activities between the potential human receptors and the UXO items, if and when humans become exposed to the items.

CHAPTER 5
SUMMARY OF PROJECT SITE HAZARDS

5.1 POTENTIAL EXPOSURE TO UXO

Figure 3 demonstrates the nature and extent of the UXO contamination across MRS-R04 (Range VII). The delineated nature and extent of the UXO coupled with the expected future land use and human activities result in a potential for exposure to UXO at the Former Conway BGR.

5.2 POTENTIALLY EXPOSED POPULATION

The potentially exposed population associated with the Former Conway BGR includes residents, recreational users, utility workers, timber industry employees, and workers associated with various industries working within the site boundaries, and visitors.

5.3 POTENTIAL EXPOSURE PATHWAYS

5.3.1 UXO Pathways

Since most UXO is below the ground, UXO is usually found during excavation (i.e. digging foundations, utility work, planting trees, clearing land, etc.). Populations which could interact with the pathways mentioned above include residents, visitors, workers (e.g., road and trail construction, employees of various utility businesses working on-site). Potential exposures to various employees include direct contact with munitions (i.e. during activities such as digging via timber landing, etc.). For workers, the degree of potential exposure varies according to the nature of their work, ranging from contact with surface UXO, to those in contact with UXO in the subsurface (i.e. those performing timbering operations, e.g., road building, stump removals, or any intrusive activities, etc.). Occasionally, UXO can be exposed through erosion either by natural forces or disturbances from off road vehicles, etc.

5.4 SUMMARY OF HAZARDS AND RISKS

More detailed information concerning the MEC Hazard Assessment (MEC HA) and the MC Risk Assessment are presented in Former Conway BGR RI Report (EODT, 2012a) and FS Report (EODT, 2012b).

5.4.1 MEC Hazard Summary

The data compiled from previous investigations and RI field activities sufficiently characterized the nature and extent of MEC for MRS-R04 (Range VII) (Figure 3). The MEC HA noted that there is a potential, but unlikely, risk of humans to come into contact with UXO at the Former Conway BGR. Of the 254 targets were investigated, only nine locations produced remnants of inert practice bombs (non high explosive).

5.4.2 Conclusion

5.4.2.1 In conclusion, while there are indications of potential UXO hazards remaining at MRS-R04 (Range VII), there has been no confirmation that such hazards exist. When surface soil samples from MRS-R04 were compared to RSLs, there was no indication of MC contamination. Subsequently, the MC risk assessment concluded that there are no potential risks for either human health or ecological receptors associated with MCs within the MRS.

5.4.2.2 It is USACE's current judgment that the preferred alternative identified in this Proposed Plan is necessary to protect public health and welfare from actual or threatened interaction with UXO.

CHAPTER 6
REMEDIAL/REMOVAL ACTION OBJECTIVES

6.1 INTRODUCTION

The overall **Remedial Action Objective (RAO)** is to achieve an acceptable minimum level of risk within the MRS in support of the Site Closeout Goal identified in the Technical Project Plan. The RAO statement below defines the measures for the success of the adopted remedial action objective. The means for how the actions are implemented will be established during a future remedial design phase.

6.2 MRS-R04 - RANGE VII

The RAO for MRS-R04 will be achieved when people living in, working in, or visiting the MRS are aware of MEC hazards (EODT, 2012a).

CHAPTER 7
SUMMARY OF REMEDIAL ALTERNATIVES

7.1 INTRODUCTION

A description of each of the four remedial alternatives developed for consideration is presented below.

7.2 ALTERNATIVE 1: NO ACTION ALTERNATIVE (NAA)

The NAA alternative indicates USACE has determined that a remedial action will not be performed to reduce the potential safety hazards posed by UXO. Evaluation of this alternative is required and used as a baseline for comparison with the other alternatives.

Estimated Costs for all MRSs:
Capital Cost: $0
Maintenance Cost for 30 years: $0
Recurring Five-Year Review Costs for 30-years: $0

7.3 ALTERNATIVE 2: INSTITUTIONAL CONTROLS WITH FIVE-YEAR REVIEWS

This alternative is comprised of signage, informational pamphlets, website hosting, kiosk display, and educational awareness training. The planning commission and utility companies within the Former Conway BGR area would receive informational pamphlets in the mail. A kiosk would be installed in the park or other common areas with detailed information on UXO recognition and appropriate defensive actions to be taken. The educational pamphlets have the goal of modifying behavior to reduce the risk of exposure and reduce the impact if exposure occurs. In addition, letters and fact sheets would be sent to residents and neighboring landowners. The pamphlets would also identify where to find more information, including the internet sites, informational repositories and government points of contact. Five-Year Reviews would be conducted in accordance with established CERCLA and USACE guidelines to determine if the response action continues to minimize explosives safety risks and protect human health, safety, and the environment. LUCs would be coupled with Five-Year reviews. The LUCs do not remove or restrict access to potential UXO residual; however, it keeps the public and landowners knowledgeable of potential future risks. Therefore, a complete exposure pathway may still exist. Implementation of this alternative is compatible with both the current and projected future land use within Former Conway BGR MRS area. This alternative employs current standard approaches and does not rely on innovative technology for implementation.

Costs MRS-R04:
Capital or Initial Cost: $27,000
Maintenance Cost and Five-Year Reviews for 30 years: $170,000

7.4 ALTERNATIVE 3: SURFACE CLEARANCE, WITH LUCS AND FIVE-YEAR REVIEWS

7.4.1 A UXO surface clearance would be conducted over accessible areas that have not already had a removal operations conducted under previous actions. Surveys designed to detect metallic anomalies would be conducted over the entire accessible area. Metallic anomalies would be removed only from the ground surface. If any discovered UXO must be destroyed onsite, evacuation and protective actions will be required. All MD will be inspected, certified, and shipped offsite for disposal. As part of this alternative, LUCs similar to those described under Alternative 2, would provide additional protection by increasing public awareness concerning munitions hazards at the site. In addition, notices would be published and meetings held to inform residents of UXO clearance activities and to help plan for evacuations if applicable. Five-Year Reviews would be conducted to determine if the response action continues to minimize explosives safety risks and protect human health, safety, and the environment.

7.4.2 This alternative uses a combination of measures that reduce the source of the UXO hazards and modify behavior to avoid the residual hazards and to take the correct actions if these hazards are encountered. Implementation of this may be in conflict with the current and projected future land use due to the required vegetation removal operations that are an integral part of UXO clearance operations. This alternative employs current standard approaches and does not rely on innovative technology for implementation.

Estimated Costs for MRS-R04
Total Costs for UXO (surface) clearance: $2,420,000
Includes LUCs and Five-Year Reviews: $2,600,000

7.5 ALTERNATIVE 4: SUBSURFACE REMOVAL WITH SURFACE CLEARANCE, WITH LUCS AND FIVE-YEAR REVIEWS

7.5.1 An UXO removal would be conducted in areas that have not already had a removal operation conducted under previous actions. Subsurface removal operations would be conducted across the entire MRS using detectors capable of locating potential MEC below the ground surface. Metallic anomalies would be removed to a depth which minimizes the UXO risk to people; that is, the depth of removal would be to the depth that UXO occurs onsite, or to the depth that people are reasonably expected to excavate for construction, mining or other land use, whichever is shallower. For MRS-R04, the depth of potential excavation is assumed to be

approximately 8', which is associated with the construction of water and sewer lines and in-ground swimming pools for residential development. As UXO has not been confirmed to be present in the MRS, there is no conclusive depth of MEC onsite. For the purposes of this plan, an assumed depth of MEC of 4' was used, based on similar ranges where intact 100-lb practice bombs were found. If any discovered UXO must be destroyed onsite, evacuation and protective actions will be required. All MD will be inspected, certified, and shipped offsite for disposal. As part of this alternative, LUCs, similar to that described under Alternative 2, would provide additional protection by increasing public awareness concerning munitions hazards at the site. In addition, notices would be published and meetings held to inform residents within the vicinity of removal activities and to help plan for evacuations where needed. Five-Year Reviews would be conducted to determine if the response action continues to minimize explosives safety risks and protect human health, safety, and the environment.

7.5.2 This alternative uses a combination of measures that reduce the source of the UXO hazards and modify behavior to avoid the residual hazards and to take the correct actions if these hazards are encountered. Implementation of this may be in conflict with the current and projected future land use due to the required vegetation removal operations that are in integral part of UXO clearance operations. This alternative employs current standard approaches and does not rely on innovative technology for implementation.

Estimated Costs for MRS-R04
Total Costs for UXO removal: $4,300,000
Includes LUCs and Five-Year Reviews: $4,460,000

CHAPTER 8
EVALUATION OF ALTERNATIVES

8.1 INTRODUCTION

8.1.1 The rationale for selecting the preferred alternative was based on nine criteria used to compare them to one another in a detailed analysis (USEPA, 1999). The nine criteria fall into three groups: threshold criteria, primary balancing criteria, and modifying criteria. A description and purpose of the three groups follows,

- *Threshold criteria* are requirements that each alternative must meet in order to be eligible for selection.
- *Primary balancing criteria* are used to weigh major trade-offs among alternatives.
- *Modifying criteria* may be considered to the extent that information is available during the Feasibility Study, but can be fully considered only after public comment is received on the Proposed Plan. In the final balancing of trade-offs among alternatives upon which the final remedy selection is based, modifying criteria are of equal importance to the balancing criteria.

8.1.2 An evaluation of the threshold criteria is presented in Table 4, and an evaluation of the primary balancing criteria are presented in Table 4.

8.2 EVALUATION SUMMARY

8.2.1 The four alternatives were evaluated in terms of seven criteria. Tables 3 and 4 summarize the evaluation and identify the most practicable solutions for reducing the potential UXO exposure hazard at the MRS. In some cases, more than one alternative was identified within the same evaluation category, indicating that those alternatives have similar compliance with the criterion.

8.2.2 The following conclusions were derived from the comparative analysis:

- Alternative 1 (NAA) is in the comparative analysis for MRS-R04 because it established the baseline of the area if remedial actions are not selected. NAA is considered too ineffective in reducing risk to human health and the environment and has no long-term permanence.

- Alternative 2 (LUCs with Five-Year Reviews) is the preferred alternative for MRS-R04, however, this alternative provides no reduction in toxicity,

mobility, or volume of UXO. However, this alternative keeps the public and landowners knowledgeable of potential future risks. A kiosk would be installed in the park or other common areas with detailed information on UXO recognition and appropriate defensive actions to be taken. The educational pamphlets have the goal of modifying behavior to reduce the risk of exposure and reduce the impact if exposure occurs. In addition, letters and fact sheets would be sent to residents and neighboring landowners. The pamphlets would also identify where to find more information, including the internet sites, informational repositories and government points of contact.

- Alternative 3 (Surface Clearance with LUCs and Five-Year Reviews) would only temporarily achieve the balancing factors of long-term effectiveness, permanence, and reduction of toxicity, mobility, and volume through UXO source removal of surface only. This alternative could be appropriate for MRS-R04 especially along those areas readily accessible by the general public such as residential and commercial properties, and public right-of-ways. However, it would leave in place subsurface UXO and provides limited reduction in, mobility or volume of UXO and has no long-term permanence. This alternative is significantly more expensive and will take longer to implement than Alternative 2.

- Alternative 4 (Subsurface Removal with Surface Clearance, LUCs and Five-Year Reviews) achieves the balancing factors of long-term effectiveness, permanence, and reduction of mobility and volume through UXO source removal when implemented. As with Alternative 3, this alternative would be appropriate for MRS-R04 especially along those areas readily accessible by the general public such as residential and commercial properties, and public right-of-ways. This alternative is significantly more expensive and will take longer to implement than either Alternative 2 or Alternative 3.

TABLE 2: EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES

Criteria	Descriptions
Threshold	**1. Overall Protectiveness of Human Health and the Environment** determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
	2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.
Primary Balancing	**3. Long-Term Effectiveness and Permanence** considers the ability of an alternative to maintain protection of human health and the environment over time.
	4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's 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 considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
	6. Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
	7. Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
Modifying	**8. State/Support Agency Acceptance** considers whether the State agrees with the analyses and recommendations, as described in the RI/FS and Proposed Plan.
	9. Community Acceptance considers whether the local community agrees with the analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

TABLE 3: EVALUATION OF ALTERNATIVES USING THRESHOLD CRITERIA

Criteria		Alternative 1	Alternative 2	Alternative 3	Alternative 4
Threshold Criteria	**1. Protectiveness**	Establishes a baseline evaluation of the MRS area. Least protective alternative. No source reduction. No reduction of future risk.	No source reduction. Provides minimal protectiveness depending on human activities and hazard recognition to reduce chances of exposure. Pamphlets, kiosks and educational awareness training can reduce interaction with UXO, thus reducing risk.	UXO clearance (insignificant source reduction). Provides protectiveness only through removing the source and reduction of interaction. Reducing exposure possibility and reducing interaction with visible MEC on the surface.	UXO removal (significant source reduction) on safe, physically accessible areas with ROEs. Provides protectiveness through removing the source, and educational awareness.
	2. ARARs Compliance	No ARARs associated with the alternative.	No ARARs associated with the alternative.	Portions of Endangered Species Act (ESA) may be invoked during clearance operations.	Portions of ESA may be invoked during removal operations.

Note: Shaded box indicates the most practicable solution in reducing the UXO exposure hazard at a site, e.g. the preferred alternative.

TABLE 4: EVALUATION OF ALTERNATIVES USING PRIMARY BALANCING CRITERIA

Criteria		Alternative 1	Alternative 2	Alternative 3	Alternative 4
Primary Balancing Criteria	**3. Effectiveness & Permanence**	No UXO-related risk reduction and no long-term effectiveness.	No reduction of UXO hazards, but can be effective at behavior modification with appropriate response reducing possible receptor interaction. Effectiveness reviewed and updated/ revised over time.	Effective minimal because of hazard reduction and reduced receptor interaction with UXO removal only on the surface and behavior modification with appropriate response reducing possible receptor interactions of UXO. Effectiveness reviewed and updated/revised over time results permanent.	Effective because of hazard reduction and reduced receptor interaction with UXO removal and educational awareness training. Results permanent.
	4. Reduction of Toxicity	No reduction of source.	No reduction of source.	Insignificant reduction in source. UXO hazards are removed from the site surface only.	Significant reduction in source. UXO hazards are removed from the site upon accessibility.
	5. Short-Term Effectiveness	No short-term impacts on workers or community.	Any intrusive work (post holes) within a Former range area, presents a risk, however slight.	Surface clearance and education reduce receptor interaction prior to clearance work being completed.	Land use restrictions and education reduce receptor interaction prior to removal work being completed.
	6. Implement-ability	Readily implemented. No action required.	Kiosk can be installed in park or other common use areas. Updates and maintenance are implementable.	Similar operations were conducted during the Time Critical Removal Action (TCRA) and EE/CA. Implementable.	Similar operations were conducted during the TCRA and EE/CA. Implementable.
	7. Cost	$0	$254,000	$2,600,000 plus Alt 2 costs (if implemented all at one time).	$4,460,000; plus Alt 2 costs (if implemented all at one time)

Note: Shaded box indicates the most practicable solution in reducing the UXO exposure hazard at a site, e.g. the preferred alternative.

TABLE 5: DISCUSSION OF THE MODIFYING CRITERIA

Criteria	
Modifying Criteria	**8. State/Support Agency Acceptance** SCDHEC has provided input and regulatory over-site to the RI/FS investigation.
	9. Community Acceptance Community acceptance of the preferred alternative was evaluated after the public comment period ended and will be described in the Decision Document for the site.

CHAPTER 9
PREFERRED ALTERNATIVE

9.1 MRS-R04 – RANGE VII

9.1.1 Alternative 2 (Land Use Controls in conjunction with Five-Year Reviews) is preferred for this MRS. This alternative is recommended because it will achieve a practical level of risk reduction by educating potential receptors of possible threats at the site and providing safe management of the area. The alternative balances the cost of the remedial action to the relatively low risk to people in the area. This alternative can be implemented in a very short time relative to Alternatives 3 and 4.

9.1.2 Alternative 2 achieves the balancing factors of long-term effectiveness, permanence, and mitigation of risk through awareness and education. Implementation of this alternative would provide educational awareness recognition to reduce chances of exposure leading to reduction in risk to humans, if the population complies with safeguards the information will convey. This alternative is expected to be acceptable to SCDHEC and the community because it is protective of human health and the environment. Therefore, implementing LUCs is recommended in MRS-R04 as the most practical alternative. Alternative 2 has the lowest cost (excluding Alternative 1 – NAA).

Estimated Costs for MRS-R04
Total Costs for LUCs: $170,000

9.2 SUMMARY STATEMENT

9.2.1 Based on the information currently available, USACE believes that the preferred alternative presented above meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The USACE expects the preferred alternative to satisfy the following statutory requirements of CERCLA §121(b): (1) be protective of human health and the environment; (2) comply with ARARs (or justify a waiver); (3) be cost-effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element, or explain why the preference for treatment will not be met.

9.2.2 Regarding CERCLA §121(b), Alternative 2 is intended to increase the protection of human health by behavior modification via education and information. The Alternative does not directly increase protection of the environment, but is in compliance with applicable ARARs and

is cost effective. It presents neither a permanent solution nor alternative treatment technologies nor resource recovery technologies. The preferred treatment in the form of a general removal action is not a favorable option with the general population. Additionally, there are areas of the project site that are physically inaccessible for safe removal operations due to swamp-like conditions.

9.2.3 The preferred alternative presented above is based on current information and could change in response to public comment or new information.

CHAPTER 10
COMMUNITY PARTICIPATION

10.1 PUBLIC COMMENTS

10.1.1 The USACE solicited public comments on the preferred alternative recommended for this project site. Public comments were considered before the final action was selected and approved. A public meeting took place at November 21, 2013 at the Courtyard Marriot at Barefoot Landing. Representatives from the USACE and SCDHEC was present at the meeting to explain this Proposed Plan, listen to any concerns raised, answer questions, and accept public comments.

10.1.2 The Final Former Conway BGR RI Report (EODT, 2012a) and FS Report (EODT, 2012b) provide a comprehensive report that describes the history of the site, the details of the RI, the associated risk assessments, and their conclusions. This and other information on this site are available for review at the Information Repositories in the Administrative Record listed below.

10.1.3 Written comments were accepted throughout a 30-day public comment period from November 17– December 18, 2013. The written comments were to be forward to Shawn Boone (information provided below). For further information on the project site, please contact the following representatives.

10.2 INFORMATION ACCESS

10.2.1 USACE Representatives

Shawn Boone
Program Manager
U.S. Army Corps of Engineers, Charleston District
69A Hagood Avenue
Charleston, SC 29412

Chris Cochrane
Project Manager
U.S. Army Engineering and Support Center, Huntsville (USAESCH)
PO Box 1600; 35807-4301
4091 University Square
Huntsville, AL 35807-4301

10.2.2 Regulatory Representatives

Susan Byrd
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29801

10.2.3 Information Repository

Copies of the Final Former Conway BGR Remedial Investigation Report (EODT, 2012a) and

Feasibility Study Report (EODT, 2012b), and the Administrative Record for this site can be found at the following location:

Horry County Memorial Library Conway
ATTN: Reference Desk
801 Main Street
Conway, SC 29526
843.915.7323

CHAPTER 11
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United States Code (USC), 1980. Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986, and as amended by the Brownfields Amendments of 2002. Title 42 USC § 9601 *et seq*.

ACRONYMS AND ABBREVIATIONS

AAB	Army Air Base
AAF	Army Air Field
AR	Administrative Record
ARARs	Applicable or Relevant and Appropriate Requirements
ASR	Archives Search Report
BGR	Bombing and Gunnery Range
Cd	cadmium
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CWM	Chemical Warfare Materiel
DD	Decision Document
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
DOT	Department of Transportation
EE/CA	Engineering Evaluation and Cost Analysis
EIS	Environmental Impact Statement
EOD	Explosive Ordnance Disposal
EODT	EOD Technology, Inc.
EP	Engineering Pamphlet
ER	Engineering Regulation
ERM	Environmental Resources Management
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Action
FS	Feasibility Study
FUDS	Formerly Used Defense Site
HA	Hazard Assessment
HE	High Explosive
Hg	mercury
lb(s)	pound(s)
LUC	Land Use Control
MC	Munitions Constituent
MD	Munitions Debris
MDEH	Material Documented as an Explosive Hazard
MEC	Munitions and Explosives of Concern
MEC HA	Munitions and Explosives of Concern Hazard Assessment
MG	Machine Gun
MPPEH	Material Potentially Presenting an Explosive Hazard
MRS	Munitions Response Site
NAA	No Action Alternative
NFA	No Further Action
PA	Preliminary Assessment
Pb	lead
PP	Proposed Plan
PWS	Performance Work Statement

RAIS	Risk Assessment Information System
RAO	Remedial Action Objective
RI	Remedial Investigation
RI/FS	Combined Remedial Investigation and Feasibility Study Operation or Report
ROE	Rights of Entry
RSL	Regional Screening Level
SCDHEC	South Carolina Department of Health and Environmental Control
SI	Site Investigation
TCRA	Time Critical Removal Action
US	United States
USACE	United States Army Corps of Engineers
USAE	USA Environmental, Inc.
USAESCH	United States Army Engineering and Support Center, Huntsville
USC	United States Code
USEPA	United States Environmental Protection Agency
UXO	Unexploded Ordnance
Zn	zinc

GLOSSARY OF TERMS

Administrative Record (AR)	A compilation of all documents relied upon to select a remedial action pertaining to the investigation and remediation of the project site.
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, otherwise known as Superfund)	A federal law that addresses the funding for and remediation of abandoned or uncontrolled hazardous waste sites. This law also establishes criteria for the creation of key documents such as the Remedial Investigation, Feasibility Study, Proposed Plan, and Decision Document.
Decision Document	The USACE uses the term "Decision Document" for the documentation of remedial response decisions at FUDS properties. Concurrence on the Decision Document by EPA or the state regulatory agency is sought and the Army approves the document.
Feasibility Study (FS)	The study evaluates possible remedies using the information generated from the RI. The FS becomes the basis for selection of a remedy that effectively eliminates or mitigates the threat posed by contaminants (MPPEH or MC) at the site.
Formerly Used Defense Site (FUDS)	Locations that were owned by, leased to, or otherwise used by the Department of Defense. The term does not include any operational range, operating storage or manufacturing facility, or facility that was used for or was permitted for the treatment or disposal of military munitions.
Material Potentially Presenting an Explosive Hazard (MPPEH)	Material that has not yet been classified as either MDAS or MDEH. It is treated as MDEH until it has determined and documented as MDAS.
Material Documented as an Explosive Hazard (MDEH)	Material that has been examined by a qualified UXO technician and determined and documented to present an explosive hazard.
Munitions Constituents (MC)	Any materials 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 (MD)	Remnants of munitions (e.g., penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization or disposal. Munitions debris is confirmed inert and free of explosive hazards by technically-qualified personnel.
Munitions and Explosives of Concern (MEC)	This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, means: (a) unexploded ordnance; (b) discarded military munitions; or (c) Explosive MC (e.g., TNT, RDX) present in high enough concentrations to pose an explosive hazard.
Munitions Response Site (MRS)	A discrete location within a defense site that is known to require a munitions response (investigation, removal action and/or remedial actions).
Preferred Alternative	The alternative that, when compared to other potential alternatives, was determined to best meet the CERCLA evaluation criteria and is proposed for implementation at a site.
Proposed Plan (PP)	A plan that identifies the preferred remedial alternative for a site, and is made available to the public for comment.
Remedial Action Objective (RAO)	A specific goal for protecting human health and the environment
Remedial Investigation (RI)	Exploratory inspection conducted at a site to de-fine the nature and extent of contamination present.

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