

**FINAL PROPOSED PLAN FOR
FORMER MORTAR RANGE MRA
FORT GEORGE G. MEADE, MARYLAND**

July 2012

INTRODUCTION AND PURPOSE

This Proposed Plan (Plan) is being issued to facilitate public involvement in the remedy selection process to address risk posed by **munitions and explosives of concern** (MEC) at the former Mortar Range **Munitions Response Area** (MRA) at Fort George G. Meade (FGGM), Maryland (MD).

A list of acronyms, abbreviations, references and a glossary of the terms (appearing in boldface in the text) are provided at the end of this Plan to further define the terminology used.

The former Mortar Range MRA, identified in the Army Environmental Database – Restoration Module (AEDB-R) as Site Number FGGM-003-R, is located in the west-central portion of FGGM (**Figure 1**). The site was used as a mortar range beginning in the early 1920s; training was assumed to have ended in the 1940s. Based on the results of past fieldwork and research, this site has been split into two **munitions response sites** (MRSs): the Mortar Area MRS (AEDB-R: FGGM-003-R-01) and the Training Area MRS (AEDB-R: FGGM-003-R-02).

This Plan summarizes information found in detail in the **Remedial Investigation** (RI), the **Focused Feasibility Study** (FFS), and other reports, which are available for review as part of the **Administrative Record** file for this site. Based on the results of the RI, it was determined that the probability for humans to encounter MEC on both the Mortar Area MRS and the Training Area MRS is low. Therefore, the same remedial alternatives were found to be applicable to both MRSs. However, MRS-specific differences in remedies and site controls were identified and evaluated during the FFS and are included in this Plan. This Plan highlights the preferred remedial alternative to address the surface and subsurface soil at the Mortar Area MRS and the Training Area MRS and outlines all remedial alternatives identified during the FFS. The preferred remedial alternative described in this Plan for surface and subsurface soil is detailed in the *Former Mortar Range Munitions Response Area Focused Feasibility Study* (ARCADIS/Malcolm Pirnie, 2012). The preferred remedial alternative is:

Remedial Alternative 2—Land Use Controls (LUCs) with Long Term Management (LTM)

Potential MEC hazards will be addressed by additional LUCs at the site. These will include the continuation of current site access restrictions (i.e., security controlled access gate on a portion of the Training Area MRS), MRS-specific signage, revising the dig permits process to require MEC construction support for all intrusive activities on-site, and the establishment of an educational program for construction workers, potential

future site workers, recreational users, and emergency responders. Residential land use at the former Mortar Range MRA will be prohibited as part of LUCs and updated in the Master Plan. A 5-year review process and annual LUC inspections/surface sweeps will also be conducted. As part of the preferred remedy, a pit containing several thousand expended 0.22-caliber short cartridge casings that was identified on the Training Area MRS during the RI fieldwork will also be removed. This action will be performed as a preliminary maintenance activity to prepare the Training Area MRS for the preferred remedy.

It is the current judgment of the Army and United States (U.S.) Environmental Protection Agency (USEPA) that the preferred remedy identified in this Proposed Plan is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

IMPORTANT DATES AND LOCATIONS

Public Comment Period: July 19th to August 18th

The Army will accept written comments on the Proposed Plan during the public comment period.

Public Meeting: July 19th, 2012 at 6:00 p.m.

The Army will hold a public meeting to explain the Proposed Plan and all Response Actions presented in the Focused Feasibility Study. Oral and written comments will also be accepted at the meeting. The meeting will be held at the Captain John Smathers Reserve Center located between 20 ½ Street and 21st Street, Odenton, Maryland at 6:00 PM.

The Administrative Record, containing information used in selecting the preferred remedial alternative, is available for public review at the following location:

Fort Meade Environmental Management Office
Building T-239
Fort Meade, MD 20755

Anne Arundel County West County Area Public Library
1325 Annapolis Rd
Odenton, MD 21113

The Army, as the lead agency, will finalize and present the selected remedial alternative for the site in a **Record of Decision** (ROD), in coordination with the support agencies, United States (U.S.) Environmental Protection Agency (USEPA) and the Maryland Department of the Environment (MDE). The final selection will not take place until after the Army and USEPA have reviewed and considered all comments submitted during the public comment period and have signed the ROD. New information or comments provided to the Army, USEPA, or MDE during the public comment period could result in the selection of a final remedy that differs from the preferred remedial alternative described herein. The

public is encouraged to comment on the preferred remedial alternative and all other remedial alternatives considered in this Plan. Information about how to submit comments may be found in the "Community Participation" section of this Plan.

The Army and USEPA Region 3 issue this Plan jointly in order to fulfill public participation requirements under Section 117(a) of the **Comprehensive Environmental Response, Compensation, and Liability Act** of 1980 (CERCLA), as amended by the **Superfund Amendments and Reauthorization Act** of 1986 and the **National Oil and Hazardous Substances Pollution Contingency Plan** Section 300.430(f)(2).

The Army encourages the public to review all of the documents relevant to activities conducted at the former Mortar Range MRA in order to assist in the selection of an appropriate remedy for the site.

Relevant documents used in the preparation of this Plan are listed in the "References" section found at the end of this document.

An RI was conducted between 2007 and 2011 (ARCADIS/Pirnie, 2011) to develop sufficient information on potential MEC, munitions potentially presenting an explosive hazard, and munitions constituents (MC). Data generated were used to assess the potential safety hazards and/or risks to enable selection of a cost effective and efficient response action.

Based on the lack of evidence of an explosive risk, the use of the MEC hazard assessment methodology was deemed inappropriate for the MRA and a MEC hazard assessment was not prepared. However, given the historical use of the MRA as a training area, a minimal residual risk of explosive hazard remains despite the lack of physical evidence uncovered during the RI field activities. The qualitative explosive risk assessment concluded that, based on the results of the 2011 RI, there is a low probability for human receptors to encounter MEC across the MRA including both the Mortar Area MRS and the Training Area MRS.

Based on the Human Health Risk Assessment and the Screening Level Environmental Risk Assessment, no unacceptable risk exists for MC at the site. Therefore, this Plan only focuses on the control of MEC safety hazards at the site.

The preferred remedial alternative presented in the Plan is believed to meet the CERCLA threshold criteria to be protective of human health and the environment, and to meet the requirements of all applicable or relevant and appropriate federal and State environmental statutes and regulations (ARARs), and to provide the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. It is also the most cost effective solution considered.

REMEDIAL ALTERNATIVES

Surface and Subsurface Soil

Remedial Alternative 1: No action

Remedial Alternative 2: LUCs with LTM¹

Remedial Alternative 3: Surface and subsurface clearances with LUCs and LTM

FGGM BACKGROUND

FGGM is located in Anne Arundel County, MD, almost midway between the cities of Baltimore, MD, and Washington, District of Columbia. FGGM lies approximately four miles east of Interstate 95 and immediately east of the Baltimore-Washington Parkway (MD Route 295), between MD Routes 175 and 32. FGGM is located near the communities of Odenton, Laurel, Columbia, and Jessup. Following the 1988 Base Realignment and Closure, the installation covers 5,415 acres. The current installation boundaries encompass the area previously referred to as the cantonment area, which is used for administrative, recreational, and housing facilities.

FORMER MORTAR RANGE MRA BACKGROUND

The former Mortar Range MRA is a former range and training area located in the west-central portion of FGGM (see **Figure 1**). The former Mortar Range was first identified on a 1923 Special Military Map for Camp Meade as a 59-acre range. The former Mortar Range is also shown on a 1924 War Game Map for Camp Meade. The former Mortar Range does not appear on any maps after 1924, and no reference is made to it in historical documents. As presented in the 2007 Site Inspection and based on historical maps and the Site Inspection findings, the site was used as a mortar range from the early 1920s (Malcolm Pirnie, 2006). Based on munitions debris found at the MRA, it is believed the MRA was used into the 1940s (ARCADIS/Malcolm Pirnie, 2011).

The majority of the MRA has been used as a golf course since 1956. A jogging trail is present along the western edge of the golf course. The northwestern portion of the site is Department of Defense (DoD) property and is developed with buildings and associated paved surfaces (i.e., roadways, parking lots, and walkways). As of early 2012, construction of additional DoD buildings began on the area that had been the golf course and jogging trail. During the RI, no MEC (except small arms ammunition not presenting a unique explosive hazard) were found on the MRA; however, munitions debris (which does not present an explosive hazard) from 60- and 81-millimeter (mm) training mortar rounds, 3-inch Stokes training mortar rounds, a training landmine, expended flares, practice grenades, a dummy grenade, discarded small

¹ A pit containing several thousand expended 0.22-caliber short cartridge casings that was identified on the Training Area MRS during the RI fieldwork will also be removed as part of Alternative 2 or 3.

arms ammunition, and casings from expended small arms ammunition were found during the RI MEC field activities. The training mortar rounds, identified during the RI MEC field activities, were concentrated in an area corresponding to the original location of the former Mortar Range shown on maps from the 1920s. An analysis of historical aerial photographs, performed during the RI, confirmed the former Mortar Area MRS boundary. Additionally, a number of training areas within the former Mortar Range MRA were observed and the former Mortar Range MRA boundary was found to extend east to Taylor Avenue beyond the boundary established during the 2007 Site Inspection. As a result of these findings, the boundary was revised and the overall acreage of the former Mortar Range MRA was increased from a total of 291 acres to 322 acres. Based on the evidence of two distinct historical uses as a general troop training area and a training range, the former Mortar Range MRA (FGGM-003-R) was divided into the 62-acre Mortar Area (FGGM-003-R-01) and the 260-acre Training Area (FGGM-003-R-02) MRSs.

The former Mortar Range MRA slopes slightly radially from a topographic high in the northeastern portion of the site and to the southwest from a secondary topographic high in the central portion of the site. Elevations range from approximately 256 feet (ft) above mean sea level in the northeastern portion of the former Mortar Range MRA to approximately 151 ft above mean sea level in the southeast portion of the MRA (Berger/EA, 2004).

The Mortar Area MRS and a majority of the Training Area MRS overlap a portion of the FGGM golf course, with deciduous forest and some coniferous trees interspersed between the golf greens. A jogging trail is present along the western edge of the golf course in the Training Area MRS. The northwestern portion of the Training Area MRS overlaps a secure DoD facility and is developed with buildings and associated paved surfaces (i.e., roadways, parking lots, and walkways). As of early 2012, construction of additional DoD buildings began on the area that had been the golf course and jogging trail.

The former golf course was designed and built after the former Mortar Range MRA stopped operational activities; any fill material brought to the site for regrading (including building of mounds for tee boxes or greens) would have altered the natural topography.

The former Mortar Range MRA lies within the drainage of the Little Patuxent River. Midway Branch is located approximately 700 ft east of the former Mortar Range MRA and flows south through Allen Lake (also identified as Soldier Lake). Approximately 1.25 miles south of the MRA, Midway Branch eventually empties into the Little Patuxent River. One unnamed tributary is located in the southeast corner of the former Mortar Range MRA and flows southeast to join Midway Branch. Additional unnamed tributaries are located to the west and south of the former Mortar Range MRA and flow southwest toward the Little Patuxent River. No evidence of these tributaries was observed during the RI field investigation.

There are three distinct aquifers underlying the MRA: the Patuxent Formation, the lower Patapsco unit, and the upper Patapsco unit. The Patapsco Formation is separated from the Patuxent Formation by the Arundel clay.

CURRENT AND FUTURE USE

The majority of the MRA overlaps the FGGM former golf course, with a portion overlapping a secure DoD facility. Based on discussions at the 12 June 2008 Technical Project Planning meeting and subsequent planning by DoD, no future residential development is planned within the MRA boundary. Based on the 2011 Real Property Master Plan Update, the MRA is intended for future professional (office buildings) and industrial use (Atkins, 2011). Construction as part of DoD expansion is currently underway for the majority of the MRA and its surroundings. A portion of the area will also be retained for open space use, outdoor recreation, and a forested



Figure 1: Site Location

SITE CHARACTERISTICS

The former Mortar Range MRA, comprised of the Mortar Area MRS and the Training Area MRS, is situated in the west-central portion of the installation and encompasses approximately 322 acres. The former Mortar Range MRA is bounded to the west by a secure DoD facility to the north by Rockenbach Road, to the east by Taylor Avenue, and to the south by Mapes Road. Undeveloped property is located to the southwest of the MRA. The eastern portion of the MRA overlaps the former golf course, and interspersed natural areas exist between and to the west of the golf greens. A secure DoD facility occupies buildings on the northwest corner of the former Mortar Range MRA. As of early 2012, construction of additional DoD buildings began on the area that had been the golf course and jogging trail.

area. The Army owns and controls the property, and there are no plans to close FGGM in the future.

IDENTIFICATION OF ENVIRONMENTAL CONTAMINATION

The initial investigation of the former Mortar Range MRA was the Closed, Transferring, and Transferred Range and Site Inventory in 2003 followed by the Environmental Baseline Study conducted in 2004. A Historical Records Review and Site Inspection were conducted in 2006 and 2007, respectively. Subsequent to the Historical Records Review / Site Inspection activities, the RI field activities were conducted from January to March 2008 to evaluate MEC risks and in January 2010 to evaluate MC risks, respectively (ARCADIS/Pirnie, 2011). Surface soil samples were collected and analyzed during the RI in order to perform a comprehensive evaluation. Based on the Human Health Risk Assessment and the Screening Level Environmental Risk Assessment, no unacceptable risk exists for MC at the site.

Munitions and Explosives of Concern

The MEC fieldwork conducted from January to March 2008 included a geophysical and an intrusive investigation. The geophysical investigation identified 6,228 anomalies; of these, 1,805 were identified as cultural features (e.g. buried utilities). The 4,423

remaining anomalies were evaluated, and 1,333 anomalies were investigated during the intrusive investigation. A high amount of non-munitions-related scrap metal was identified at the site, such as horseshoes and nails. No MEC (except small arms ammunition not presenting a unique explosive hazard) were found at the site. However, munitions debris (which does not present an explosive hazard) from 60 and 81mm training mortar rounds, 3-inch Stokes training mortar rounds, a training landmine, flares, training and dummy grenades, and discarded small arms ammunition was found during the field effort (**Figure 2**). By definition, the discarded small arms ammunition is considered discarded military munitions (DMM) and, hence, MEC; however, the small arms ammunition does not present a unique explosive hazard.

The training mortar rounds were concentrated in an area corresponding to the original location of the former Mortar Range shown on maps from the 1920s. The historical aerial photographs and the MEC fieldwork results support that the surrounding area was used for general troop training. Thus, based on two distinct historical uses, the former Mortar Range MRA (FGGM-003-R) was divided into the 62-acre Mortar Area MRS (FGGM-003-R-01) and the 260-acre Training Area (FGGM-003-R-02) MRS (**Figure 2**).

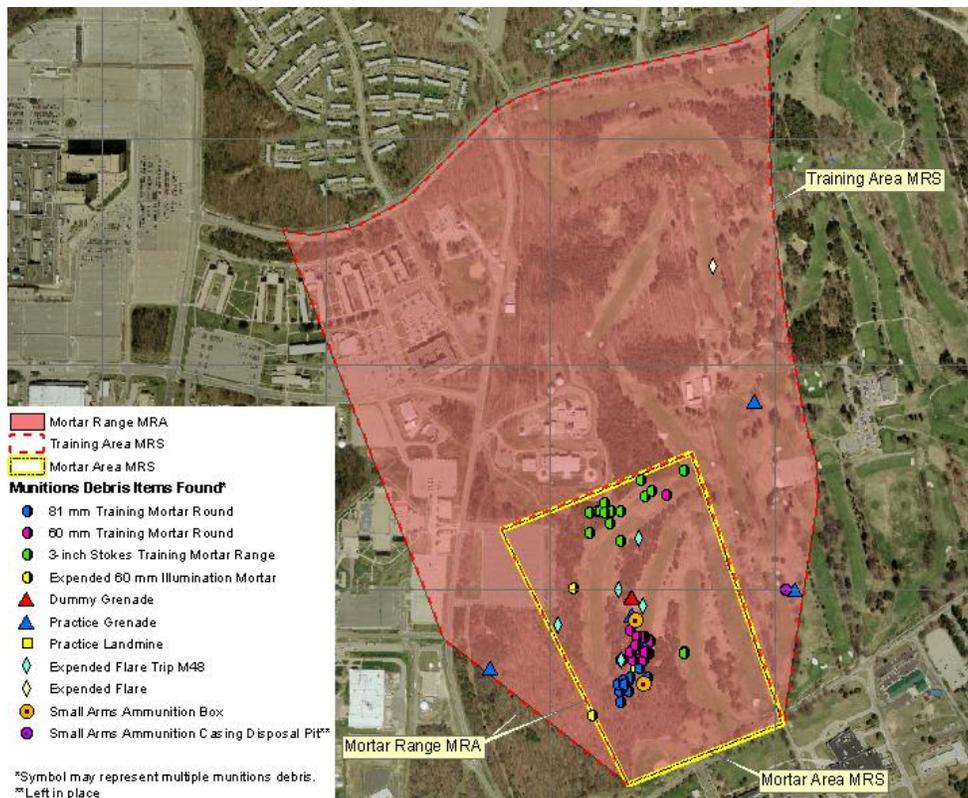


Figure 2: RI Findings

SUMMARY OF THE SITE RISKS

A revised **Conceptual Site Model** (CSM), Qualitative Explosive Risk Assessment, and **Munitions Response Site Prioritization Protocol** (MRSP) were completed based on the 2011 RI results.

Although no MEC (except small arms ammunition not presenting a unique explosive hazard) was identified on the MRA during the RI, given the historical use of the MRA as a training area, a minimal residual risk of explosive hazard remains despite the lack of physical evidence uncovered. It is important to note that once a MEC source area is identified, there will always be a residual risk of exposure regardless of the remedial alternative chosen.

Based on the Human Health Risk Assessment and the Screening Level Environmental Risk Assessment conducted during the RI, no unacceptable risk exists for MC at the Mortar Area MRS or the Training Area MRS.

BASIS FOR THE ESTABLISHMENT OF REMEDIAL ACTION OBJECTIVES

A statutory goal of the Defense Environmental Restoration Program is for the Army to take appropriate remedial alternatives to investigate and, where necessary, address releases of hazardous substances or pollutants that pose risk to human health or the environment. The Army is required to select remedies that attain a degree of cleanup that assures protection of human health and the environment.

It is the Army's current judgment that the preferred remedial alternative identified in this Plan will continue to provide protection to human receptors from MEC risks that may exist at the MRA.

REMEDIAL ACTION OBJECTIVE

The Remedial Action Objective (RAO) for the former Mortar Range MRA is based on the continued management of safety hazards associated with the potential for MEC that may be within the MRA.

The proposed RAO for the site is:

"Control and minimize the potential for contact of receptors with possible MEC at the surface and within the subsurface."

It is important to note that once a MEC source area is identified, there will always be a residual risk of exposure regardless of the remedial alternative chosen. The limit of technology for the detection and removal of MEC, combined with the nature of the hazard (explosive), results in a residual risk that must be considered when selecting a remedial alternative.

SCOPE AND ROLE OF THE RESPONSE ACTION

The Mortar Range MRA is one of numerous sites covered under CERCLA at FGGM. This is the first site where a ROD will be issued within the active installation under either the Installation Restoration Program or

Military Munitions Program. The Site Management Plan (URS 2011) provides details on other sites at Fort Meade which will be covered under separate RODs. The anticipated schedule for each is also provided in the Site Management Plan.

Based on past investigations, a risk of MEC at both the Mortar Area MRS and the Training Area MRS on the former Mortar Range MRA exists. Explosive risks from MEC must be eliminated or controlled to mitigate the physical hazard posed to current and future site users.

The following paragraphs describe the preferred remedial alternative and are based upon the entire body of investigative work.

Remedial Alternative 2, LUCs with LTM, is the most appropriate remedy for the former Mortar Range MRA.

SUMMARY OF RESPONSE ACTIONS

Remedial alternatives for the former Mortar Range MRA were developed and evaluated in the FFS (ARCADIS, 2012). The remedial alternatives considered during the evaluation presented in the FFS included:

- No action;
- LUCs with LTM; and
- Surface and subsurface removal with LUCs and LTM

The remedial alternatives are described below with their respective estimated **Capital Costs**, estimated cost for **Operation and Maintenance** (O&M) activities, and an estimate of the **Present Worth Costs** for each remedial alternative.

Remedial Alternative 1: No action

Estimated Capital Cost: \$0

Estimated O&M Cost Over 30 Years: \$0

Estimated Present Worth Cost: \$0

CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan require that a No Action alternative be evaluated at every site to establish a baseline for the comparison of other remedial alternatives. Under this alternative, no remedial alternative would take place on the Mortar Area MRS or the Training Area MRS.

Remedial Alternative 2: LUCs with LTM (preferred remedial alternative)

Estimated Capital Cost: \$215,100

Estimated O&M Cost over 30 years: \$365,700

Estimated Present Worth Cost: \$339,800

Under Remedial Alternative 2, existing LUCs, including institutional controls and engineering controls at the Mortar Area MRS and the Training Area MRS would be maintained and enhanced. Institutional controls are administrative measures put in place to restrict human activity, in order to control future land use. Engineering controls include a variety of engineered constructed barriers to restrict human activity, in order to control

future land use. The LUCs would be incorporated into the master plan and included in the Installation Geographical Information System. Remedial Alternative 2 will minimize and control exposure to MEC on the surface and/or in the subsurface soil.

Most of the required institutional controls are already in place as elements of required procedures at FGGM. These elements include requirements to obtain dig permits from the Directorate of Public Works for any intrusive activity at FGGM; Master Plan Regulations; and the FGGM Geographical Information System Database. These institutional controls would be formalized into CERCLA required procedures at the former Mortar Range MRA and supplemented by revising the established dig permit process to require MEC construction support for all intrusive activities occurring on the MRA. On-site MEC construction support would be required for the Mortar Area MRS; on-call MEC construction support would be required for the Training Area MRS. Residential land use at the former Mortar Range MRA will be prohibited as part of the LUCs. This prohibition will be added to the Installation Master Plan. Additionally, an education program would be initiated for future users of the MRA.

Engineering controls, including signage (warning signs) specific to both the Mortar Area MRS and the Training Area MRS describing restrictions of site use at key locations of the site would be installed. Annual Inspections of each of the MRSs would be performed to establish that all on-site LUCs (for example, MRS-specific signage) were in good condition, to confirm that the land use of the site had not changed, and through instrument-assisted surface sweep that no MEC or munitions debris had been exposed through erosion or frost heave.

The 5-year review process and the annual land use certifications/surface sweeps would be used to document that the continuing land use is industrial and the remedy remains protective. Additionally, the remedial design would specify notification requirements to the USEPA and MDE should land use change occur, or be planned.

A pit containing several thousand expended 0.22-caliber short cartridge casings was identified on the Training Area MRS during the RI fieldwork. Prior to implementing Alternative 2, the expended 0.22-caliber short cartridge casings would be recovered and recycled as scrap metal or disposed of properly. This would be done as a preliminary maintenance activity to prepare the Training Area MRS for the remedial alternative.

Remedial Alternative 3: Surface and subsurface clearance with LUCs and LTM

Estimated Capital Cost: \$6,785,950

Estimated O&M Cost over 30 years: \$365,700

Estimated Present Worth Cost: \$6,911,000

Remedial Alternative 3 would include the full MEC clearance within the surface and the subsurface across

the entire former Mortar Range MRA including both the Mortar Area MRS and the Training Area MRS. Location surveys, brush cutting, and a surface sweep throughout both of the MRSs would be conducted prior to the start of MEC activities.

Subsurface anomalies could be identified by either using a process commonly referred to as "mag and dig" or by Digital Geophysical Mapping. The mag and dig process consists of employing a magnetometer to identify subsurface anomalies followed by an intrusive investigation (hand dig and inspect). Digital Geophysical Mapping surveys have a higher level of quality control and provide the ability for advanced processing to limit the number of intrusive investigations. The detection limit of geophysical instruments is approximately 11 times the diameter of MEC and the effectiveness of this technique therefore, depends on the size of the metallic item in the subsurface. Intrusive investigations in a subsurface removal action would be limited to four ft below ground surface (approximate equipment detection depth).

During the RI field work, 102 munitions debris items and approximately 2,500 pounds of non-munitions-related metal waste were recovered from the Mortar Area MRS and the Training Area MRS. It is also expected that numerous anomalies would be detected during the surface and subsurface clearance.

Should any MEC items found on site be safe to move, these items would be consolidated and demolition operations conducted in a remote portion of the construction site to reduce the number of demolition shots and impacts on nearby Installation mission activities. If they could not be moved, the items would be blown-in place. Munitions debris would be handled under chain-of-custody protocols, thermally treated to neutralize explosive characteristics, and disposed of or recycled properly. Non-munitions-related scrap would be removed from the site and properly disposed of or recycled.

It is important to note that limitations of technology for the identification and removal of MEC on site would result in a residual MEC hazard. Due to this small but possible residual MEC hazard after the removal action, LUCs would still need to be put in place to effectively control and prevent explosive hazard exposure to potential human receptors. The LUCs that would apply at the former Mortar Range MRA have been described under Remedial Alternative 2.

A pit containing several thousand expended 0.22-caliber short cartridge casings was identified on the Training Area MRS during the RI fieldwork. As part of the preferred remedy, these casings would be recovered and recycled as scrap metal or disposed of properly as a preliminary maintenance activity to prepare the Training Area MRS for the remedial alternative.

Remedial Alternative 2 is the most appropriate remedy for the former Mortar Range MRA. It offers a sustainable solution to controlling MEC risk to human

receptors and is the most cost effective and implementable strategy given the current and future site use and anticipated risk.

EVALUATION OF RESPONSE ACTIONS

Nine criteria are used to evaluate the different remedial alternatives individually, and against one another in order to select a remedy. These criteria are as follows:

Threshold Criteria – Must be met for the remedial alternative to be eligible for selection as the preferred remedial alternative.

1. Overall Protection of Human Health and the Environment – Addresses whether a remedial alternative will achieve adequate protection of human health and the environment and describes how wastes or contaminants presenting risks at the site will be eliminated, reduced, or controlled through treatment, engineering, and/or LUCs. Because there is not an established threshold for MEC hazard, the goal is to effectively minimize or eliminate the exposure pathway between the MEC and receptor.
2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) – Addresses whether a remedial alternative meets the requirements of all applicable or relevant and appropriate federal and State environmental statutes and regulations. To be acceptable, a remedial alternative must comply with ARARs or be covered by a waiver.

Primary Balancing Criteria – Used to Weigh Major Trade-offs Among Response Actions

3. Long-term Effectiveness and Permanence – This criterion addresses the ability of a remedial alternative to maintain reliable protection of human health and the environment over time. It considers the magnitude of residual hazard, the adequacy of the response in limiting the hazard, and whether LUCs and LTM are required.
4. Reduction of Toxicity, Mobility, and Volume through Treatment – This criterion relates to the extent to which the remedial alternatives permanently reduce the volume of MEC, thus reducing the associated safety hazard. Factors to consider for this criterion for MEC include the degree of permanence of the remedial alternative, the amount of MEC removed/demolished, and the type and quantity of MEC remaining.
5. Short-term Effectiveness – Short-term effectiveness addresses the period of time needed to implement the remedy and any risks that may be posed to workers, emergency responders, the community, and the environment during implementation. MEC removal poses risks to workers and the public that must be considered and controlled.
6. Implementability – The technical and administrative feasibility of implementing each remedial alternative and the availability of services and materials are

addressed by this criterion. This criterion also considers the degree of coordination required by the regulatory agencies, successful implementation of the remedial alternative at similar sites, and research to realistically predict field implementability.

7. Cost – This criterion addresses the capital costs, the O&M costs, and the present worth analysis of costs anticipated for implementation of the remedial alternative. Capital costs are divided into direct costs and indirect costs. Direct capital costs include construction, equipment, relocation, disposal, and land and site development costs. Indirect capital costs include engineering expenses, legal fees, license or permit costs, start-up costs, and contingency allowances. O&M costs consist of costs associated with post-construction activities necessary to properly operate, maintain, and monitor a given remedial alternative.

Modifying Criteria – May be considered to the extent that information is available during the FFS, but can be fully considered only after public comment is received on this Plan.

8. State/Support Agency Acceptance – Considers whether the State agrees with the Army's analysis and recommendations, as described in the FFS and Plan.
9. Community Acceptance – Considers whether the local community agrees with the Army's analysis and preferred remedial alternative. Comments received on the Plan are an important indicator of community acceptance.

A detailed evaluation of remedial alternatives compared to threshold and primary balancing criteria is presented in the FFS and is summarized below. A summary of cost for each remedial alternative is presented in **Table 1**.

COMPARATIVE ANALYSIS OF RESPONSE ACTIONS

This section summarizes the comparative analysis of remedial alternatives for the former Mortar Range MRA that was presented in the FFS.

The comparison of the remedial alternatives is based on the threshold and balancing criteria that consider effectiveness at protecting human health and the environment; compliance with ARARs; short- and long-term effectiveness; reduction of toxicity, mobility, and volume through treatment; implementability; and cost.

Table 1

Remedial Alternative	Total Capital Cost	Total Annual O& M Costs	Total Present Worth of Annual Costs	Total Present Worth of Capital and Annual Costs
Remedial Alternative 1 ¹	\$0	\$0	\$0	\$0
Remedial Alternative 2	\$215,100	\$365,700	\$124,700	\$339,800
Remedial Alternative 3	\$6,785,950	\$365,700	\$124,700	\$6,910,650

¹There are no costs associated with this remedial alternative as it represents no action

Threshold Criteria

Overall Protection of Human Health and the Environment: Remedial Alternative 1 does not meet the threshold criteria since MEC is potentially located at the site and no action would be taken to control or eliminate the exposure pathway to receptor populations, thus, it is not protective of human health and the environment. Therefore, Remedial Alternative 1 will not be discussed further in this analysis. Both Remedial Alternatives 2 and 3 are protective of human health and the environment because they reduce the risk/explosive hazard of potential receptor exposure to MEC through LUCs. Remedial Alternative 3 also would reduce the volume of potential MEC on-site but would significantly impact the environment as a result of the intrusive nature of the removal activities.

Compliance with ARARs: Remedial Alternatives 2 and 3 would comply with ARARs identified with the former Mortar Range MRA. These ARARs include: characterization of solid waste, hazardous waste management, erosion and sediment control, excavation and off-site disposal, temporary storage of hazardous waste containers, and transportation of hazardous materials.

Balancing Criteria

Long-Term Effectiveness: Remedial Alternatives 2 and 3 both provide long-term effectiveness for reducing the potential for human receptor interaction with MEC at the site. Remedial Alternative 3 would provide slightly increased long-term effectiveness because potential MEC on the surface and subsurface would be removed. However, LUCs, including revising the established dig permit process to require MEC construction support at both MRSSs, would still be required in the future along with LTM.

Reduction of Toxicity, Mobility, and Volume through Treatment: Remedial Alternative 2 does not reduce the volume of MEC at the MRA; however, it is important to note that during the extensive RI fieldwork no MEC, with the exception of small arms ammunition not presenting a unique explosive hazard, was found at the site. Remedial Alternative 3 would potentially reduce the volume of MEC through removal and destruction/detonation, if any is present. However, there

is a residual risk of MEC even following a removal action and therefore LTM would still be required.

Short-Term Effectiveness: Remedial Alternative 2 has no short term risk associated with it. Remedial Alternative 3 would pose short term risk to site workers and possibly Installation personnel and contractors during construction activities.

Implementability: Remedial Alternative 2 is the most feasible, as all of the proposed LUCs are easy to implement. Remedial Alternative 3 is considered feasible, but non-optimal, due to its long implementation time, destruction of the environment, and site worker safety risk for minimal benefit.

Costs: Remedial Alternative 2 is less costly (while still protective of the environment) than Remedial Alternative 3. Remedial Alternatives 2 and 3 are both protective of the environment; however, Remedial Alternative 3 costs approximately 20 times as much as Remedial Alternative 2. Therefore the benefit of the significant effort associated with Remedial Alternative 3 may not justify the cost. Costs are presented in **Table 1**.

Modifying Criteria

State Acceptance: Approval of the preferred remedial alternative presented in this Plan is expected. State approval will be further evaluated in the ROD following the public comment period.

Community Acceptance: The USEPA has approved the release of this Plan to the public. Community acceptance of the preferred remedial alternative will be evaluated at the conclusion of the public comment period. Community acceptance will be addressed in the **Responsiveness Summary** prepared for the ROD.

SUMMARY OF THE PREFERRED REMEDIAL ALTERNATIVE

Remedial Alternative 2 (LUCs with LTM) is recommended as the preferred remedial alternative in the Plan. Remedial Alternative 2 meets the RAO and would be effective over the short- and long-term, because it controls or eliminates the exposure pathway between receptor populations and potential MEC through institutional and engineering controls. Based on the analysis, Remedial Alternative 2 provides benefits over Remedial Alternative 3, as Remedial Alternative 2

scores higher in terms of short term effectiveness, can be implemented relatively more quickly, and is more cost effective than Remedial Alternative 3. Remedial Alternative 2 is equally protective of human health and the environment as Remedial Alternative 3, and both remedial alternatives meet ARARs.

Remedial Alternative 3 is considered feasible, but non-optimal, due to its long implementation time, destruction of the environment, and site worker safety risk for minimal benefit. It is also important to note that no MEC (except small arms ammunition not presenting a unique explosive hazard) was encountered during the RI field work nor during the many years the site has been in use as the Installation golf course with the associated visual inspections during maintenance activities. Further, following completion of this action LUCs and LTM would still be required. Based on the large effort to reduce the volume of very few, if any, MEC items, and the need to still implement LUCs following the action, Remedial Alternative 3 is not considered a viable, cost effective, munitions response action at this MRA.

COMMUNITY PARTICIPATION

Public participation is an important component of remedy selection. The Army, USEPA, and MDE are soliciting input from the community on the preferred remedial alternative. The comment period extends 30 days from the release of the Proposed Plan. This period includes a public meeting at which the Army will present the Plan as agreed to by the USEPA and MDE. The Army will accept both oral and written comments at this meeting.

A critical component of FGGM's program to keep the public informed about the environmental cleanup activities and to provide an opportunity for involvement in decision-making is the Restoration Advisory Board (RAB). The RAB gives community members, particularly those who may be affected by the cleanup activities, and government representatives a chance to exchange information and participate in meaningful dialogue. The RAB has been briefed on this project during the RI stage. The RAB will be briefed on the FFS and Proposed Plan.

Public Comment Period

The Army is providing a comment period that extends 30 days from the release of the Proposed Plan, to provide an opportunity for public involvement in the decision-making process for the proposed action. If any significant new information or public comments are received during the public comment period, the Army, in consultation with USEPA and MDE, may modify the preferred remedial alternative outlined in this Plan or select another remedial alternative. The public is encouraged, therefore, to review and comment on this Plan. During the public comment period, the public is encouraged to review the following documents pertinent to this site and the Superfund process: *Former Mortar Range Munitions Response Area Remedial Investigation Report, Fort George G. Meade, Maryland* and *Former*

Mortar Range Munitions Response Area Focused Feasibility Study, Fort George G. Meade, Maryland. This information is available at the Fort George G. Meade Environmental Management Office, located in Buildings T-239 at Fort George G. Meade and the Anne Arundel County West County Area Public Library, located at 1325 Odenton Road in Odenton, MD. To obtain further information, the following representatives may be contacted:

**U.S. Army Garrison Fort George G. Meade
Public Affairs Office
4409 Llewellyn Avenue
Fort Meade, MD 20755
(301) 677-1361**

**Mr. John Burchette
Remedial Project Manager - USEPA Region III
1650 Arch Street
Philadelphia, PA 19103-2029
(215) 814-3378**

**Dr. Elisabeth Green
Maryland Department of Environment
1800 Washington Blvd, Suite 625
Baltimore, MD 21230-1719
(410) 537-3346**

Written Comments

If the public would like to comment in writing on the Plan or other relevant issues, comments should be delivered to the Army at the public meeting or mailed (postmark date August 17, 2012) to Ms. Melanie Moore, FGGM Public Affairs, at the address above.

Public Meeting

The Army will hold a public meeting to accept comments on this Plan; the date and location are July 18, 2012. This meeting will provide an opportunity for the public to comment on the proposed action. Comments made at the meeting will be transcribed. A copy of the transcript will be included in the ROD Responsiveness Summary and will be added to the FGGM Administrative Record file and information repositories.

Army's Review of Public Comment

The Army and USEPA will review the public's comments as part of the process in reaching a final decision on the most appropriate action to be taken. The Army's final choice of action will be issued in a ROD. A Responsiveness Summary, documenting and responding to written and oral comments received from the public, will be issued with the ROD. Once community response and input are received and the Army and USEPA sign the ROD, it will become part of the Administrative Record.

ACRONYMS AND ABBREVIATIONS

AEDB-R	Army Environmental Database – Restoration Module
ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CSM	Conceptual Site Model
DMM	Discarded Military Munitions
DoD	Department of Defense
FGGM	Fort George G. Meade
FFS	Focused Feasibility Study
ft	feet
LTM	Long Term Management
LUC	Land Use Control
MC	Munitions Constituents
MD	Maryland
MDE	Maryland Department of the Environment
MEC	Munitions and Explosives of Concern
mm	millimeter
MRA	Munitions Response Area
MRS	Munitions Response Site
MRSPP	Munitions Response Site Prioritization Protocol
O&M	Operation and Maintenance
RAB	Restoration Advisory Board
RAO	Remedial Action Objective
RI	Remedial Investigation
ROD	Record of Decision
U.S.	United States
USEPA	U.S. Environmental Protection Agency
UXO	Unexploded Ordnance

GLOSSARY OF TERMS

Administrative Record: This is a collection of documents (including plans, correspondence and reports) generated during site investigation and remedial activities. Information in the Administrative Record is used to select the preferred remedial alternative and is available for public review.

Applicable or Relevant and Appropriate Requirements (ARARs): The requirements found in federal and State environmental statutes and regulations that a selected remedy must attain. These requirements may vary among sites according to the remedial actions selected.

Capital Costs: This includes costs associated with construction, treatment equipment, site preparation, services, transportation, disposal, health and safety, installation and start-up, administration, legal support, engineering, and design associated with Response Actions.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): This federal law was passed in 1980 and is commonly referred to as the Superfund Program. It provides for liability, compensation, cleanup, and emergency response in connection with the cleanup of inactive hazardous waste disposal sites that endanger public health and safety or the environment.

Conceptual Site Model (CSM) – The CSM is a schematic diagram that identifies the primary source of contamination in the environment, shows how chemicals at the original point of release might move in the environment, identifies the different types of human populations who might come into contact with contaminated media, and lists the potential exposure pathways that may occur for each population. This conceptual model is used to plan the risk assessment and associated data collection activities and is often revised periodically as data become available at a site.

Focused Feasibility Study (FFS): This CERCLA document reviews the risks to humans and the environment at a site, and evaluates multiple remedial technologies for use at the site. Finally, it identifies the most feasible Response Actions.

Land Use Controls (LUCs) – LUC are physical, legal, or administrative mechanisms that restrict use of or limit access to, real property, to manage risks to human health and the environment. Physical mechanisms encompass a variety of engineered remedies to contain or reduce contamination and/or physical barriers to limit access to real property, such as fences or signs.

Long Term Management (LTM) – The period of site management (including maintenance, monitoring, record keeping, 5-year reviews, etc.) initiated after response (removal or remedial) objectives have been met (i.e. after the final remedy has been implemented).

Munitions and Explosives of Concern (MEC) – This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, includes: unexploded ordnance (UXO), as defined in 10 U.S.C. 101(e)(5); DMM, as defined in 10 U.S.C. 2710(e)(2); and munitions constituents (e.g., trinitrotoluene [TNT], cyclotrimethylenetrinitramine [RDX]) present in high enough concentrations to pose an explosive hazard.

Munitions Constituents (MC) – Any materials originating from UXO, DMM, or other military munitions, including explosive and nonexplosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.

Munitions Debris – Remnants of munitions (e.g. fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.

Munitions Potentially Presenting an Explosive Hazard (MPPEH) – Material potentially containing explosives or munitions (e.g. munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or disposal; and range related debris); or material possibly containing a high enough concentration of explosives such that the materials present an explosive hazard (e.g. equipment, drainage systems, holding tanks, piping, or ventilation ducts that were associated with munitions production, demilitarization, or disposal operations). Excluded from MPPEH are munitions within DoD's established

munitions management system and other hazardous items that may present explosive hazards (e.g. gasoline cans, compressed gas cylinders) that are not munitions and are not intended for use as munitions.

Munitions Response Area (MRA) – Any area on a defense site that is known or suspected to contain unexploded ordnance, DMM, or MC. Examples include former ranges and munitions burial areas. An MRA is composed of one or more munitions response sites.

Munitions Response Site (MRS) – A discrete location within an MRA that is known to require a munitions response.

Munitions Response Site Prioritization Protocol (MRSP) – A document that assigns a priority to each MRS based on the overall conditions at each location, taking into consideration various factors relating to safety and environmental hazard potential. The MRSP allows the Army to address the sites that have the highest relative risk first.

National Contingency Plan (NCP): The National Oil and Hazardous Substances Pollution Contingency Plan. These CERCLA regulations provide the federal government the authority to respond to the problems of abandoned or uncontrolled hazardous waste disposal sites as well as to certain incidents involving hazardous substances (e.g., spills).

Operation and Maintenance (O&M): Annual post-construction cost necessary to ensure the continued effectiveness of a Response Action.

Preferred Response Alternative – The MEC remediation approach that appears to best meet acceptance criteria; the remedial option proposed for implementation in the ROD.

Present Worth Costs: Used to evaluate expenditures that occur over an extended time period by discounting all future costs to a common base year. This allows the costs of the remedial alternatives to be compared on the basis of a single figure representing the amount of money that would be sufficient to cover capital and O&M costs associated with each remedial alternative over its planned life.

Record of Decision (ROD): This legal document is signed by the Army and the USEPA and will be reviewed by the MDE for concurrence. It provides the cleanup action or remedy selected for a site, the basis for selecting that remedy, public comments, responses to comments, and the estimated cost of the remedy.

Remedial Investigation (RI): An investigation under CERCLA that involves sampling environmental media such as air, soil, and water to determine the nature and extent of contamination and human health and environmental risks that result from the contamination.

Responsiveness Summary: A part of the ROD in which the Army documents and responds to written and oral comments received about the Proposed Plan.

Superfund Amendments and Reauthorization Act (SARA): A Congressional act that modified CERCLA. SARA was enacted in 1986 and again in 1990 to authorize additional funding for the Superfund Program.

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