Final Proposed Plan
NDNODS Fort Tuthill Small Arms Range Impact Area
Military Munitions Response Program
Munitions Response Site, Arizona
AEDB-R Site ID AZHQ-005-R-01
August 2022

1.0 INTRODUCTION

This **Proposed Plan** presents the **Preferred Alternative** for addressing **munitions and explosives of concern (MEC)** at the **Military Munitions Response Program (MMRP)** site; Fort Tuthill Small Arms Range Impact Area **Munitions Response Site (MRS)** in Coconino County, Arizona. Previously, under this Remedial Investigation, the site has been named NDNODS Fort Tuthill Small Arms Range North. For reasons related to ARNG tracking, the name going forward will be "NDNODS Fort Tuthill Small Arms Range Impact Area." This site is a **Non-Department of Defense owned, Non-Operational Defense Site (NDNODS)**. NDNODS Fort Tuthill Small Arms Range Impact Area MRS, is a former small arms range where a MEC item was discovered in 2017 (AZHQ-005-R-01), hereafter referred to as "the MRS" (**Figure 1**).

NOTE: Definitions for terms shown in **boldface** are included in a glossary in **Section 13** of this document. Acronyms and abbreviations used throughout this document are listed in **Section 12**.

The purpose of this Proposed Plan is to provide the rationale for the Preferred Alternative for the MRS pursuant to the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)**. This Proposed Plan discusses the MRS history, findings, and conclusions from previous environmental investigations conducted at the MRS and explains how the public can participate in the selection of remedial action at the MRS (**Box 1**).

This document is being prepared by the

BOX 1. MARK YOUR CALENDAR FOR THE PUBLIC COMMENT PERIOD FROM 20 AUGUST 2022 THROUGH 22 SEPTEMBER 2022

The ARNG will accept written comments on the Proposed Plan during the public comment period. Comment letters must be postmarked by 22 September 2022, and should be submitted to:

Rob Halla
Army National Guard Program Manager
Army National Guard Installations and Environment
111 South George Mason Dr.
Arlington, VA 22204-3231
703-607-7995
walter.r.halla2.civ@army.mil

To request an extension, send a written request to the above.

PUBLIC MEETING:
A public meeting will be held if requested by the public to explain this Proposed Plan and answer questions. Interested parties should contact Rob Halla (contact information above) on or before 22 September 2022 with their interest.

Information Repository:
For more information, see the NDNODS Fort Tuthill Small Arms Range Impact Area MRS project documents at:

Northern Arizona University Cline Library
Special Collections and Archives
1001 Knoles Dr,
Flagstaff, AZ 86011
928-523-2173

Flagstaff City – Coconino County
Public Library
300 West Aspen Ave
Flagstaff, Arizona 86001
928-213-2330

National Guard Bureau Army Guard Directorate (ARNG), the lead agency for the site cleanup activities, and has been prepared in coordination with the Arizona Department of Environmental Quality (ADEQ), the State regulatory authority for site cleanups, the Unites States Army Corps of Engineers (USACE)-Sacramento District, and Coconino County Parks and Recreation, the landowner. As a result of the previous environmental investigations conducted at the MRS detailed below, the ARNG and USACE, in consultation with ADEQ and Coconino County Parks and Recreation, has concluded a focused surface and subsurface MEC removal with **land use controls** is recommended at the MRS.

The ARNG is required under CERCLA §117(a) and the **National Oil and Hazardous Substances Pollution Contingency Plan (NCP)** §300.430(f)(2) to issue this Proposed Plan and seek public comment and participation. The ARNG will select the final action for the NDNODS Fort Tuthill Small Arms Range Impact Area MRS after reviewing and considering all information submitted during the public comment period and the public meeting (if requested by the public). The ARNG may modify the remedial action based on new information or public comments. A final remedial action will not be selected until the public comment period ends, and all comments are reviewed and addressed. Therefore, the public is encouraged to review and comment on the information and rationale presented in this Proposed Plan. See **Box 1** (Page 1) for public participation information.

This Proposed Plan summarizes information that can be found in greater detail in the **Remedial Investigation/Feasibility Study** Report (Parsons, 2021) and other documents contained in the **Administrative Record** File for this MRS, which can be viewed at the Information Repositories listed in **Box 1** (Page 1). The ARNG encourages the public to review these documents to gain a more comprehensive understanding of the MRS and investigation activities that have been conducted. Public input to this Proposed Plan will be documented in a **Responsiveness Summary** that will be included in a **Record of Decision** that documents the selected final remedial action.

2.0 SITE BACKGROUND

The NDNODS Fort Tuthill Small Arms Range Impact Area MRS is located approximately five miles south of Flagstaff, Coconino County, Arizona. The MRS is situated on land owned by the Coconino County Parks and Recreation and is open to the public as part of the County Park system. The Remedial Investigation (RI) investigation area includes the original small arms range and associated range safety fan, a northeast-southwest oriented partially coincident 2.36-inch bazooka rocket range safety fan, and an east-west oriented potential 2.36-inch bazooka rocket range safety fan all comprising a combined 100-acre footprint (**Figure 1**).

Fort Tuthill contains a former small arms range and adjacent military range. During the Historical Records Review performed during the Site Inspection, the Fort Tuthill Artillery Range was identified as a new MRS, immediately adjacent to, and surrounding the Fort Tuthill Small Arms Range. As a result, the NDNODS Fort Tuthill Munitions Response Area was established comprising the Fort Tuthill Small Arms Range MRS and the Fort Tuthill Artillery Range MRS.

The NDNODS Fort Tuthill Small Arms Range MRS was originally identified as a 3.18-acre small arms and adjacent artillery range. The small arms range was used from 1928 through 1955 for training with .30 and .50 caliber water-cooled machine guns and Browning Automatic Rifles (.30 caliber). Firing at the range was documented from the northeast to the southwest into an impact **berm**. Exhibits at the Fort Tuthill Museum

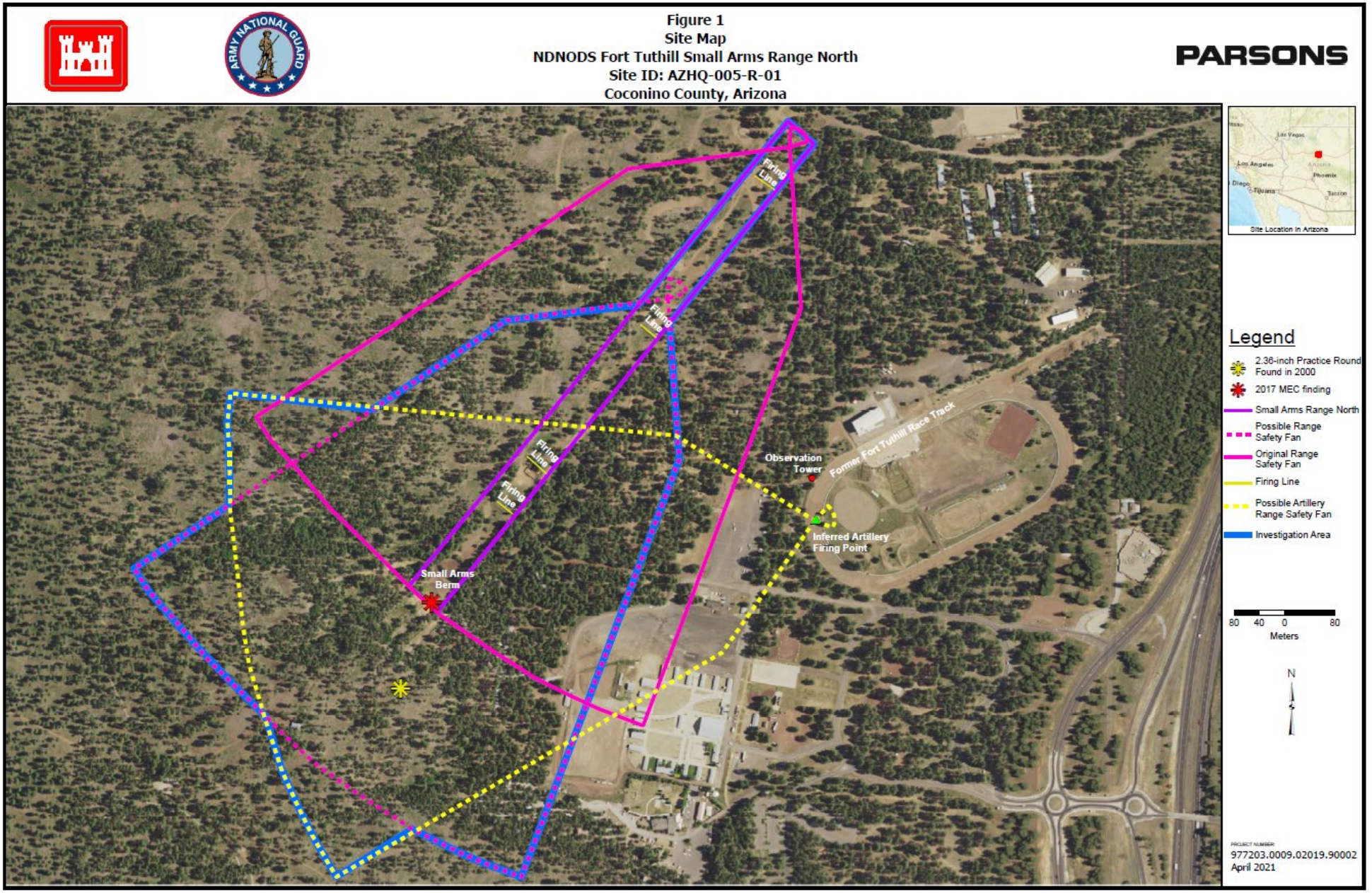
Figure 1
Site Map
NDNODS Fort Tuthill Small Arms Range North
Site ID: AZHQ-005-R-01
Coconino County, Arizona
PARSONS
Firing Line
Firing Line
Firing Line
Firing Line
Observation Tower
Former Fort Tuthill Race Track
Inferred Artillery Firing Point
Small Arms Berm
Site Location in Arizona
Legend
2.36-inch Practice Round Found in 2000
2017 MEC finding
Small Arms Range North
Possible Range Safety Fan
Original Range Safety Fan
Firing Line
Possible Artillery Range Safety Fan
Investigation Area
80 40 0 80
Meters
N
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April 2021

list weapons used at Fort Tuthill as .30 and .50 caliber machine guns, mortars, bazookas (2.36-inch rockets), recoilless rifles, and grenades. However, historical documents regarding the NDNODS Fort Tuthill Artillery Range MRS indicate that grenades, bazookas (2.36-inch rockets), mortars, and artillery were not associated with the small arms range since other dedicated training ranges for their usage were present within Fort Tuthill.

Figure 2: Small Arms Berm

Five relevant investigations/incidents have occurred at the NDNODS Fort Tuthill Small Arms Range Impact Area MRS. These include :

1. Preliminary Assessment Report (EA, 2008)
2. Historical Records Review (Weston, 2011)
3. Site Inspection (Weston, 2012)
4. October 2017 MEC Discovery (2.36-inch bazooka rocket) (Coconino, 2017)
5. Remedial Investigation/Feasibility Study Report (Parsons, 2021)

Preliminary Assessment Report (EA, 2008) – The Preliminary Assessment indicated the Fort Tuthill Range was used as a small arms range from approximately 1928 through 1955. Other information found in the Preliminary Assessment included the direction of fire (southwest) and the location of an earthen berm at the base of a hill approximately 50 to 100 feet high. During the October 2008 Preliminary Assessment site visit, no MEC or munitions debris (MD) were observed but interviews indicated that MD from a possible bazooka round had been observed on site. The NDNODS boundary presented in the Preliminary Assessment Report is a combination of an exclusion area and original lease for training at Fort Tuthill.

Historical Records Review (Weston, 2011) – The Historical Records Review included research at the Northern Arizona University Cline Library, the Flagstaff Public Library, and the Fort Tuthill Museum. The Historical Records Review determined the data collected, reviewed, and assessed from the Preliminary Assessment and Historical Records Review was relevant and of sufficient quantity and quality to support the Site Inspection planning and execution. The Historical Records Review confirmed the firing and training of .30 and .50 caliber machine guns as the primary usage of the small arms range and also ruled out the usage of grenades, bazookas, mortars, and artillery for training at the small arms range. The Historical Records Review concluded that the boundary of the small arms range is generally consistent with present and historical physical features at the site and has not been expanded or modified. However, the Historical Records Review modified the estimated size of the MRS to 13.39 acres (compared to 3.2 acres in the Preliminary Assessment report) as a result of more accurate recalculations based on geographic information system (GIS) data from the ARNG Directorate.

Site Inspection (Weston, 2012) – The Site Inspection field activities included visual survey of approximately 2.6 acres of instrument aided transect surface sweeps and the collection of biased surface soil samples. The Site Inspection was conducted over 2.6 acres instead of the entirety of the 13.39-acre MRS due to access refusal (refusal of the Right-of-Entry) by the Arizona State Land

Department. These activities were completed within the MRS boundary in the area associated with the target impact berm. Two target berms were observed: a larger, southern "L" shaped berm approximately 150 feet long, 20 feet wide, and 10 feet high. A smaller, northeastern berm, roughly 200 yards from the "L" shaped berm, consisting of a brick and concrete retaining wall roughly 5 feet tall was also identified.

No MEC items were identified at the 2.6-acre MRS investigated during the Site Inspection. Biased soil samples for lead did not exceed the Arizona Site Inspection screening level of 400 milligrams per kilogram (mg/kg). As a result of the investigation the Site Inspection recommended the NDNODS Fort Tuthill Small Arms Range MRS be separated into two MRSs consisting of the NDNODS Fort Tuthill Small Arms Impact Area MRS (2.6 acres) and the NDNODS Fort Tuthill Small Arms Range North MRS (10.79 acres). The NDNODS Fort Tuthill Small Arms Impact Area MRS was recommended for No Further Action (NFA) and the NDNODS Fort Tuthill Small Arms Range North MRS was recommended for a Site Inspection (because one was not conducted due to restricted access) with five-year reviews.

October 2017 MEC Discovery (Coconino, 2017) - On October 31, 2017 the Coconino County Sheriff's Office was contacted to report the presence of what was determined to be a World War II bazooka munition (2.36-inch rocket) found in a construction area west of the Flagstaff Extreme Adventure Course (**Figure 3**). This construction area is in the vicinity of the suspected small arms berm. The Luke Air Force Base Explosive Ordnance Disposal responded to the scene on November 1, 2017 and identified the item as a World War II shoulder mounted antitank rocket. X-Ray imagery of the item indicated that it was high explosive (HE); therefore, the munition was destroyed by controlled detonation.

Remedial Investigation (Parsons, 2021) – The 2021 Remedial Investigation (RI) was performed for the NDNODS Fort Tuthill Small Arms Range Impact Area MRS based on concerns raised from the 2017 MEC discovery which presented new information that impacted the recommendations of the 2012 Site Inspection. The discovery of the 2.36-inch rocket introduced a possible new use of the MRS as a 2.36-in bazooka rocket range.

Following the initial RI planning meeting, **Systematic Project Planning** Meeting #1, on January 30, 2020 and discussion of the upcoming RI, the landowner (Coconino County Parks and Recreation) informed the Project Team that additional information had been discovered when discussing the MRS with the maintenance staff. The Project Team was informed that a previously unreported blue, practice 2.36-inch bazooka rocket had been found within the MRS by maintenance personnel in 2000. The item was found on the hillside behind the termination berm at the small arms range and the approximate location was added to the project figures. As a result of this discovery, the possible range configuration was re-evaluated by the Project Team during a subsequent meeting held on March 3, 2020 and an alternate potential firing point and range configuration was identified based on topographic conditions and locations presented for the two rocket findings (the 2017 MEC discovery and 2000 practice rocket discovery). This alternate range fan mostly overlaps the prior defined 100-acre MRS with small additional portions outside the current MRS. These additional areas were considered with regard to the RI but have yet to be formally included in the MRS footprint.

The RI investigation area included the original small arms range and associated range safety fan, a northeast-southwest oriented partially coincident 2.36-inch bazooka rocket range safety fan, and an east-west oriented potential 2.36-inch bazooka

rocket range safety fan all comprising a combined 100-acre footprint (**Figure 1**).

The RI MEC sampling was designed to determine the nature and extent of MEC contamination in the soil with contingencies to sample for, and characterize the nature and extent of **munitions constituents (MC)** in soil based on the findings of the MEC sampling effort. The findings of the RI are summarized in **Sections 3 and 5**.

3.0 SITE CHARACTERISTICS

PHYSICAL SETTING

The 100-acre MRS is located approximately five miles south of Flagstaff, Coconino County, Arizona. The MRS is characterized by gently rolling terrain with elevations ranging from approximately 6,965 feet to 7,010 feet above sea level. The MRS is sparsely vegetated with sparse to dense strands of pine-fir conifer forest **(Figure 3)**. There is an intermittent stream in the MRS but otherwise there are no surface water bodies at the site.

The MRS lies predominately on Coconino County Park land and is operated and open to the public as Fort Tuthill County Park. A portion of the MRS also lies on Fort Tuthill Luke Air Force Base Recreational Area, Coconino County Fairgrounds and Park is immediately to the east.

Figure 3: General Area of 2017 MEC Discovery

CURRENT AND FUTURE USE

The 100-acre MRS is located on property owned by Coconino County Parks and Recreation and partially on Luke Air Force Base recreation land. The MRS is predominately natural land with trails and pathways throughout. Land use is recreational with hiking, biking, camping, archery, equestrian, and snow sporting. The MRS also contains Flagstaff Extreme Adventure Course (obstacles and zipline course), Fort Tuthill Campground, Bike Park, Equestrian Cross-County Jump Course, and Flagstaff Snow Park (snow tubing park). The foreseeable future use will remain the same as the current uses as described.

FIELD INVESTIGATION ACTIVITIES

The RI survey was designed to obtain data to sufficiently characterize the presence or absence as well as nature and extent of MEC and MC contamination at the NDNODS Fort Tuthill Small Arms Range Impact Area MRS in order to evaluate potential hazards or **risks** related to MEC and MC. These findings were planned to support the development of potential remedial alternatives where complete exposure pathways were identified. Therefore, the RI field investigation was divided into two segments:

- **MEC Sampling -** consisted of three phases: A Digital Geophysical Mapping (DGM) transect survey, a DGM grid survey, and an intrusive investigation.
- **MC Sampling –** designed to be up to two phases with additional background samples dependent on results of MEC sampling.

The MEC sampling effort was designed to delineate potential high use areas, low use areas, and no evidence of usage areas. Given the prior MC Site Inspection recommendation of No Further Action in soil associated with site use as a small arms range, the RI MC sampling effort was limited to assess potential

MC risk associated with 2.36-inch bazooka and other munitions in the event a former impact area or high use area was identified.

MEC INVESTIGATION RESULTS

During the first of three phases of the MEC investigation, the entirety of the MRS was surveyed using PDM8® sensors by collecting DGM data over 2-ft wide transects. The transects were spaced at 150 ft intervals in the extended 2.36-inch bazooka rocket safety fan and 100-ft intervals in the historic small arms range. The anomaly density transect data was extrapolated and evaluated to divide the MRS into high density areas (potential high use areas) and low density areas (potential low use areas).

The second phase of the RI included installation and survey of seven strategically placed grids in areas determined to be high density and five grids in low density areas. All grids were 100-ft by 100-ft in size except for one 25-ft by 400-ft high density grid that was elongated to capture two adjacent areas of elevated anomaly density. Each grid was surveyed with 100 percent DGM coverage using the PDM8® to identify subsurface anomalies potentially indicative of MEC.

The third phase of the RI involved intrusive investigation of anomalies detected within the grids during the second phase. A total of 1,000 targets were intrusively investigated (736 from the high density grids and 264 from the low density grids). As a result of the intrusive investigation during the final phase no MEC items were identified and recovered and only 8 items recovered were identified as MD, 873 items recovered were identified as other debris which were non-munitions related items.

Based on the findings of the MEC investigation effort, the entirety of the NDNODS Fort Tuthill Small Arms Range Impact Area MRS was determined to be a low use area. Details of the sampling methodology of all three phases are documented in the Remedial Investigation Work Plan/**Uniform Federal Policy - Quality Assurance Project Plan** (**UFP-QAPP**; Parsons, 2020) The full results of the MEC sampling survey are provided in the Remedial Investigation/Feasibility Study Report (Parsons, 2021).

MC SAMPLING RESULTS

Based on the analytical results reported for samples collected during the 2012 Site Inspection report, No Further Action for MC was recommended at the NDNODS Fort Tuthill Small Arms Range Impact Area MRS. Therefore, MC characterization tasks planned for the RI included the collection of soil samples solely from within designated high use areas. As a result of the MEC investigation effort, no high use areas were identified and therefore, the MC sampling was not needed.

However, following discussions with the ADEQ, the Project Team conducted MC sampling for explosives in the four grid locations where MD was recovered in the MEC sampling effort. This modification was enacted based on reconsideration of the MRS as a potential munitions training area, whereas the original Site Inspection sampling only sampled for lead due to the presumed usage as a small arms range.

In total four samples were collected where MD was found during the RI. Explosives were not detected in any of the four samples.

NATURE AND EXTENT OF MEC AND MC

Upon completion of the MEC investigation and intrusive operations no MEC items were found during the 2021 RI for NDNODS Fort Tuthill Small Arms Range Impact Area MRS and no high use areas were identified. The modified MC sampling effort that was undertaken found no MC risk from explosives at any of the four areas at which sampling was conducted.

4.0 SCOPE AND ROLE OF THE ACTION

This Proposed Plan addresses the NDNODS Fort Tuthill Small Arms Range Impact Area MRS (AZHQ-005-R-01). The overall strategy of the ARNG is to protect human health and the environment. The proposed strategy is appropriate at this MRS because the results of the RI illustrated that the MRS has been sufficiently characterized and the Preferred Alternative is protective of human health and the environment. Therefore, it is the ARNG's, USACE's and ADEQ's current judgement that the Preferred Alternative, focused surface and subsurface MEC removal and land use controls, is appropriate at the NDNODS Fort Tuthill Small Arms Range Impact Area MRS to protect human health, welfare, and the environment.

5.0 SUMMARY OF SITE RISKS

A baseline risk assessment was conducted to evaluate potential risk from MEC at the MRS using the risk management method (RMM). This RMM involves the use of four matrices to define acceptable and unacceptable risk from MEC hazards based on an evaluation of site conditions related to the likelihood of an encounter, the severity of an incident, and the sensitivity of interaction based on expected land use activities. Based on the 2017 discovery of MEC, combined with the MD items found in the RI and current land use and accessibility of the assessment area, an unacceptable risk exists for human receptors to come in direct contact with explosive hazards at the MRS. However, there are no potential human health risks from exposure to MC in soil. In addition, unacceptable risks to ecological receptors are unlikely.

6.0 REMEDIAL ACTION OBJECTIVES

This Proposed Plan recommends actions to address MEC contamination in the soil at NDNODS Fort Tuthill Small Arms Range Impact Area MRS that poses a risk to human health. The **Remedial Action Objective (RAO)** is to reduce the risk due to the potential presence of 2.36-inch bazooka rockets; 60 millimeter (mm) HE mortars; and 57mm HE recoilless rifles within the NDNODS Fort Tuthill Small Arms Range Impact Area MRS on the surface and in the subsurface to the depth of contamination (depths up to 25 centimeters [cm] below ground surface[bgs]) to address likelihood of exposure to on-site workers (i.e., Fort Tuthill County Park workers), construction workers, and site visitors/recreational users (hikers, bikers, horseback riders, campers, archers) via direct contact, through a source removal to 60 cm (24 inches) bgs (and to original grade at the former impact/target berm), an implementation of land use controls, access restrictions, or a combination thereof, such that an acceptable condition is achieved.

7.0 SUMMARY OF REMEDIAL ALTERNATIVES

Based on the findings of the 2021 RI at the NDNODS Fort Tuthill Small Arms Impact Area MRS five alternatives were proposed. Each alternative was assessed individually against the assessment criteria required by law provided by the United States Environmental Protection Agency (USEPA) in CERCLA §121(b) (full list of criteria is provided in **Table 1**). The alternatives proposed are as follows:

ALTERNATIVE 1 – NO ACTION

Alternative 1 is no action towards the potential MEC at the NDNODS Fort Tuthill Small Arms Range Impact Area North MRS. Alternative 1 does not involve implementing any remedial actions. The NCP requires that a **No Action** alternative be evaluated to provide a baseline for comparison to other alternatives. This alternative provides no actions to protect human health or the environment at the MRS. Because this alternative does not change the conditions at the MRS it is not included in the evaluation of alternatives (Section 8.0).

ALTERNATIVE 2 – PUBLIC EDUCATION AND WARNING SIGNS (LAND USE CONTROLS)

Alternative 2 is the implementation of public education and warning signs which would serve to limit human interaction with surface and subsurface MEC within the MRS by increasing the awareness of potential MEC hazards. The land use controls implemented under Alternative 2 would focus on modifying human behavior through public education and warning signs. To educate the receptors of potential explosive hazards, educational pamphlets would be developed and distributed to the public at the Park and warning signs would be installed at Park access points and kiosks.

The focus of educational pamphlets should be the prevention of handling of suspected MEC and the reporting of suspected MEC. Based on the number of people who access the Park daily an estimated 5,000 pamphlets will be produced yearly. The signs would reinforce the link between appropriate access and safety. Annual maintenance would be necessary for the signs. This alternative would require that Five-Year Reviews be conducted to ensure that the land use controls remain protective of potential human receptors.

ALTERNATIVE 3 – SURFACE MEC REMOVAL AND LAND USE CONTROLS

Alternative 3 is the implementation of a complete surface MEC removal and land use controls across the 100-acre MRS which would serve to reduce risks by removing surface MEC throughout the MRS and would limit human interaction with surface and subsurface MEC at the MRS by increasing the awareness of potential hazards.

The first step MEC detection would be accomplished with an instrument aided-sweep of the MRS. Unexploded ordnance-qualified personnel would systematically walk the MRS and mark, identify, and record the locations of all MEC found on the surface for removal or subsequent disposal. The search would be conducted with a handheld analog magnetometer.

This alternative would consist of 100% coverage of the 100-acre MRS. If the instrument indicates a response but the source item is not found on or just below the ground surface, the Unexploded Ordnance Technician would move on without extensive digging into the subsurface.

The same land use controls as described in Alternative 2 would be utilized. Five-Year Reviews would be conducted to ensure that the implementation of the selected remedy and land use controls remain protective of potential human receptors.

ALTERNATIVE 4 – FOCUSED SURFACE AND SUBSURFACE MEC REMOVAL AND LAND USE CONTROLS

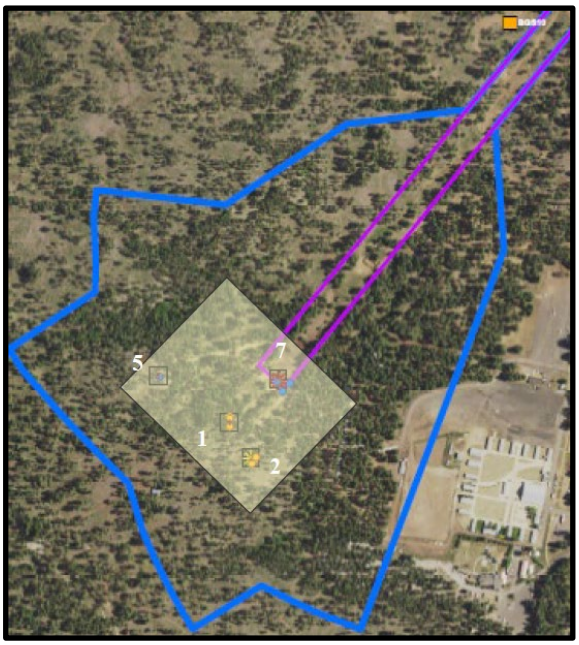
Alternative 4 is the implementation of a 25-acre "focused" surface and subsurface MEC removal and land use controls which would serve to reduce risks by removing surface and subsurface MEC throughout a portion of the MRS and would limit human interaction with surface and subsurface MEC by increasing the awareness of potential hazards.

The 25-acre "focused" area is an area that is determined to be the area with the highest likelihood of MEC contamination at the MRS. The "focused" area includes the impact area, both historical locations where 2.36-inch bazooka rockets finds were previously reported, the locations where RI MD findings were identified (grids 1, 2, 5, and 7 on **Figure 4**), plus a buffer area. **Figure 4** shows the conceptual "focused" removal area as a shaded box with the balance of the MRS making up the "Remainder of MRS" area.

Instrumented-aided surface sweeps would be conducted first followed by DGM and advanced geophysical classification (AGC) over the "focused" area. MEC Detection for surface MEC removal would be accomplished with an instrument-aided

surface sweep.

Figure 4: Conceptual "Focused" Removal Area



Note: 25-acre "Focused Area" graphic is representative only. Actual configuration (location and shape) would be finalized during Removal Action Systematic Project Planning meetings.

Following completion of surface sweeps, DGM, and AGC surveys, intrusive removal actions would be conducted to clear all anomalies detected in the DGM and AGC surveys to the RAO depth of 60 cm bgs. This would all be conducted with 100% coverage in the "focused area".

Additionally, the former small arms impact/target berm (**Figure 4**) will be cleared to original grade which may exceed the 60 cm clearance depth applied to the balance of the focused area.

The same land use controls as described in Alternative 2 would be utilized. Five-Year Reviews would be conducted to ensure that the implementation of the selected remedy and land use controls remain protective of potential human receptors.

ALTERNATIVE 5 – COMPLETE SURFACE AND SUBSURFACE MEC REMOVAL

Alternative 5 is the implementation of a complete surface and subsurface MEC removal across the entire 100-acre MRS and would serve to reduce risk by removing all surface and subsurface MEC throughout the MRS.

Complete removal to the RAO depth of 60 cm bgs would be accomplished by first conducting instrument-aided surface sweeps followed by a DGM survey covering 100% of the MRS. An AGC survey would then be conducted to confirm the anomalies detected in the DGM survey.

Finally, all of the anomalies retained by the AGC survey would be intrusively investigated to the RAO depth of 60 cm bgs. Additionally, the former small arms impact/target berm will be cleared to original grade which may exceed the 60 cm clearance depth applied to the balance of the MRS.

After implementation of this remedy Unlimited Use/Unlimited Exposure conditions will be assessed. The depths that MEC is detected and removed and whether 100% coverage was attained will be evaluated post-removal to verify that UU/UE is achieved. UU/UE would also require that all ROE is granted or renewed for 100% of the MRS. If Unlimited Use/Unlimited Exposure is not achieved land use controls as described in Alternative 2 would be implemented.

8.0 EVALUATION OF ALTERNATIVES

The Alternatives were evaluated with respect to the nine NCP criteria, as outlined by CERCLA (**Table 1**). The nine NCP criteria are categorized into three groups: threshold criteria, primary balancing criteria, and modifying criteria.

The comparative analysis evaluates the relative performance of Alternatives 1, 2, 3, 4, and 5 with respect to each of the nine NCP

criteria (**Table 2**). Identifying the advantages and disadvantages of each alternative, with respect to each other, helps identify relative strengths of the Preferred Alternative. These strengths, combined with risk management decisions made by the ARNG, USACE, and ADEQ, as well as input from the community, will serve as the basis for selecting the remedy.

Threshold Criteria

Remedial Alternatives 4 and 5 would be protective of human health and the environment by addressing the exposure of receptors to MEC such that there are no unacceptable risks remaining at the NDNODS Fort Tuthill Small Arms Range Impact Area MRS. Remedial Alternatives 2 and 3 would be protective of human health and the environment by addressing the exposure of receptors to MEC such that there are no unacceptable risks remaining at the "Remainder of MRS" area only, however, risks would still remain in the "Focused Area" (**Figure 4**). Remedial alternatives are either protective or not and, therefore, no comparison of overall protectiveness is possible between alternatives.

All remedial alternatives identified to address MEC risk at the NDNODS Fort Tuthill Small Arms Range Impact Area MRS comply with ARARs where applicable. There are no chemical-specific, location-specific, or action-specific ARARs identified for Alternative 2. Alternatives 3, 4, and 5 will include MEC disposal if MEC is encountered and will comply with Resource Conservation and Recovery Act (RCRA) Subpart X which is the USEPA guidance document for non-typical hazardous waste

Primary Balancing Criteria

Alternatives 3, 4, and 5 are effective over the long-term; moreover, they are the most permanent because they involve some measure of MEC removal. Implementing Alternatives 3, 4, and 5 would change the risk status from "unacceptable" to "acceptable" throughout the MRS, as the risk would be reduced via source removal. Because Alternative 2 would not change the risk status to 'acceptable' it was not evaluated in detail against the other criteria.

Table 1 – Evaluation Criteria for Remedial Alternatives

Threshold	**Overall Protectiveness of Human Health and the Environment** determines whether an alternative adequately protects human health and the environment from unacceptable risks.
	Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) evaluates whether the alternative meets Federal and State environmental regulations and requirements that pertain to the site.
Primary Balancing	**Long-Term Effectiveness and Permanence** considers the ability of an alternative to maintain protection of human health and the environment over time.
	Reduction of Toxicity, Mobility, and Volume (TMV) of Contaminants through Treatment evaluates use of treatment to reduce harmful effects of principal **contaminants**, their ability to move in the environment, and the amount of contamination present.
	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.
	Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the availability of goods and services.
	Cost includes estimated capital and annual operations and maintenance costs for a specific time period.
Modifying	**State/Support Agency Acceptance** considers whether the State agrees with the Army's analyses and recommendations, as described in the Remedial Investigation/Feasibility Study and Proposed Plan.
	Community Acceptance considers whether the local community agrees with the Army's analyses and Preferred Alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

Table 2 - Comparison of Alternatives

CERCLA Evaluation Criteria	Alternative 1 No Action	Alternative 2 Land Use Controls	Alternative 3 Surface MEC Removal with Land Use Controls	Alternative 4 Focused Surface and Subsurface MEC Removal and Land Use Controls	Alternative 5 Complete Surface and Subsurface MEC Removal
Protective of Human Health and the Environment [1]	No	**Focused Area** – No Risk remains unacceptable after implementation of alternative, based on Decision Logic to Assess Risk. **Remainder of MRS** - Yes Risk becomes acceptable after implementation of alternative, based on Decision Logic to Assess Risk.	**Focused Area** – No Not protective of human health because does not decrease amount of MEC in subsurface and future intrusive plans for the area. **Remainder of MRS** - Yes Risk becomes acceptable after implementation of alternative, based on Decision Logic to Assess Risk.	Yes Risk becomes acceptable after implementation of alternative, based on Decision Logic to Assess Risk.	Yes Risk becomes acceptable after implementation of alternative, based on Decision Logic to Assess Risk.
Complies with Applicable or Relevant and Appropriate Requirements	NA	Yes	Yes	Yes	Yes
Effective and Permanent	NA	Medium	High	High	Highest
Reduces Toxicity, Mobility, or Volume through Treatment	None (no treatment)	None (no treatment)	Reduction in volume of MEC on ground surface	Reduction in volume of MEC on ground surface and in subsurface in 25-acre "focused" area	Elimination of MEC on ground surface and in subsurface
Short-Term Effectiveness	No short-term hazards to workers and surrounding area	Some short-term hazards to workers and surrounding area	Significant short-term hazards to workers and surrounding area	Greatest short-term hazards to workers and surrounding area	Greatest short-term hazards to workers and surrounding area
Implementable	Readily Implementable	Readily Implementable	Readily Implementable	Readily Implementable	Readily Implementable
State Acceptance	Unacceptable	Unacceptable	Unacceptable	Acceptable	Acceptable
Community Acceptance		To be determined during preparation of the Proposed Plan and Decision Document			
Cost [2]	$0	$507,195	$1,830,128	$1,847,912	$4,984,654

(1) Conceptual "Focused Area" and "Remainder of MRS" areas are shown on Figure 4.

(2) Costs shown are based on alternative implementation duration estimates with recurring costs based on 30-year planning horizons specified in the Remedial Investigation/Feasibility Study Guidance (USEPA, 1988) for the purposes of evaluating and comparing alternatives with a 20% contingency reported as a **total present value (TPV)**. The TPV is based on a discount rate of 7 percent. Details of the cost estimates and the development of the TPVs are provided in Appendix J of the Remedial Investigation/Feasibility Study Report.

Alternatives 3, 4, and 5 would achieve reduction in volume of wastes, because they all involve some measure of MEC removal. The MEC removal associated with Alternative 3 only focuses on MEC located on the surface and, therefore, would achieve less reduction in volume of wastes than either Alternatives 4 and 5. Although very similar to the reduction achieved by Alternatives 3 and 4, Alternative 5 achieves the greatest reduction in volume of wastes, because the associated MEC removal includes both surface and subsurface removals of the site. Alternative 4 provides a targeted approach and would achieve elimination of wastes through the removal of all surface and subsurface MEC in a "focused" portion of the MRS.

Implementation of Alternatives 3, 4, and 5 would result in short-term hazards to workers involved with the MEC removal activities or the installation of warning signs because of the increased likelihood of MEC exposure. Of the three alternatives, Alternatives 4 and 5 would present the greatest short-term hazards to workers, because the associated MEC removal includes all depths and locations that receptors might encounter. In all cases, hazards to workers during implementation of the alternatives would be managed using industry-standard safety procedures (e.g., using qualified unexploded ordnance personnel, enforcement of safe separation distances, engineering controls, etc.), which would also minimize any associated potential risks to the surrounding community.

All technologies and methods involved in implementing Alternatives 2 through 5 are well established and would be readily implementable using existing technology. The cost associated with each is as follows:$507,195 (Alternative 2), $1.83M (Alternative 3), $1.85M (Alternative 4), and $4.98M (Alternative 5). A summary of the detailed analysis of alternatives is shown in **Table 2**.

Modifying Criteria

Based on input from the ADEQ Alternative 3 was determined to not be an acceptable alternative. Regardless of the outcome of the RMM evaluation of "acceptable", the Systematic Project Planning Team agreed during Meeting #4 that Alternative 3 is not protective of human health for the "Focused Area" as it does not decrease the amount of MEC in the subsurface and there is future park development plans that are potentially intrusive in that area.

Community acceptance cannot be evaluated fully until public comments are received on the Proposed Plan (this document).

9.0 PREFERRED ALTERNATIVE

The Preferred Alternative is Alternative 4: Focused Surface and Subsurface MEC Removal and Land Use Controls.

Based on the information available at this time, ARNG and USACE believe that this alternative would be protective of humans and the environment and would achieve the RAO of minimizing risk to human receptors from exposure to MEC. The Preferred Alternative may be modified in response to public comments or new information.

Based on information currently available, ARNG and USACE believe the Preferred Alternative meets the threshold criteria and provides the best balance of trade offs among the other alternatives with respect to the balancing and modifying criteria. USACE expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA §121(b):

1. Protects humans and the environment;
2. Complies with ARARs;
3. Is cost-effective;

4. Utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and
5. Satisfies the preference for treatment as a principal element (or justify not meeting the preference).

10.0 REGULATORY PARTICIPATION

ADEQ and USACE actively participated with the ARNG to evaluate the NDNODS Fort Tuthill Small Arms Range Impact Area MRS (AZHQ-005-R-01) during development of the Remedial Investigation Work Plan/UFP-QAPP and the Remedial Investigation/Feasibility Study Report. In cooperation, ARNG and USACE, in consultation with ADEQ, are in mutual agreement that Alternative 4 – Focused Surface and Subsurface Removal and Land Use Controls is an appropriate decision for the MRS. Appendix A contains letters from ADEQ conditionally concurring with both the Remedial Investigation/Feasibility Study Report and this PP.

The proposed decision can change in response to public comment or if new information is obtained for the MRS.

11.0 COMMUNITY PARTICIPATION

Public input is important to the decision-making process. Information regarding the implementation of the proposed Alternative 4 – Focused Surface and Subsurface Removal and Land Use Controls decision at AZHQ-005-R-01 is provided to the public through information and documents in the ARNG Administrative Record File, and announcements published in local newspapers. The public is encouraged to refer to these sources to stay informed on issues pertaining to activities at the MRS.

The dates for the public comment period and the location of the Remedial Investigation/Feasibility Study report at the local public library are provided on Page 1 of this Proposed Plan. Nearby residents and other interested parties are encouraged to use the comment period for questions and concerns about the proposed decision for the MRS. ARNG will summarize and respond to public comments in a Responsiveness Summary, which will become part of the Record of Decision.

12.0 ACRONYMS AND ABBREVIATIONS

AGC	advanced geophysical classification
ARARs	Applicable or Relevant and Appropriate Requirements
ARNG	Army National Guard
ADEQ	Arizona Department of Environmental Quality
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm	centimeters
DGM	Digital Geophysical Mapping
FS	Feasibility Study
GIS	geographic information system
MC	munitions constituents
MD	munitions debris
HE	High Explosive
MEC	munitions and explosives of concern
mg/kg	milligrams per kilogram
mm	millimeter
MMRP	Military Munitions Response Program
MRS	Munitions Response Site
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDNODS	Non-Department of Defense owned, Non-Operational Defense Site
NFA	No Further Action
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RMM	Risk Management Method
TPV	Total Present Value
UFP-QAPP	Uniform Federal Policy-Quality Assurance Project Plan
USACE	United States Corps of Engineers
USEPA	United States Environmental Protection Agency

13.0 GLOSSARY

Administrative Record – A collection of documents made available to the public that includesall the information considered and relied on in selecting a remedy for a contaminated site.

Applicable or Relevant and Appropriate Requirements (ARARs) – State or federal requirements, standards, criteria, or limitations that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site, or that are sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Generally, the federal standards are the ARARs; state standards only apply if they are either more stringent or more broadly applied than their federal counterparts.

Berm – A flat strip of land, raised bank, or terrace that is used at a firing range to help limit the spread of fired bullets.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) - Passed in 1980 and subsequently amended, this law 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 of the environment.

Contaminant – A compound or element that upon exposure will or may reasonably be anticipated to cause certain specified harmful health effects.

Feasibility Study (FS) - A document that describes and evaluates potential cleanup alternatives for a contaminated site based on data and risk assessments documented in the RI.

Land use controls: Government ordinances, codes, and permit requirements that restrict the private use of land and natural resources. The primary private land-use control is deed restrictions, limiting what can be done on the property by the owner. Land use controls also include public education and warning signs.

Military Munitions Response Program (MMRP): A program under the Defense Environmental Restoration Program that addresses training ranges that are no longer used but suspected or known to contain munitions or contamination from munitions.

Munitions Response Site (MRS): A site that was formerly used as a military training range or for munitions disposal but is no longer in use. An MRS may contain munitions and/or munitions contamination.

Munitions and Explosives of Concern (MEC) - This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, means unexploded ordnance, discarded military munitions, or munitions constituents (for example, TNT) that are present in high enough concentrations to pose an explosive hazard.

Munitions Constituents (MC) – Materials that originate from ordnance or other military munitions such as bullets.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP) - A set of federal regulations that provide the organizational structure and procedures for preparing for and responding to discharges of oils and releases of hazardous substances, pollutants, or contaminants into the environment. (See 40 CFR Part 300).

No Action Determination - A determination that no contaminants are present at the site in amounts presenting an unacceptable risk to human and ecological health.

Non-Department of Defense Non-Operational Defense Sites (NDNODS) – Defense sites that were exclusively used by a state ARNG and never owned, leased or otherwise possessed or used by the Army or other DoD component. NDNODS are a subcategory of Munitions Response sites.

Preferred Alternative – The alternative that, when compared to other alternatives, best meets the Comprehensive Environmental Response, Compensation, and Liability Act evaluation criteria, and is proposed for implementation at a site.

Total Present Value (TPV) – The current value of a future sum of money.

Proposed Plan (PP) - A document used to facilitate public involvement in the remedy selection process for a CERCLA contaminant release site. The document presents the lead agency's preliminary recommendation concerning how best to address contamination at a site.

Record of Decision - A legal document that certifies that the remedy selection process was carried out in accordance with CERCLA and the NCP, that documents the cleanup action or remedy selected for a site, the basis for the choice of that remedy, and public comments received on the Proposed Plan.

Remedial Action Objective – A site-specific objective developed based on evaluation of potential risks to human health and the environment for future protection of environmental resources.

Remedial Investigation (RI) - A study of a contaminant release site that includes data collection and analysis to determine 1) the nature and extent of the contamination, 2) the potential risks to human health and the environment from that contamination, and 3) whether or not remedial action is warranted.

Responsiveness Summary – A summary of responses to comments made by the public during the public comment period.

Risk - A measure of the probability that damage to life, health, property, and/or the environment will occur as a result of a given hazard.

Systematic Project Planning - Systematic Project Planning is a rigorous project planning process that lays a scientifically defensible foundation for proposed project activities. The Systematic Project Planning Team consists of ARNG, USACE, ADEQ, the landowner, and the contracted company performing the work.

Uniform Federal Policy - Quality Assurance Project Plan (UFP-QAPP) – a comprehensive planning document that addresses the complete scope of a project, from planning through implementation, sampling design, analytical laboratory performance, assessment, data validation and verification, data usability, and reporting.

14.0 DOCUMENT REFERENCES

Code of Federal Regulations (CFR). Revised 2014. Applicable Sections of Title 40, Part 300, National Oil and Hazardous Substances Pollution Contingency Plan.

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EA Engineering, Science, and Technology, Inc (EA), November 2008. Final State/Territory Inventory Report, National Guard Bureau, Non-Department of Defense Owned Non-Operational Defense Sites Inventory, Arizona. EM-200-1-2, Technical Project Planning (TPP) Process, August 1998

Parsons, 2020. Final Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP), Remedial Investigation (RI)/Feasibility Study (FS), Fort Tuthill Small Arms Range North, Flagstaff, Coconino County, Arizona. September 2020.

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U.S. Environmental Protection Agency (USEPA), 1988. Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, October 1988, OSWER Directive 9355.3-01, EPA/540/G-89/004, http://www.epa.gov/superfund/policy/remedy/pdfs/540g-89004-s.pdf

Weston, 2011. Final Historical Records Review/Site Inspection Work Plan, Army National Guard Munitions Response Sites, Site Inspection Phase, Arizona. November 2011.

Weston, 2012. Final Site Inspection Report, Army National Guard Munitions Response Sites, Site Inspection Phase, Arizona. October 2012.

APPENDIX A

Arizona Department of Environmental Quality Correspondence