Final, Revision 1

Engineering Evaluation/Cost Analysis

Crow's Nest Impact Area Munitions Response Site (MRS) (WSTPT-023-R-01)

(UNCLASSIFIED)

U.S. Army Garrison West Point
West Point, New York

September 2023

Prepared for:

U.S. Army Corps of Engineers
Baltimore District

UNITED STATES MILITARY ACADEMY
WEST POINT

United States Army Garrison West Point

Prepared by:

TLI/MMG Joint Venture

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Prepared For:

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Baltimore District
2 Hopkins Plaza
Baltimore, Maryland 21201-1715

Prepared By:

TLI/MMG Joint Venture
14840 Conference Center Dr.
Suite 200
Chantilly, VA 20151

DCN: 80309-0001-03-01-OD-0068

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LIST OF ACRONYMS AND ABBREVIATIONS

AM	Action Memorandum
AR	Army Regulation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CTT	Closed, Transferring, and Transferred
DD	Decision Document
DERP	Defense Environmental Restoration Program
DMM	discarded military munitions
DoD	U.S. Department of Defense
DPW	Department of Public Works
DU	decision unit
EE/CA	Engineering Evaluation/Cost Analysis
EM	Engineering Manual
EOD	Explosive Ordnance Disposal
EOTI	Explosives Ordnance Technologies Incorporated
ER,A	Environmental Restoration, Army
FS	Feasibility Study
FY	Fiscal Year
GIS	Geographic Information System
HA	Hazard Assessment
HE	high explosive
HFA	Human Factors Applications, Inc.
HHRA	Human Health Risk Assessment
HQAES	Headquarters Army Environmental System
IC	institutional control
IMCOM	Installation Management Command
LTM	Long-Term Management
LUC	Land Use Control
LUCP	Land Use Control Plan
LUR	Land Use Restriction
MC	munitions constituents
MD	munitions debris
MEC	munitions and explosives of concern
mm	millimeter(s)
MMRP	Military Munitions Response Program
MRS	Munitions Response Site
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NPV	net present value
NTCRA	Non-Time-Critical Removal Action
NYSDEC	New York State Department of Environmental Conservation
O&M	operations and maintenance
OSWER	Office of Solid Waste and Emergency Response
PA	Preliminary Assessment
RAGS	Risk Assessment Guidance for Superfund
RAWP	Removal Action Work Plan
RDX	cyclotrimethylenetrinitramine
REC	Record of Environmental Consideration
RI	Remedial Investigation
ROD	Record of Decision
SI	Site Inspection
SLERA	Screening Level Ecological Risk Assessment
SSFR	Site-Specific Final Report

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

TLI/MMG JV	TLI Solutions/Munitions Management Group, LLC Joint Venture
TNT	trinitrotoluene
TPP	Technical Project Planning
UFP-QAPP	Unified Federal Policy-Quality Assurance Project Plan
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Command
USAG	U.S. Army Garrison
U.S.C.	United States Code
USEPA	U.S. Environmental Protection Agency
UXO	unexploded ordnance

GLOSSARY OF TERMS

Closed Range – A military range that has been taken out of service as a range; and that either has been put to new uses that are incompatible with range activities or is not considered by the military to be a potential range area. A closed range is still under the control of a U.S. Department of Defense (DoD) component.

Defense Site – All locations that were owned by, leased to, or otherwise possessed or used by the DoD. The term does not include any operational range, operating storage or manufacturing facility, or facility that is used or was permitted for the treatment or disposal of military munitions.

Discarded Military Munitions (DMM) – Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded explosive ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations. (10 U.S. Code [U.S.C.] 2710(e)(2)).

Engineering Evaluation/Cost Analysis (EE/CA) – An EE/CA is prepared for all non-time-critical removal actions as required by Section 300.415(b)(4)(i) of the National Contingency Plan. The goals of the EE/CA are to identify the extent of a hazard, to identify the objectives of the removal action, and to analyze the various alternatives that may be used to satisfy these objectives for cost, effectiveness, and implementability (EP 75-1-3; citation taken from Engineering Manual (EM) 1110-1-4009, *Engineering and Design: Military Munitions Response Actions,* [USACE, June 2007]).

Explosive Ordnance Disposal (EOD) – The detection, identification, on-site evaluation, rendering safe, recovery, and final disposal of unexploded ordnance by a military response unit. EOD may also include explosive ordnance that has become hazardous by damage or deterioration.

Explosives Safety – A condition where operational capability and readiness, personnel, property, and the environment are protected from unacceptable effects of an ammunition or explosives mishap.

Land Use Controls (LUCs) – Physical, legal, or administrative mechanisms that restrict the use of, or limit access to, contaminated property to reduce risk to human health and the environment. Physical mechanisms encompass a variety of engineered remedies to contain or reduce contamination and physical barriers to limit access to property, such as fences or signs. The legal mechanisms are generally the same as those used for institutional controls (ICs) as discussed in the National Contingency Plan. ICs are a subset of LUCs and are primarily legal mechanisms imposed to ensure the continued effectiveness of land use restrictions imposed as part of a remedial decision. Legal mechanisms include restrictive covenants, negative easements, equitable servitudes, and deed notices. Administrative mechanisms include notices, adopted local land use plans and ordinances, construction permitting, or other existing land use management systems that may be used to ensure compliance with use restrictions ("DoD Management Guidance for the DERP," citation taken from EM 1110-1-4009, *Engineering and Design: Military Munitions Response Actions* [USACE, June 2007]).

Military Munitions – All ammunition products and components produced for or used by the armed forces for national defense and security, including ammunition products or components under the control of the DoD, the U.S. Coast Guard, the Department of Energy, and the Army National Guard. The term includes confined gaseous, liquid, and solid propellants, explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives and chemical warfare agents, chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges, and devices and components thereof. The term does not include wholly inert items, improvised explosive devices, and nuclear weapons, nuclear devices, and nuclear components, except that the term does include non-nuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under 42 U.S.C. 2011 (Atomic Energy Act) have been completed (10 U.S.C. 2710(e)(3)(A) and (B)).

Military Range – "Active range" and "inactive range" as these terms are defined in 40 CFR §226.201.

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, DMM, or munitions constituents (e.g., trinitrotoluene [TNT] or cyclotrimethylenetrinitramine [RDX]) present in high enough concentrations to pose an explosive hazard.

Munitions Constituents (MC) – Any materials originating from unexploded ordnance, DMM, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions (10 U.S.C. 2710).

Non-Time-Critical Removal Actions – Actions initiated in response to a release or threat of a release that poses a risk to human health, human welfare, or the environment. Initiation of removal cleanup actions may be delayed for 6 months or more (EP 1110-1-24, USACE, 2000).

Operational Range – A range that is under jurisdiction, custody, or control of the Secretary of Defense and that is used for range activities or, although not currently being used for range activities, is still considered by the Secretary to be a range and has not been put to new use incompatible with range activities. (10 U.S.C. 101(e)(3)(A) and (B)). Also includes "military range," "active range," and "inactive range" as those terms are defined in 40 CFR 266.201.

Other than Operational Range – Includes all property under jurisdiction, custody, or control of the Secretary of Defense that is not defined as an Operational Range.

Range – A designated land or water area that is set aside, managed, and used for DoD range activities such as the following:

(A) Firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, electronic scoring sites, buffer zones with restricted access, and exclusionary areas.

(B) Airspace areas designated for military use in accordance with regulations and procedures prescribed by the Administrator of the Federal Aviation Administration (10 U.S.C. 101(e)(5)).

Removal Action – The cleanup or removal of released hazardous substances from the environment. Such actions may be taken in the event of the threat of release of hazardous substances into the environment and/or may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removed material, or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release. In addition, the term includes, but is not limited to, security fencing or other measures to limit access, provision of alternative water supplies, temporary evacuation and housing of threatened individuals not otherwise provided for, action taken under Section 9604(b) of this title, and any emergency assistance that may be provided under the Disaster Relief and Emergency Assistance Act [42 U.S.C. 5121 et seq.] The requirements for removal actions are addressed in 40 CFR §§300.410 and 330.415. The three types of removal are emergency, time-critical, and non-time-critical removals ("DoD Management Guidance for the DERP," citation taken from EM 1110-1-4009, *Engineering and Design: Military Munitions Response Actions,* [USACE, June 2007]).

Time-Critical Removal Action – A response to a release or threat of release that poses such a risk to public health (serious injury or death) or the environment that clean up or stabilization actions must be initiated within 6 months.

Unexploded Ordnance (UXO) – UXO are military munitions that meet the following criteria:

(A) Have been primed, fused, armed, or otherwise prepared for action.

(B) Have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or materiel.

(C) Remain unexploded, whether by malfunction, design, or any other cause (10 U.S.C. 101(e)(5)).

EXECUTIVE SUMMARY

The United States (U.S.) Army is establishing land use controls (LUCs) at installations within the Military Munitions Response Program (MMRP) to protect human health and the environment from potential hazards at Munitions Response Sites (MRSs) as an interim action while the sites progress to a final remedy. The MMRP addresses munitions and explosives of concern (MEC) and munitions constituents (MC) within the framework of the Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. §§ 9601 et seq.). The LUCs considered under this phase of the MMRP are interim or non-time-critical removal actions (NTCRAs) that are required because the conditions at the site support an NTCRA according to 40 Code of Federal Regulations [CFR] 300.415(b)(2)(vi), including, but not necessarily limited to, "threat of fire or explosion."

The U.S. Army Garrison (USAG) West Point is conducting its MMRP and has eight on-post MRSs where further actions are pending. One of these MRSs, the Crow's Nest Impact Area, is the subject of this Engineering Evaluation/Cost Analysis (EE/CA). The Crow's Nest Impact Area MRS is currently going through the Remedial Investigation (RI) through Record of Decision (ROD) process to establish the final Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response for the MRS. However, the MRS is eligible for LUCs as an interim action while the status of its CERCLA response is being determined.

This EE/CA is a required step (in addition to an Action Memorandum [AM] and public involvement activities) in implementing the LUCs as an NTCRA at USAG West Point. This EE/CA is streamlined and summarizes MRS information and comparatively evaluates LUCs against a No Action alternative. This EE/CA has a focused purpose and is not intended to result in a final remedy at the Crow's Nest Impact Area. The Crow's Nest Impact Area is at the Feasibility Study (FS) stage, and a final remedy selection is anticipated in 2023 or 2024.

Following the EE/CA, the Army will prepare an AM and finalize a Land Use Control Plan (LUCP) to guide the implementation of LUCs as an NTCRA.

E.1 AGENCIES INVOLVED

The U.S. Army is the executing agency for the MMRP. The U.S. Environmental Protection Agency (USEPA) and New York State Department of Environmental Conservation (NYSDEC) are regulatory stakeholders for USAG West Point. The installation is not on the National Priorities List (NPL), and U.S. Department of Defense (DoD) operates as the lead agency under CERCLA.

E.2 DESCRIPTION OF MRS

The history of West Point dates to the Revolutionary War when West Point was identified as a strategic military location. Numerous forts and batteries have been constructed in the area, and the facility was the principal testing ground for ordnance during the 19th century.

The Crow's Nest MRS is associated with former artillery training that occurred from the early 1800s to the early 1930s. Eight artillery range fans, including a testing range that originated on the

east side of the Hudson River (West Point Foundry), were oriented toward the former Crow's Nest Impact Area and overlie Training Areas G1, G2, and J1.

The LUCs are intended to limit the risk posed by the MEC and MC at these MRSs while the following further investigation and response actions are being implemented under CERCLA: FS, Proposed Plan, Record of Decision, Remedial Action.

E.3 REMOVAL ACTION OBJECTIVE

The objective of the NTCRA is to protect human health by minimizing exposure to MEC and MC, including but not limited to the potential for fire and explosion, at the Crow's Nest Impact Area MRS while further response actions at the MRS are evaluated and implemented.

E.4 EVALUATION OF ALTERNATIVES

This EE/CA is focused on two alternatives, (1) No Action and (2) LUCs, for addressing the risks at the Crow's Nest Impact Area MRS during the interim while the MMRP progresses and more permanent actions are investigated and implemented. The No Action alternative assumes that no additional steps will be taken to mitigate, monitor, or document the potential risks, though it does not remove existing controls that are in place at the MRSs. The LUCs alternative considered for USAG West Point involves a combination of Institutional Controls (including land use restrictions, notations in the Installation Master Plan, and dig permits) and Engineering Controls (including signs, markers, fences, and guards).

In this NTCRA, the No Action and LUCs alternatives are evaluated against the CERCLA criteria of effectiveness, implementability, and cost.

The EE/CA evaluation determined that the LUCs alternative at the Crow's Nest Impact Area MRS could be implemented and would effectively meet the removal action objective.

E.5 RESIDUAL RISK MANAGEMENT

The LUCs will reduce the probability of direct contact with MEC and thus reduce the likelihood of exposure and explosive risk to humans at the MRS.

However, no action will be taken with this NTCRA to remove or remediate the MEC. Therefore, residual risk from the MEC will remain on-site. The LUCs alternative is an NTCRA and is not intended to be permanent or to replace the need for the more permanent solutions that may be developed under the MMRP.

E.6 COSTS OF NO ACTION AND LUCs ALTERNATIVES

The cost estimates for the LUCs alternative at USAG West Point were developed as shown in **Appendix B**. The cost summaries for the No Action and LUCs alternatives are shown in **Table ES-1**. The No Action alternative will incur no additional cost because no action, reviews, or other activities are conducted. NTCRA LUCs will incur capital and operating costs in the short term while the full response action is developed and implemented for the MRS through the MMRP. It is estimated that it will be 2 years before investigations and remedial action construction phases are completed at the Crow's Nest Impact Area MRS at USAG West Point.

Table ES-1: Cost Summary of NTCRA Alternatives (Costs in $1,000s)

Alternative	MRS	Area *(Acres)*	Capital Cost	Annual Operating Cost	O&M Years[(1)]	Net Present Value[(2)]
Alternative 1 - No Action	Crow's Nest Impact Area	615	$0	$0	NA	$0
Alternative 2 - LUCs			$916.1	$33.5	2	$969.0

Notes: (1) The number of years of LUC maintenance until the removal action completion phase for the MRS is completed and Long-Term Management (LTM) commences.
(2) A 2-year period with a 0.7% discount rate is used for economic projections.
NA – not applicable
O&M – operations and maintenance

Operational safety measures that may be in place at an installation (e.g., installation-wide dig restrictions) are not equivalent to NTCRA LUCs, which are site-specific. The NTCRA LUCs identified in the LUCP may be eligible for funding under the Environmental Restoration, Army funding source. The NTCRA LUC cost estimates cover new requirements and have not yet been incorporated into the Installation Action Plan, outyear budget, or the Headquarters Army Environmental System (HQAES). They are of a form and detail that should allow their incorporation, which will be done after completion of this EE/CA.

E.7 RECOMMENDED ALTERNATIVE

Alternative 1, No Action, is not capable of meeting the removal action objective of protecting human health from exposure to potential MEC. LUCs (Alternative 2) are capable of meeting this objective, are feasible to implement, and incur a reasonable cost beyond that of No Action. On the basis of this evaluation, it is recommended that the LUCs alternative be implemented at the Crow's Nest Impact Area MRS. The LUC measures applied at the Crow's Nest Impact Area MRS include institutional controls.

1. OVERVIEW

1.1 REGULATORY FRAMEWORK/AUTHORIZATION

The Military Munitions Response Program (MMRP) is conducted under the Defense Environmental Restoration Program (DERP) to address U.S. Department of Defense (DoD) sites with unexploded ordnance (UXO), discarded military munitions (DMM), and munitions constituents (MC) located on current and former military installations. In general, the MMRP follows the process established for the Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. §§ 9601 et seq.).

The United States (U.S.) Army began performing MMRP site inspections (SIs) in Fiscal Year (FY) 2003 and completed them nationwide by the end of FY2010. For various reasons, it may be years before most of the sites proceed beyond the SI phase. Due to the potential hazards posed by the possible presence of munitions and explosives of concern (MEC) (which include UXO, DMM, and MC in sufficiently high concentrations to pose an explosive hazard), there is the potential for harm if appropriate controls are not maintained. Both the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the DoD Ammunition and Explosives Safety Standards (DESR 6055.09) require the U.S. Army to prohibit unnecessary access to such sites and take appropriate actions to reduce the threat to public health or welfare.

To address the explosive hazards and the risks from MEC and MC at active installations and to meet the requirements in the *FY2010 Program Management Plan for the Active Sites Cleanup Program*, the U.S. Army Environmental Command (USAEC) is assisting installations in preparing and implementing land use controls (LUCs) for their on-post munitions response sites (MRSs). Only U.S. Army-owned MRSs that are recommended for further action beyond the SI phase are included in this requirement. Sites with a no further action recommendation and MRSs located off Army-owned land will not be addressed in this action, although they are still being addressed as appropriate in accordance with the MMRP.

LUCs are considered a CERCLA response action, and as such, they must be applied via either a removal action (i.e., a non-time-critical removal action [NTCRA]) or a remedial action. Because these LUCs are an interim action (not a final action) for each MRS, an NTCRA is the appropriate mechanism to implement them. An NTCRA requires the preparation and coordination with stakeholders of an Engineering Evaluation/Cost Analysis (EE/CA) and an Action Memorandum (AM), in addition to the required public involvement actions. This document is the EE/CA for the Crow's Nest Impact Area MRS, located at the U.S. Army Garrison (USAG) West Point, in accordance with the National Contingency Plan (NCP) (40 Code of Federal Regulatory [CFR] 300.415(b)(4)(i)).

1.2 SITE DESCRIPTION

USAG West Point is within the Installation Management Command (IMCOM). The installation is located in Orange and Putnam Counties, New York. **Figure 1-1** shows the location of the installation within New York. USAG West Point is approximately 50 miles north of New York City and approximately 13 miles south of Newburgh. The 15,974 acres of land encompassing USAG West Point has been designated as two areas: the Main Post or campus (2,530 acres) and the Military Reservation (13,444 acres). The Main Post contains the majority of the academic,

residential, and support facilities. The Military Reservation is largely undeveloped and contains operational training facilities such as firing ranges and bivouac areas used during the summer to house and train cadets.

1.3 MMRP INVESTIGATIONS TO DATE

In 2001, the U.S. Congress established the MMRP under the DERP to address DoD MEC and MC located on current and former defense sites. In response to the establishment of the MMRP, the Army conducted investigations consistent with the requirements of CERCLA at the Crow's Nest Impact Area MRS. **Table 1-1** summarizes the investigations and removal actions that have been completed at the Crow's Nest MRS.

Table 1-1: Summary of Previous Investigations

Investigation	Date	Activities
UXO Site Survey Finds (HFA, 1994)	1994	A UXO Site Survey of the Crow's Nest was performed for the U.S. Army Corps of Engineers Baltimore District. During the survey, 475 MEC/munitions debris (MD) items were removed from the Crow's Nest Impact Area and the areas to the north and west of the Crow's Nest Impact Area.
UXO Clearance for Utility Installation (EOTI, 2001)	2001	A UXO clearance in support of a gas pipeline installation was conducted along the northern Training Area J1 boundary on the western edge of the Crow's Nest Impact Area boundary and then bisecting Training Area G1 to the west. In total, 10 inert items, 1 live projectile, and 15 small arms rounds were recovered.
Closed, Transferring, Transferred (CTT) Range Inventory Report (Malcolm Pirnie, 2004)	2004	The purpose of the CTT Range Inventory Report was to identify CTT ranges. This report marked the completion of the Preliminary Assessment (PA) phase of work for the Installation under CERCLA.
SI Report (URS, 2015)	2015	The primary goal of the SI was to collect information to confirm the presence/absence of MEC and MC. The SI recommended further evaluation of MEC and MC at the Crow's Nest MRS.
Remedial Investigation (RI) Report (URS, 2016)	2016	The overall objectives of the RI were to collect sufficient information to characterize the nature and extent of MEC and MC and to evaluate the associated risks to human health and the environment. Finalized by the Army; currently no concurrence from NYSDEC.
Feasibility Study (FS) Report (URS, 2018a)	2018	The purpose of the FS is to develop, evaluate, and perform a detailed analysis of potential remedial alternatives for the Crow's Nest MRS that will meet remedial action objectives (RAOs) and allow the Army to select and propose an appropriate remedy. Finalized by the Army; currently no concurrence from NYSDEC.
PP (URS, 2018b)	2018	Presented the Army's preferred alternative to address contamination. Under review by NYSDEC.

1.4 PURPOSE AND SCOPE OF EE/CA

The purpose of this EE/CA is to evaluate two alternatives, (1) No Action and (2) LUCs, for mitigation of potential risks posed to human health at on-post MRSs. The evaluation is conducted

in accordance with CERCLA guidelines for NTCRAs and covers the factors of effectiveness, implementability, and cost.

1.5 TECHNICAL PROJECT PLANNING (TPP) PROCESS

The Technical Project Planning (TPP) process[1] has been used to date in the CERCLA activities at USAG West Point. The TPP process will be used for this NTCRA to establish project objectives and communicate with stakeholders.

A TPP meeting will be held with the project stakeholders to discuss the NTCRA LUC project at the Crow's Nest Impact Area MRS prior to finalization of this EE/CA.

1.6 SUMMARY OF PUBLIC PARTICIPATION

The U.S. Army is the executing agency for the MMRP. The U.S. Environmental Protection Agency (USEPA) and the New York State Department of Environmental Conservation (NYSDEC) are regulatory stakeholders for USAG West Point. The installation is not on the National Priorities List (NPL), and DoD operates as the lead agency under CERCLA.

This EE/CA will be prepared in Draft, Draft Final, and Final versions. The Draft EE/CA is for only U.S. Army review. The Draft Final EE/CA is for review by regulatory agencies (USEPA and NYSDEC). The Final EE/CA will incorporate the preceding comments and will have U.S. Army approval and regulatory stakeholder concurrence.

The Final EE/CA will be made available to the public for their review and comment. Public notification of the Final EE/CA will be printed in the local newspaper with the offer to present the EE/CA and its recommendations at a public meeting. The public meeting will be conducted only if requested by the public. At the end of the 30-day public comment period, public comments on the Final EE/CA will be addressed in the AM under Section V, "Proposed Actions and Estimated Costs," and in an attached Responsiveness Summary. The Final EE/CA and AM will become part of the administrative record for the project.

1.7 APPLICABLE REPORTS AND STUDIES

The Crow's Nest Impact Area MRS at USAG West Point has been the subject of the reports shown in **Table 1-1**.

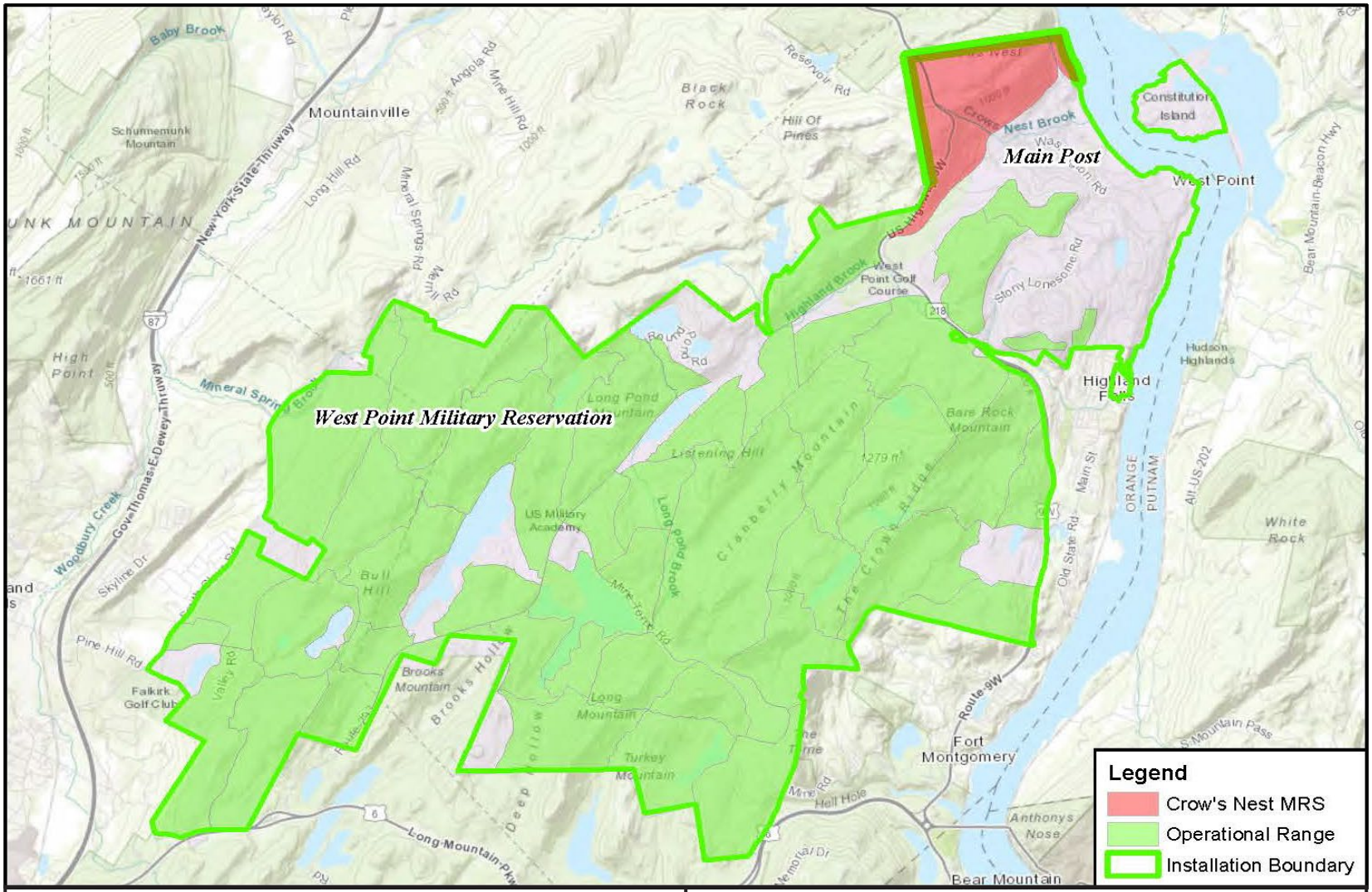
Additional data on the MRSs at USAG West Point and its surroundings can be found in the following documents:

- Fiscal Year 2021, West Point Mil Reservation, Army Defense Environmental Restoration Program, Installation Action Plan, September 2021.

[1] The four-phase TPP process is described in *EM 200-1-2 (Engineering Manual 200-1-2: Technical Project Planning Process*, U.S. Army Corps of Engineers [USACE], August 1998). The TPP team involves key decision-makers, including installation representatives, the USACE project manager, regulators, and other stakeholders. Their participation helps define the information needed to make decisions at the MRS, keeps them informed, and allows better buy-in to the process.

- Interim Probability Assessment for Determining the Probability of Encountering MEC During Site Activities at West Point, New York. U.S. Army Garrison Commander, USAG West Point. 14 April 2017.

These documents and policy and regulatory guides are listed in **Appendix A**, References.



UNITED STATES MILITARY ACADEMY
WEST POINT

Figure 1-1
Installation Location

22P-0147-1

2. SITE CHARACTERIZATION

The Crow's Nest Impact Area MRS (WSTPT-023-R-01) has been identified and is included in this EE/CA for NTCRA LUC consideration. The site layout for the MRS is shown in **Figure 2-1**.

2.1 MRS DESCRIPTION

The history of West Point dates to the Revolutionary War when West Point was identified as a strategic military location. Numerous forts and batteries have been constructed in the area, and the facility was the principal testing ground for ordnance during the 19th century.

The Crow's Nest MRS is associated with former artillery training that occurred from the early 1800s to the early 1930s. Eight artillery range fans, including a testing range that originated on the east side of the Hudson River (West Point Foundry), were oriented toward the former Crow's Nest Impact Area and overlie Training Areas G1, G2, and J1. **Figure 2-2** shows the orientation of the former artillery range fans associated with the Crow's Nest MRS.

2.1.1 MEC Findings

The RI MEC investigation consisted of a geophysical survey using hand-held all-metals detectors and intrusive investigation across 39 acres of accessible areas of the MRS to characterize the nature and extent of MEC. During the RI, the following MEC items were identified by the U.S. Army: 75-millimeter (mm) shrapnel and high explosive (HE) projectiles; 6-inch common HE projectiles; 4.7-inch HE projectiles; 155mm HE projectiles; and various associated fuzes and boosters. All MEC items were recovered from the Crow's Nest Impact Area. In addition, 6- and 8-inch cannonball MD and solid shot rounds (e.g., Parrott) were identified in Training Area G2. **Table 2--1** lists the quantity of MEC items recovered during the RI. The RI MEC investigation results are illustrated on **Figure 2-3**.

Table 2-1: MEC Recovered During RI

Crow's Nest Impact Area	
Type	**Number Recovered**
75 mm MK 1 shrapnel	43
75 mm M48 HE	7
M1907 Powder Train Time Fuze	2
M3 Point Detonating Fuze	1
M48 HE Fuze	1
Parrott Base Fuze	1
M4 HE booster	1
Unknown booster	1
6-inch common HE	1
4.7-inch projectile HE	1
155 mm MK 1 HE	1

Based on the high density of MEC and MD identified during the RI, the U.S. Army identified two areas of the MRS as "focus areas." One focus area is located within the Crow's Nest Impact Area portion of the MRS; it is approximately 202 acres and captures the majority of MEC and MD identified during the RI. The other focus area is approximately 6 acres and is located in the southern portion of Training Area G2, where numerous MD items were observed (**Figure 2-4**).

A MEC Hazard Assessment (HA) was completed to assess MEC hazards to current/future receptors (see Section 2.2.1). The U.S. Army concluded in the RI Report that the nature and extent of MEC was adequately characterized and the Crow's Nest MRS should undergo an FS to assess remedial alternatives for MEC (see Section 2.2.1).

2.2 MC FINDINGS

During the RI MC investigation, soil and sediment samples were collected using incremental and discrete sampling methodology. The U.S. Army collected soil samples from decision units (DUs) within the Crow's Nest Impact Area and Training Area G2, and the samples were analyzed for explosives and target metals. Sediment samples were also collected within a vernal pond and analyzed for lead. MC sampling results were compared to Federal human health and ecological risk screening criteria for both soil and sediment. Lead concentrations were detected above human health and ecological screening criteria in surface soil within the Crow's Nest Impact Area (DU-1) and sediment within a wetland/vernal pool (DU-2) as shown in **Figure 2-5**.

A Human Health Risk Assessment (HHRA) and Screening Level Ecological Risk Assessment (SLERA) were conducted to assess MC risks to current/future receptors. The U.S. Army concluded in the RI Report that the nature and extent of MC was adequately characterized. Results of the HHRA and SLERA are summarized in Section 2.3.2.

2.2.1 Current and Anticipated Future Land Use

The entirety of the land composing the Crow's Nest MRS is undeveloped, forested land. Access to the land is currently restricted from public use as Installation property. The boundary of West Point is signed and marked as restricted access. Entrance from roads is through manned security gates. However, trespassers routinely hike into the area from the surrounding park and preserve areas to camp and relic hunt illegally. Installation personnel and contractors occasionally access the site to perform maintenance activities on roads and subsurface utilities.

Given the topography of the area, the land within the Crow's Nest MRS is expected to remain undeveloped, forested land not used for installation training. However, use of the land may change and could include public recreational use. Future anticipated land use in the Crow's Nest Impact Area, including Training Areas G1 and J1, is passive recreational land use to include activities such as hiking and hunting. In Training Area G2, future anticipated land use is active recreational land use, including activities such as hiking, hunting, and picnicking. The hiker category would include relic hunters.

2.2.2 Existing Institutional or Engineering Controls

An installation-wide dig safe is in place. There is currently security fencing (approximately 642 feet long and 8 feet high) and a gate along the western boundary of the Crow's Nest Impact Area portion of the MRS and Highway 9W to deter access into the MRS from the Highway 9W

turnout and the small road leading into the MRS. In addition, warning signs have been posted along the boundary of the impact area portion of the MRS warning of the danger of explosive hazards and prohibiting trespass. These signs are currently posted on trees located approximately every 220 feet, where permissible.

2.3 STREAMLINED RISK EVALUATION

The explosive hazards posed by MEC to human receptors and the risks posed by MC to human health and the environment are presented in the following subsections. The data collected by the U.S. Army during the RI were utilized to evaluate the explosive hazards posed by MEC to human receptors and the risks posed by MC to human health or the environment. At an MRS, if MEC does not pose an explosive hazard to human receptors and MC does not pose an unacceptable risk to human health or the environment, then it qualifies for Unlimited Use/Unrestricted Exposure.

2.3.1 MEC

The U.S. Army evaluated the explosive hazards posed by MEC using the USEPA's Interim MEC HA Methodology (USEPA, 2008), as reported in the RI (URS, 2016). Note: the RI was finalized by the Army; currently no concurrence from NYSDEC. The MEC HA consists of a series of worksheets used to evaluate the components of a potential explosive hazard incident under the MRS's current use (Current Use Activities) to provide baseline conditions (i.e., prior to Selected Remedy implementation). The evaluation results in a Hazard Score and a corresponding Hazard Level. Hazard Levels range from 1 to 4. A Hazard Level 1 represents an MRS where there may be instances where an imminent threat to human health exists, and a Hazard Level 4 represents an MRS where a MEC cleanup has occurred.

At the Crow's Nest MRS, the Army identified an actual source of MEC in the surface and subsurface. According to the U.S. Army, installation personnel, contractors, trespassers, firefighters, hunters, hikers, and campers may interact with the identified MEC because they have access to the MRS.

The results of the MEC HA evaluation, including the Hazard Level and Hazard Score, for the Crow's Nest MRS are presented in **Table 2-2**.

Table 2-2: MEC HA Hazard Level Determination

Evaluation Scenario	Hazard Level	Hazard Score
Current Use Activities	1	870
Future Use Activities	1	840

2.3.2 MC

The U.S. Army evaluated the risks posed by MC to human health and the environment in a HHRA using the USEPA *Risk Assessment Guidance for Superfund* (RAGS), Part A (USEPA, 1989) and subsequent RAGS guidance (Parts B through F) where applicable, and in a SLERA using the *Ecological Risk Assessment for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (USEPA, 1997 and updates), as reported in the RI (URS, 2016). Note: the RI was

finalized by the Army; currently no concurrence from NYSDEC. The HHRA used the USEPA Regional Screening Levels for Residential Soil as screening values. The SLERA used Los Alamos National Laboratory Ecological Screening Levels and USEPA Eco-SSL Soil Screening Benchmark as screening values for soil and the USEPA Region 3 Biological Technical Assistance Group Freshwater Sediment Screening Benchmark as the screening value for sediment.

The HHRA identified lead as the primary MC of potential concern in soil and sediment in DU-1 and DU-2. The risk-based screening and background evaluation eliminated DU-3 from further evaluation. The USEPA's Adult Lead Methodology was used to estimate human health risk from exposure to lead in soil and sediment within the Crow's Nest Impact Area portion of the MRS. The HHRA indicated lead in soil and sediment posed no unacceptable risk to human receptors for the following non-residential exposure scenarios: current and future workers, current and future relic hunter and trespasser, and future recreational users (wild game hunter, hiker, and camper).

The SLERA results indicate that potential risks associated with lead may exist to small insectivorous mammals and insectivorous birds that have a limited home range and could potentially spend all or most of their lives within the MRS. Results are highly conservative by design and there are uncertainties inherently associated with screening level assessments.

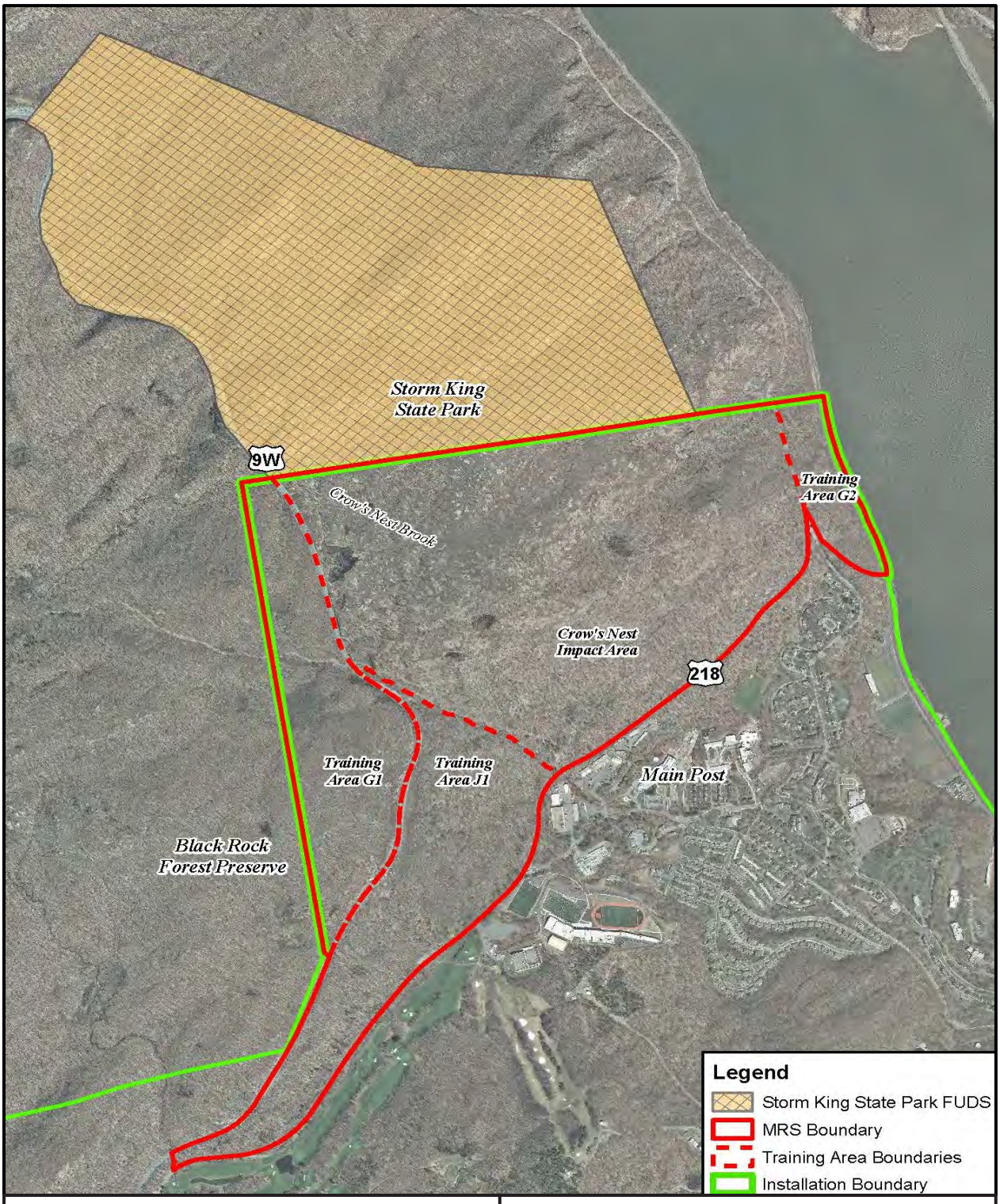


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Figure 2-1
Crow's Nest MRS Site Layout

22P-0147-2

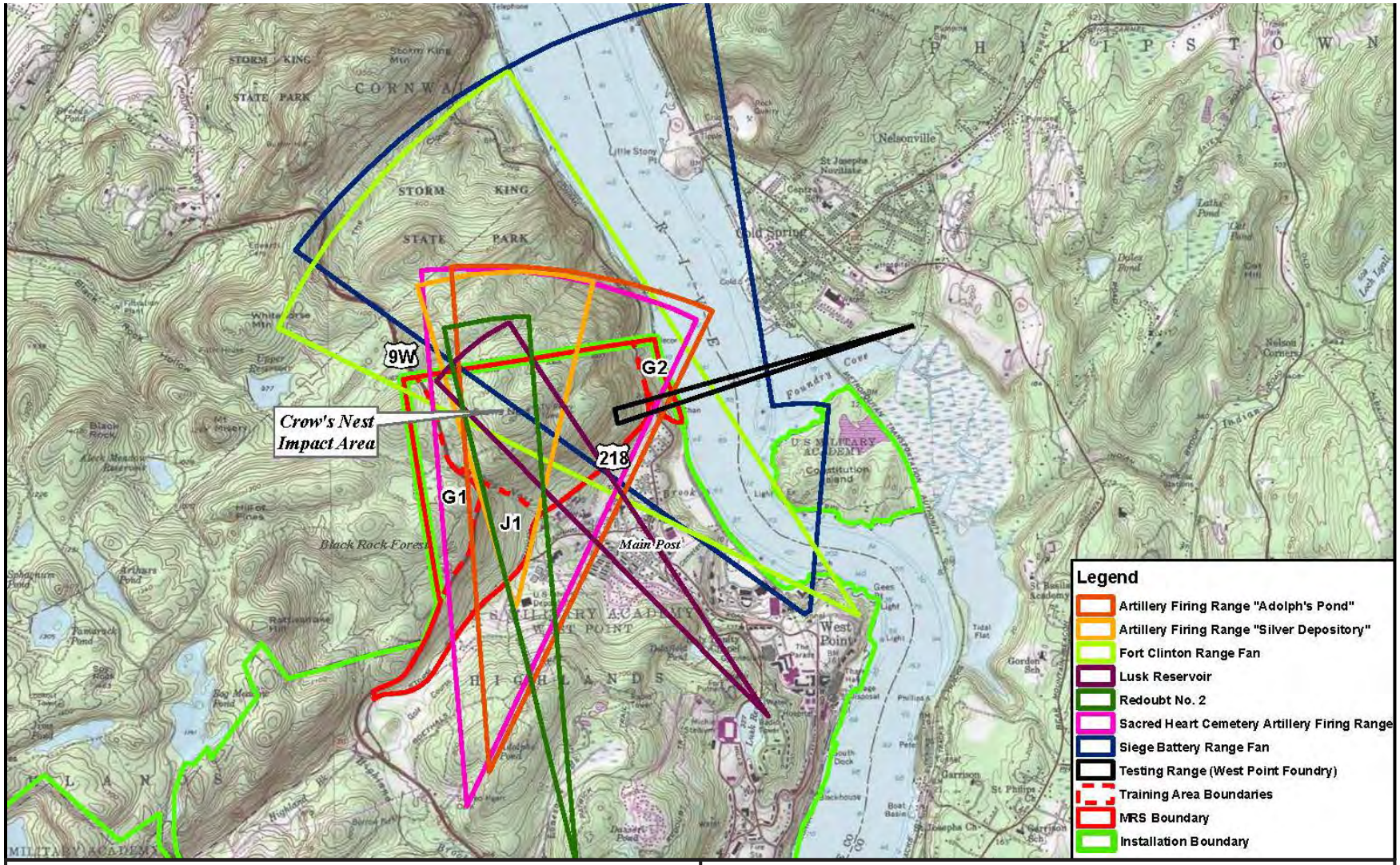

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Figure 2-2
West Point Range Fans

22P-0147-3

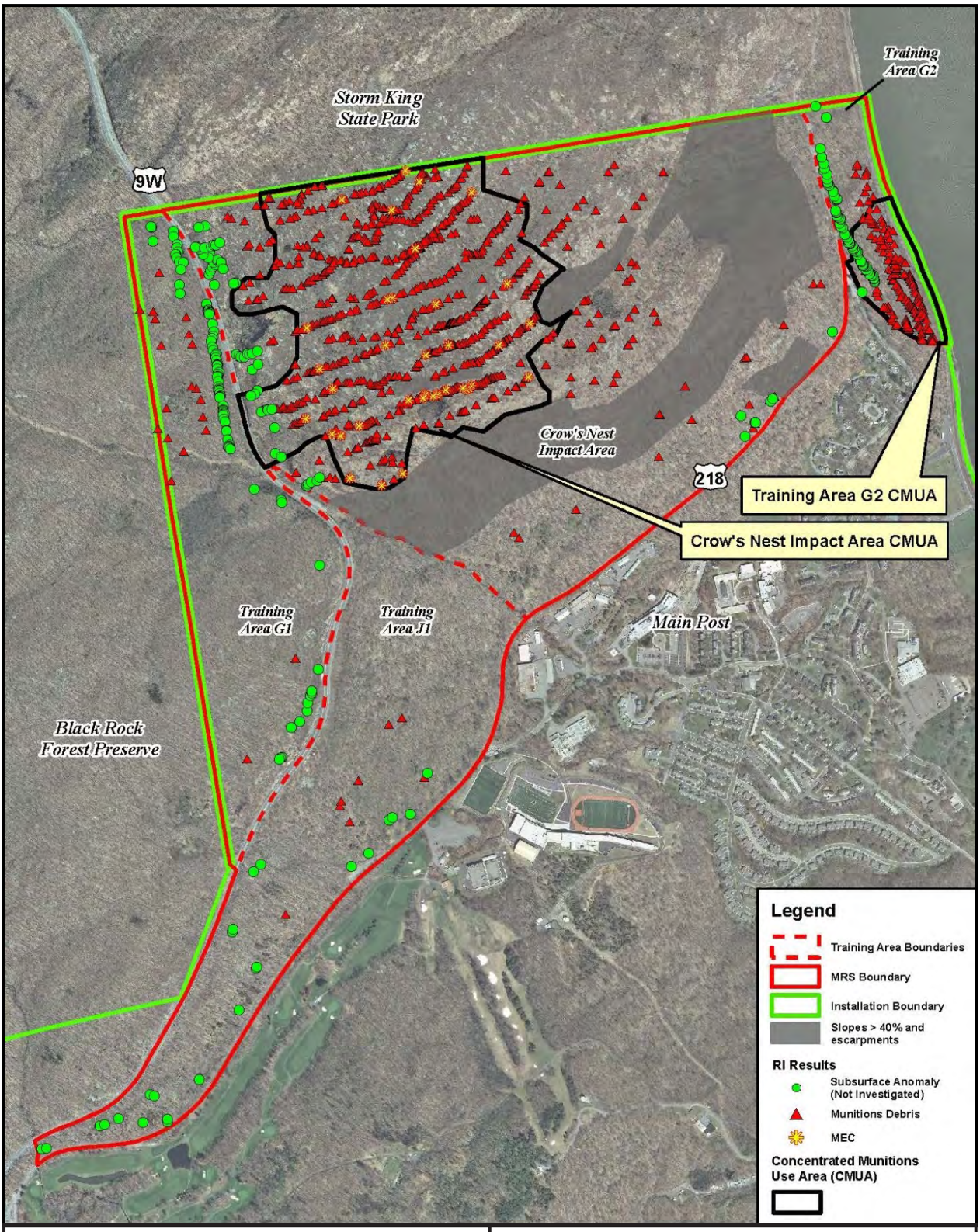

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Figure 2-3
Crow's Nest MRS MEC Investigation Results

22P-0147-4

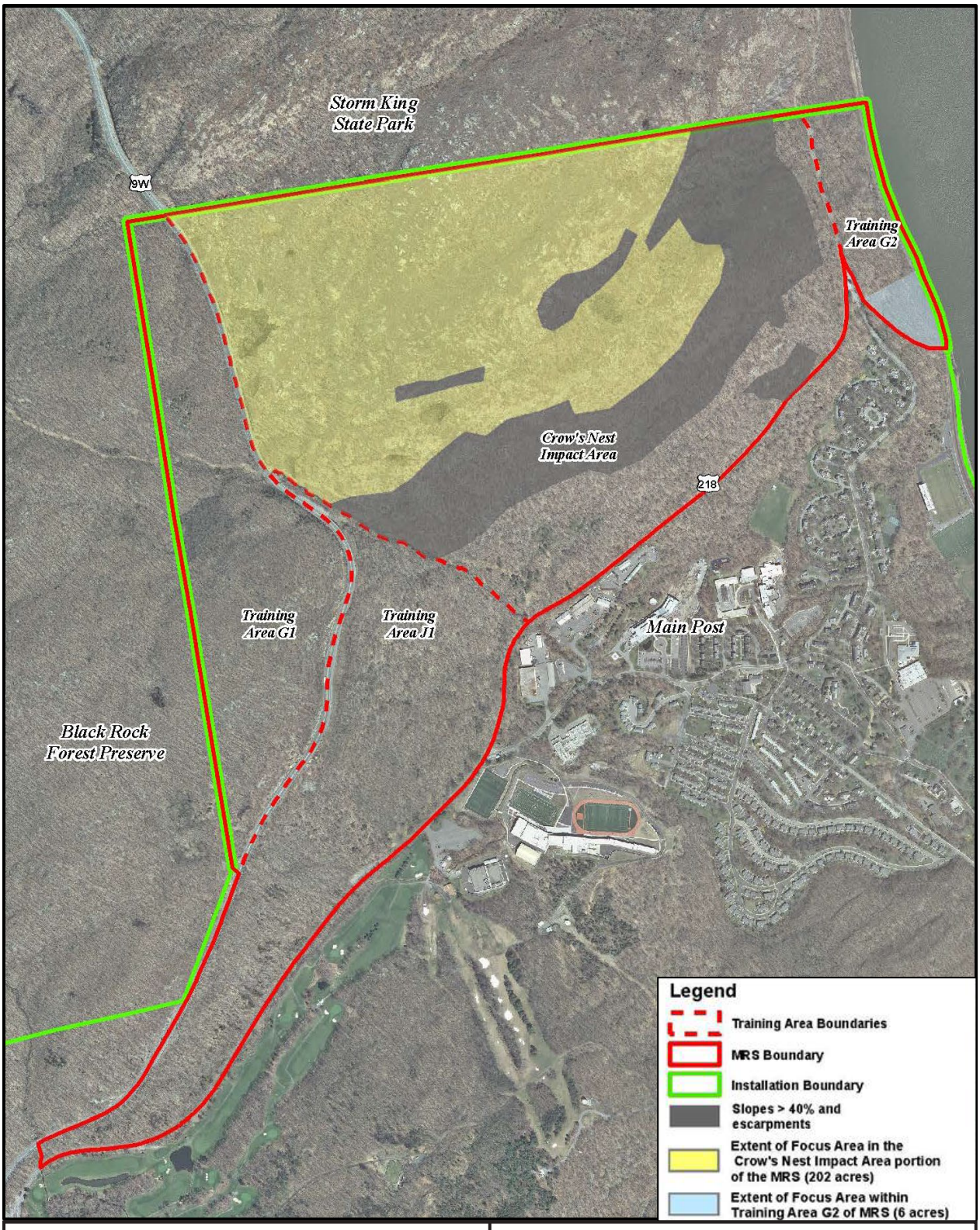

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Figure 2-4
Crow's Nest MRS MEC Focus Areas

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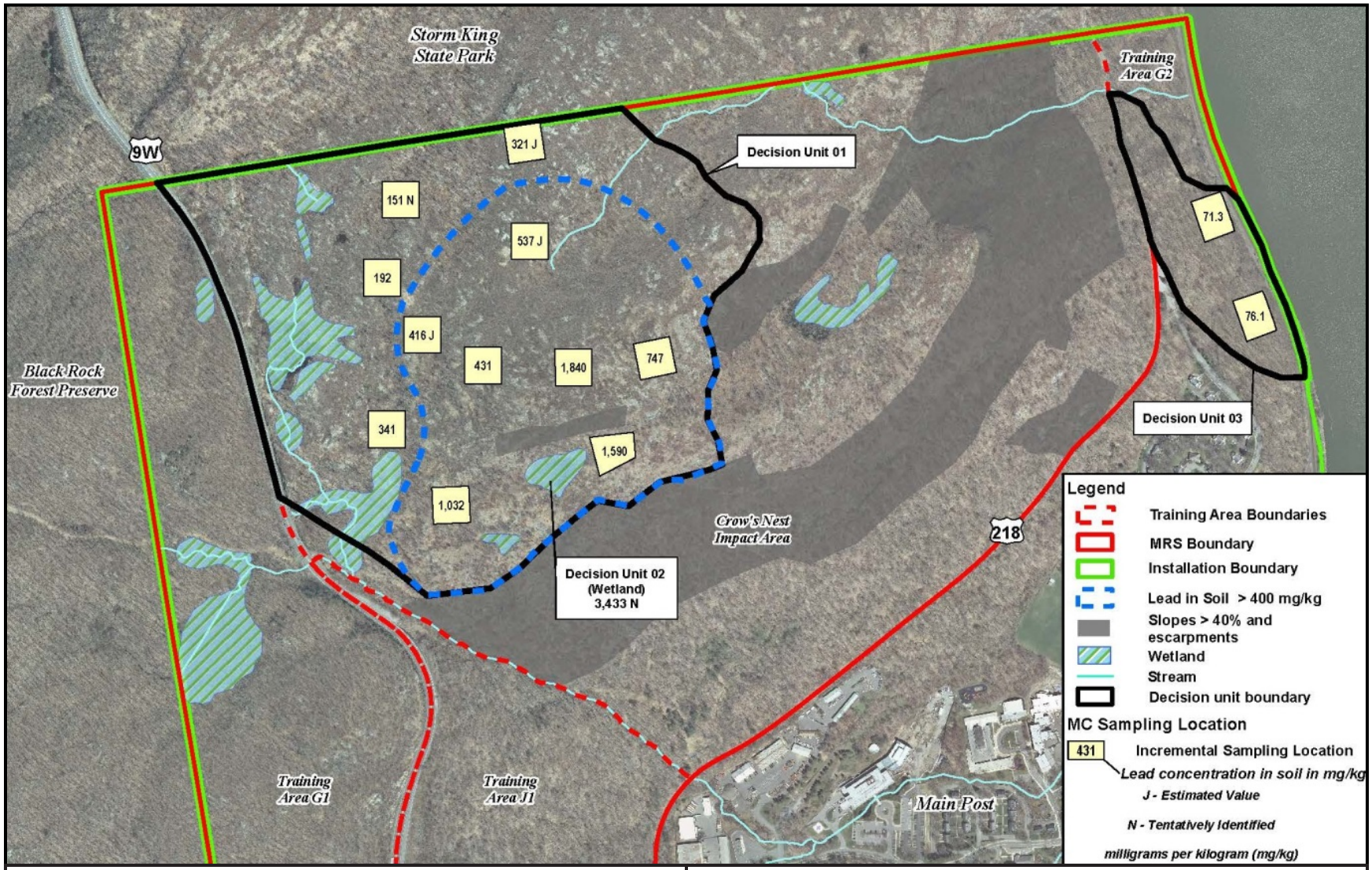

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Figure 2-5
Crow's Nest MRS MC Investigation Results

22P-0147-6

3. IDENTIFICATION OF NTCRA LAND USE CONTROL OBJECTIVES

3.1 REMOVAL ACTION OBJECTIVE

The objective of the NTCRA LUCs is to protect human health by minimizing human exposure to MEC, including, but not necessarily limited, to the potential for fire and explosion, at the Crow's Nest Impact Area MRS while further response actions are evaluated and implemented. CERCLA standard language is for removal actions to protect both human health and the environment, but an NTCRA LUC typically only protects human health. Operational safety measures that may be in place at an installation (e.g., installation-wide dig restrictions) are not equivalent to NTCRA LUCs, which are site-specific. The NTCRA LUCs identified in the Land Use Control Plan (LUCP) may be eligible for funding under the Environmental Restoration, Army (ER,A) funding source.

3.2 RESIDUAL RISK MANAGEMENT

The NTCRA LUCs are intended to reduce the probability of direct contact with MEC and thus reduce the exposure and explosive risk to humans at the MRS.

However, no action will be taken with this NTCRA to remove or remediate MEC at the Crow's Nest Impact Area MRS at USAG West Point. Therefore, residual risk from the MEC will remain. The LUCs alternative is an NTCRA and is not intended to be permanent or to replace the need for the more permanent solutions developed under the MMRP.

3.3 STATUTORY LIMITS ON NTCRA LAND USE CONTROLS

NTCRAs are conducted when a removal action is appropriate and there will be at least 6 months before on-site activities can begin. The NTCRA will be funded by the U.S. Army. The NTCRA LUCs described here are interim (not final) actions for the MRS.

The NCP §300.415 provides the regulatory framework for NTCRAs. Guidance documents include *Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA* (USEPA, 1993a) and the fact sheet, "Conducting Non-Time-Critical Removal Actions under CERCLA" (USEPA, 1993b).

NCP §300.415(b)(4) specifies that a removal action requires preparing, with stakeholder involvement, an EE/CA, an AM, and the required public involvement actions.

3.4 DETERMINATION OF NTCRA LAND USE CONTROL SCOPE

Only the Crow's Nest Impact Area MRS is included in this project. Other USAG West Point MRSs are being handled separately.

3.5 REGULATORY/OTHER STAKEHOLDER CONCERNS

USAG West Point has regulatory oversight from USEPA and NYSDEC as described in Section 1.1.

The primary regulatory and other stakeholder goals are to provide short- and medium-term protection of human health and the environment at the MRS. This will be accomplished by limiting access, which will minimize human and ecological exposure to MEC at the site.

3.6 PLANNED NTCRA ACTIVITIES

This EE/CA is the first part of a series of actions intended to result in establishing LUCs at the Crow's Nest Impact Area MRS within 1 year. This EE/CA identifies the appropriate LUC measures for the MRS and considers LUCs implemented at surrounding MRSs to provide the appropriate LUC alternative for USAG West Point.

The Final EE/CA will be presented to the public for input. Public participation will be sought with both a 30-day review as well as discussed at a public meeting that will be held if requested by the public.

An AM will follow the Final EE/CA and will document the selection and approval for the LUCs to be used at the MRS. The public input on the Final EE/CA will be incorporated into the AM, in Section V "Proposed Actions and Estimated Costs," and in an attached Responsiveness Summary. The recommended outline for an AM is provided in **Appendix C**.

Once the AM is complete, a LUCP will be drafted and will incorporate the findings of the EE/CA and AM. The LUCP explains the implementation and management of the LUCs at the MRS. In addition to background information and site information, the LUCP presents (i) existing LUCs, (ii) zoning and land use restrictions, (iii) DoD and non-DoD agency responsibilities, (iv) documentation requirements, (v) LUC monitoring, management, and maintenance, and (vi) LUC funding.

3.7 REMOVAL ACTION SCHEDULE

The removal action schedule is presented in **Table 3-1**. The site-specific schedule details the EE/CA being finalized in August 2023 and the NTCRA commencing in January 2024. Final completion of the field activities is anticipated to be March 2024.

Table 3-1: Removal Action Schedule

Activity[1]	2023												2024							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Final EE/CA	X	X	X	X	X	X	X	X	●											
Public Comment Period								X	X	●										
Draft AM			X	X	X	X	X	●												
Draft Final AM						X	X	X	X	●										
Final AM									X	X	●									
Draft Removal Action Work Plan (RAWP)/Unified Federal Policy-Quality Assurance Project Plan (UFP-QAPP)					X	X	X	X	X	●										
Draft Final RAWP/UFP-QAPP									X	X	X	●								
Final RAWP/UFP-QAPP										X	X	X	●							
Removal Action[2]													X	X	●					
Draft SSFR														X	X	X	●			
Draft Final SSFR																X	X	X	●	
Final SSFR[3]																	X	X	X	●

Notes:

[1] Activity durations include the document preparation and review time for the respective agencies. Drafts include a 30-day review period by USACE, West Point, and USAEC. Draft Finals include a 60-day review period by regulators. Finals include a 14-day concurrence period by USACE, West Point, and USAEC and a 30-day review period by regulators.

[2] Removal action work includes time to conduct pre-removal action meetings and complete the LUCs implementation.

[3.] A Proposed Plan (PP) and Decision Document (DD) will be prepared following the approval/signature of the Site-Specific Final Report (SSFR). The Integrated Master Schedule for the project will be updated as the project progresses to reflect the schedule for the PP and DD.

● = Activity Completion

X = Duration

4. IDENTIFICATION AND ANALYSIS OF NTCRA ALTERNATIVES

This EE/CA is focused on two alternatives (No Action and LUCs) for addressing the potential MEC hazards at the Crow's Nest Impact Area MRS while the MMRP progresses and more permanent actions are investigated and implemented.

4.1 ALTERNATIVE 1 – NO ACTION

This alternative provides a baseline against which Alternative 2 – LUCs can be evaluated. Under the No Action alternative, no change in the baseline conditions would be implemented at an MRS.

For example, if no LUCs are currently in place, then no action of any kind, including LUC measures, reviews, or inspections, would be implemented at the MRS. Any MEC or MC would remain in place without protective barriers, warnings, or restrictions on use of the area.

However, if LUCs are currently in place, then the LUCs will remain as established. The No Action alternative would, in this case, be evaluated based on no change to the existing condition (i.e., established LUCs). Since the LUC measures are already in place, the on-going reviews or inspections would be implemented as already planned with no change from what has already been budgeted or scheduled.

The No Action alternative has no implementation considerations because no actions would be taken that differ from the existing or baseline condition. As such, there are also no additional costs incurred with this alternative because there are no changes proposed. If there are no LUCs in place as the baseline condition, there are also no means to establish, evaluate, or confirm the No Action alternative's effectiveness in achieving the NTCRA objectives.

4.2 ALTERNATIVE 2 – LUCS

The LUCs alternative consists of the set of measures selected for the MRS that reduce or eliminate potential risks to human health and the environment at the installation. Standard installation-wide LUC components will be supplemented with MRS-specific measures, as necessary, to address the conditions at the MRS.

A description of the LUC components and their general and MRS-specific application at the Crow's Nest Impact Area MRS follows.

4.2.1 Identification and Screening of LUC Components

The term "LUCs" encompasses administrative and engineering methods to reduce or eliminate potential risks to human health, along with other measures such as periodic inspections. To identify appropriate LUCs for a specific installation, short-term NTCRA options are evaluated to address on-post MRSs while more permanent actions are determined.

The LUC measures considered in this EE/CA are listed below and described in this section.

1. Institutional Controls
    a. Land Use Restrictions (LURs)/Notations in Master Plan/Dig Permit
    b. Public Advisories

2. Engineering Controls
    a. Markers or Signs
    b. Fences
    c. Guards
3. Other Measures
    a. Periodic Inspections (i.e., Monitoring and Enforcement)

4.2.1.1 Institutional Controls: LURs, Notations in the Master Plan, and Dig Permits

The primary institutional controls measure considered is the combination of LURs, Notations in the Master Plan, and Dig Permits. These three measures are dependent on one another and functionally grouped. The restrictions considered most likely to meet the on-post and NTCRA constraints at the Crow's Nest Impact Area MRS are the following:

- Restrict Land Use
    - Mitigation area(s) protection
    - No daycare/hospital/school use[2]
    - No residential use[2]
- Landfill Restrictions
    - Prohibit excavation on landfill cap or cover system
    - Prohibit installation of utility system lines through the site
    - Restrict vehicular traffic
- Media-Specific Restrictions
    - Prohibit fishing except for recreational purposes (catch and release)
    - Prohibit swimming and wading
    - Prohibit or otherwise manage excavation
    - Restrict activities in surface water that result in contact with contaminated bottom sediments such as boating, diving, and swimming

Conditional restrictions such as UXO clearance to a specified depth with any excavation, drilling, or disturbance of soil are also required. All restrictions will require coordination with the installation master planner and other U.S. Army stakeholders. They must be approved by the Garrison commander and the IMCOM Region Directorate.

The Installation Master Plan is used for land use and construction project planning. Notations would be made in the Master Plan to identify the MRS and to document related LUC restrictions

[2] Daycare centers, hospitals, schools, and/or residential development within an MRS may only occur after appropriate review of the master plan, application of safety requirements, use of dig permits, and/or UXO construction support activities.

and zoning changes, if any. The Installation's Geographic Information System (GIS) can be used to demarcate the MRS and applicable LUCs.

LUCs are implemented through the master planning process at an installation, as described in Army Regulation (AR) 210-20, *Real Property Master Planning for Army Installations* (May 2005). The recommendations in the NTCRA are incorporated into the master planning process, but by themselves do not establish the LUCs. Ultimately, the Garrison Commander and the IMCOM Region Directorate will authorize the establishment of these LUCs.

Existing permit programs for the installation (such as dig permits, building permits, water/sewer connection permits, and excavation permitting systems) can be modified to include the prohibitions, restrictions, or conditions established for MEC at the MRS. These are often triggered by a Department of the Army Form 4283 (Facilities Engineering Work Request) and by the follow-up Record of Environmental Consideration (REC). The reviewing agencies will know of and convey to the applicants the LURs and LUCs at the site. In this way, the dig permits can be used to enforce prohibitions or notify construction crews of the potential risks and measures needed to mitigate risks.

To maintain a successful permit program, a system to verify compliance with the permit program and the authority to bring violators back into compliance is required. In the particular case of a MEC-contaminated site, a permit program can be established that would require the use of appropriate UXO-qualified personnel to clear an area of MEC prior to excavation for footings or foundations.

4.2.1.2 Institutional Controls: Public Advisories

A variety of advisory, notification, or educational materials could be used to alert the public of the potential risks at an MRS. These advisories may be helpful in alerting the public to safety consideration at the site, but they have several limitations. First, a large-scale community notice may alarm the public, exaggerating the concern beyond the actual risks posed at a site. Second, a one-time or even repeated advisory may, with time, have diminishing effectiveness, desensitizing the public to the risks and control measures taken at the site.

It is thus recommended that the advisories be targeted to the groups affected by LUCs. For instance, advisory pamphlets could be provided to buildings and houses adjacent to the MRS, or to crews and individuals when they apply for dig permits or building permits in the vicinity of the MRS.

4.2.1.3 Engineering Controls: Signs and Markers, Fences, and Guards

Signs and markers can be used to warn people of the potential dangers of MEC at the MRS. This may limit potential contact but will do nothing to restrict contact by those who cannot read or choose to ignore the warnings. Current security fencing (approximately 642 feet long and 8 feet high) and a gate exists along the western boundary of the Crow's Nest Impact Area portion of the MRS and Highway 9W to deter access into the MRS from the Highway 9W turnout and the small road leading into the MRS. The fence requires a minor repair. In addition, warning signs have been posted along the boundary of the impact area portion of the MRS warning of the danger of explosive hazards and prohibiting trespass. These signs are currently posted on trees approximately every 220 feet, where permissible.

An additional 6,600 liner feet of new fencing is required beginning where the current fencing ends and following the boundary of the impact area portion of the MRS to the north and along the northern boundary to the east, and ending where steep topography provides a natural barrier along the northeast boundary of the Crow's Nest Impact Area (see **Figure 4-1**). Additional signage (50 total estimated) will also be installed to provide information regarding the nature of the hazard, how to avoid the hazard, and a contact for additional information.

The stationing of guards to limit or control access to an MRS is labor-intensive and costly. As a result, it would normally not be recommended as an NTCRA LUC.

4.2.1.4 Other Measures: Periodic Inspections

The DoD Office of the Deputy Under Secretary of Defense (Environmental Security) recommends the following:

- **"Inspections**: The inspection of LUCs should become part of existing inspections conducted at the installation. Depending on the type of LUCs, these inspections could include a visual check to ensure that proper maintenance of LUCs is taking place.

- **Environmental Self-Audit**. Evaluating and verifying LUCs should be part of the Component's environmental audit and self-inspection program, and should be incorporated into the self-audit checklist and required report" (DoD, 2001a, b).

These inspections and environmental self-audits are estimated to cost $9,400 annually. These inspections are a combined program of "Monitoring and Enforcement" under which an annual review of the MRS will be conducted to ensure that LUCs remain effective and land usage has not changed. The results of the annual review will be made available to regulatory stakeholders at the discretion of the installation.

4.2.2 Evaluation of Alternative 2 LUC Components

NTCRAs are evaluated on the basis of three of the CERCLA criteria: effectiveness, implementability, and cost. The following is a summary of each as applied to the MRS at USAG West Point. MRS-specific adjustments are described in Section 4.3.

4.2.2.1 Effectiveness

Effectiveness is evaluated as both a short-term and long-term measure. Short-term effectiveness is defined by both the length of time needed until protection is in place and the impacts on human health after implementation. Long-term effectiveness concerns the ability of the alternative to reliably protect human health over time. **Table 4-1** shows the general effectiveness ratings of the LUC components.

Table 4-1: Effectiveness of Alternative 2 LUC Components

LUC Component	Short-Term Effectiveness		Long-Term Effectiveness		Overall Rating
	Time Needed to Reach Full Effectiveness	Construction Impacts on Human Health	Reliable Protection of Human Health	Reliable Protection of Environment(1)	
1. LURs/Notations in Master Plan/Dig Permits	Immediate upon authorization	NA	Yes to workers	No	◑
2. Public Advisories	> 1 month	NA	Some	No	○
3. Monitoring and Enforcement	Immediate	NA	Yes to workers	No	◑
4. Signs and Markers	< 1 week	No	Some	No	◑
5. Fences	> 1 month	Some to workers	Yes	Some	●
6. Guards	> 1 month	No	Yes	No	◑

● Excellent ◑ Good ○ Average ⊗ Poor NA = Not Applicable TBD = To Be Determined

(1) CERCLA standard language is for remedial actions to protect both human health and the environment, but an NTCRA LUC only protects human health.

4.2.2.2 Implementability

Implementability addresses the feasibility of implementing an alternative. It includes technical feasibility by screening out alternatives that clearly would be ineffective or unworkable at a site, and administrative feasibility, which reviews the ability to obtain permits, and the availability of necessary services, equipment, and skilled workers to implement the technology. All LUC components that passed the initial screening are considered technically feasible, so that factor is not shown here. **Table 4-2** shows the general implementability ratings of the LUC components.

Table 4-2: Implementability of Alternative 2 – LUCs

LUC Component	Administrative Feasibility		Overall Rating
	Ability to Obtain Permits	Availability of Services, Equipment, Workers	
1. LURs/Notations in Master Plan/Dig Permits	Yes	NA	●
2. Public Advisories	Yes	NA	●
3. Monitoring and Enforcement	Yes	NA	●
4. Signs and Markers	Yes	Yes	●
5. Fences	Yes	Yes	◑
6. Guards	Yes	Good use of personnel?	○

● Excellent ◑ Good ○ Average ⊗ Poor NA=Not Applicable TBD=To Be Determined

4.2.2.3 Cost

Cost estimates are reviewed as capital (first year) costs, operations and maintenance (O&M) costs, and net present value (NPV) costs.

Cost estimates were developed as shown in **Appendix B**. The total capital costs are estimated to be $916,067. The annual period costs are estimated to be $33,505. The total present value of the alternative, for 2 years, assuming a 0.7% discount rate, is estimated to be $968,956.

4.3 USAG WEST POINT/MRS-SPECIFIC LUCs

The best mix of LUCs for the Crow's Nest Impact Area MRS to achieve NTCRA goals includes the following: "LURs/Notations in Master Plan/Dig Permits," "Engineer Controls (Fence/Signs)," and "Monitoring and Enforcement." These LUCs incorporate measurable and actionable means and are highly effective in the short- and medium-term to limit exposure to the MEC at the MRS at a relatively low cost.

4.3.1 USAG West Point MRSs

There are no MRS-specific LUCs (Engineering Controls or Institutional Controls) in place at the installation. Installation-wide LUCs (i.e., dig safe) are in place. Operational safety measures that may be in place at an installation (e.g., installation-wide dig restrictions) are not equivalent to NTCRA LUCs which are site-specific. The NTCRA LUCs identified in the LUCP may be eligible for funding under the ER,A funding source. The NTCRA LUC cost estimate covers new requirements and has not yet been incorporated into the Installation Action Plan (USAG West Point, 2021), outyear budget, or HQAES. They are of a form and detail that should allow their incorporation, though that will be done after completion of this EE/CA.

The recommended LUCs to be established at USAG West Point to enforce the restrictions above are the following:

- **Restrictions on Land Use:** To prevent potential receptors from encountering UXO items, it is recommended that the MRS property not be used for residential purposes, daycare centers, hospitals, or schools, and that excavation is prohibited or otherwise managed.
  - Media-specific restriction – Prohibit, or otherwise manage excavation
  - Restrict land use – No daycare/hospital/school use[3]
  - Restrict land use – No residential use[3]
- **Notations in Master Plan:** The installation master plan will be updated to include specific notations on the MRSs.
  - A requirement will be added to the Master Plan that all 911 calls involving MEC will be recorded in a GIS database to better delineate exposure risk installation-wide.
- **Dig Permits:** USAG West Point has a standing policy requiring dig permits whenever ground is broken. USAG West Point Department of Public Works (DPW) reviews all dig permits and requires Explosive Ordnance Disposal (EOD) support for areas that are known to or have the potential to have MEC. USAG West Point uses a

[3] Daycare centers, hospitals, schools, and/or residential development within an MRS may only occur after appropriate review of the master plan, application of safety requirements, use of dig permits, and/or UXO construction support activities.

risk assessment to determine what areas on the installation require EOD support for ground disturbing activities. The MRSs within the risk assessment are broken into Group A and Group B. Group A MRSs are low probability and workers in these MRSs are provided a safety brochure with instructions in the event a munitions item is encountered. Group B MRSs require EOD support for ground disturbing activities (USAG West Point, 2017). The Crow's Nest Impact Area MRS falls into the Group B category. DPW reviews dig safe requests and compares them to the map in the risk assessment and provides guidance to the dig safe requestor. The dig permit program will be adjusted to include review of the MRS.

- **Public Advisories:** A variety of advisory, notification, or educational materials will be used to alert the public of the potential risks at the MRS. The advisories will be targeted to the groups affected by LUCs. For instance, advisory pamphlets could be provided to buildings and houses adjacent to or within the MRS, or to crews and individuals when they apply for dig permits or building permits adjacent to or within the MRS.

- **Monitoring and Enforcement:** An annual review of the MRSs at USAG West Point will be conducted to ensure that LUCs remain effective and land usage has not changed. The review will involve site visits and inspections conducted by a project engineer. The results of the annual review will be made available to regulatory stakeholders.

4.3.2 USAG West Point Summary

The costs for the LUCs Alternative components for the Crow's Nest Impact Area MRS are presented in **Appendix B**. The total present value of the alternative, for 2 years, assuming a 0.7% discount rate, is estimated to be $968,956.

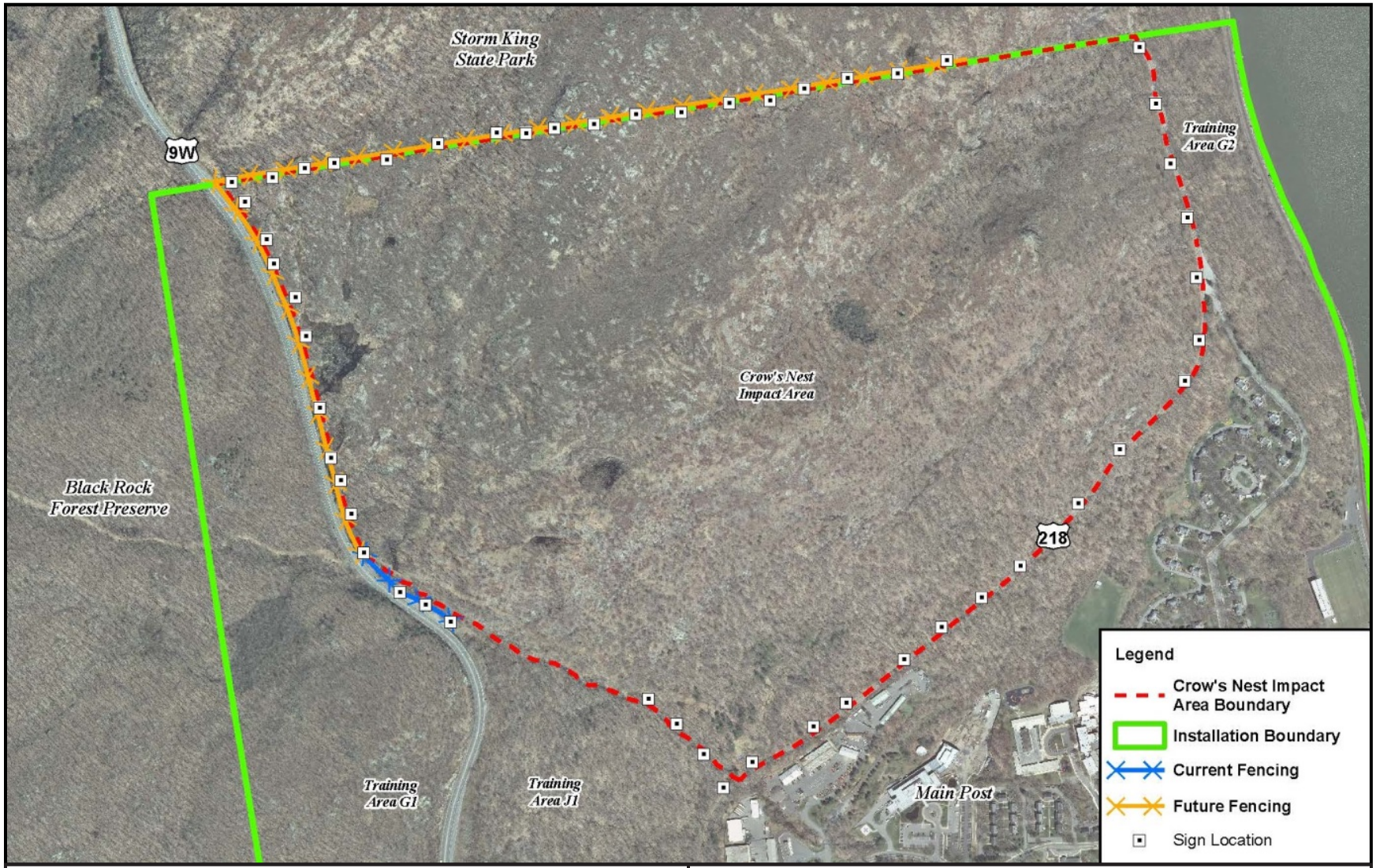

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Figure 4-1
Summary of Alternative 2 – LUCs

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5. COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES

Alternative 1 – No Action and Alternative 2 – LUCs under consideration at USAG West Point are evaluated according to the three CERCLA criteria used with NTCRAs: effectiveness, implementability, and cost.

5.1 EFFECTIVENESS

Effectiveness is evaluated as both a short-term and long-term measure. Short-term effectiveness is defined by both the length of time needed until protection is in place and the impacts on human health after implementation. Long-term effectiveness concerns the ability of the alternative to reliably protect human health over time. The effectiveness of each alternative is summarized in **Table 5-1** below. The No Action alternative has a poor effectiveness rating due to its inability to achieve the NTCRA objectives with any reliability, while the LUCs alternative is rated above average (good) in its effectiveness.

Table 5-1: Comparison of Effectiveness of Alternatives

	Short-Term Effectiveness		Long-Term Effectiveness		
Alternative	**Time Needed to Reach Full Effectiveness**	**Construction Impacts on Human Health**	**Reliable Protection of Human Health**	**Reliable Protection of Environment(1)**	**Overall Rating**
1. No Action	Unknown	●	⊗	NA	⊗
2. LUCs	Immediate upon authorization	◑	●	NA	◑
● Excellent ◑ Good ○ Average ⊗ Poor NA=Not Applicable TBD=To Be Determined					

(1) CERCLA standard language is for remedial actions to protect both human health and the environment, but an NTCRA LUC only protects human health.

5.2 IMPLEMENTABILITY

Implementability addresses the feasibility of implementing an alternative. It includes technical feasibility by screening out alternatives that clearly would be ineffective or unworkable at a site, and administrative feasibility, which reviews the ability to obtain permits, and the availability of necessary services, equipment, and skilled workers to implement the technology. All LUCs that passed the initial screening are considered technically feasible, so that factor is not shown here. The No Action alternative has no technical or administrative feasibility considerations. **Table 5-2** shows the comparison of the implementability of the alternatives.

Table 5-2: Comparison of Implementability of Alternatives

Alternative	Administrative Feasibility		Overall Rating
	Ability to Obtain Permits	Availability of Services, Equipment, Workers	
1. No Action	NA	NA	NA
2. LUCs	Yes	NA	●

● Excellent ◑ Good ○ Average ⊠ Poor NA=Not Applicable TBD=To Be Determined

5.3 COST

Cost estimates are reviewed as capital (first year) costs, O&M costs, and NPV costs.

Costs are shown in **Appendix B**. The cost summary for the alternatives is shown in **Table 5-3**. While the No Action alternative has no associated costs and thus is least expensive, implementing LUCs is a reasonably priced alternative at $968,956 over a 2-year duration.

Table 5-3: Cost Summary of Alternatives (Costs in $1,000s)

Alternative	Cost Dependency	Capital Cost	Annual Operating Cost[(1)]	O&M Years[(2)]	NPV[(3)]
1. No Action	No	$ 0	$ 0	NA	$ 0
2. LUCs	No	$ 916.1	$ 33.5	2	$ 969.0

Notes: (1) Annual costs include inspections and audits of the LUCs.
(2) The number of years of LUC maintenance until the removal action completion phase is completed and Long-Term Management (LTM) commences.
(3) A 2-year period with 0.7% discount rate is used, based on the planned completion of 2024 for the removal action completion.

6. RECOMMENDED NTCRA ALTERNATIVE

Two NTCRA alternatives were evaluated for their ability to meet the removal action objective of protection of human health at the on-post MRSs for USAG West Point.

- **Alternative 1 – No Action**: This alternative represents the baseline (current) conditions with no additional restrictions or protective measures.

- **Alternative 2 – LUCs**: This alternative includes a combination of institutional controls (LURs, notation in the Installation Master Plan, dig permits, advisories) and engineering controls (signs/markers, fences) for the Crow's Nest Impact Area MRS. The LUCs will require GIS recordation of all 911 call-ins involving MEC. Monitoring and enforcement of the LUCs will be conducted by annual site visits and inspections of the MRSs.

The No Action alternative does not meet the removal action objective and provides no means of protecting human health.

The LUCs alternative is effective and implementable. It meets the removal action objective and helps protect human health by limiting exposure to MEC at the Crow's Nest Impact Area MRS. Because MEC remains on site, risks will remain at the MRS; however, they will be controlled through LUCs. Therefore, Alternative 2 (LUCs) is recommended for implementation at the Crow's Nest Impact Area MRS at USAG West Point.

APPENDICES

APPENDIX A

REFERENCES

APPENDIX A: REFERENCES

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APPENDIX B

COST BREAKDOWNS AND ASSUMPTIONS

APPENDIX B: COST BREAKDOWNS AND ASSUMPTIONS FOR ALTERNATIVE 2 – LUCS

TABLE B-1
COST OF ALTERNATIVE 2

Alternative 2 - LUCs							
Site:	Crow's Nest Impact Area MRS (WSTPT-023-R-01)	Preparing a LUC Implementation/Management Plan. Implementing Land Use Restrictions for the Crow's Nest MRS via Master Plan Update. Updating the Dig Permit Process. Developing a UXO Awareness Plan to include policies and procedures for public advisories and contractor controls related to the Crow's Nest MRS. Implementing annual review/inspections of LUCS to confirm effectiveness. Conducting LUC monitoring and enforcement. Maintaining the UXO Awareness Program. Preparing Public Advisories to include public notices, fact sheets and meetings. Installing 3Rs signage and 6600 linear feet chain link fence, 50 signs, and conducting associated annual maintenance/repairs. Five year reviews are required until UU/UE is reached.					
Installation:	USAG West Point, New York						
Phase:	Feasibility Study (-30% to +50%)						
	2016						

CAPITAL COSTS							
Description			**QTY**	**U/M**	**Unit Cost**	**Cost**	**Notes**
Field Activities							
New 3R Signs Installation (Labor and Materials)			54	EACH	$150	$8,100	Engineer's Estimate
Installation of Fence (6 ft high)			6600	LF	$94	$620,400	Pulaski Fence Corp Quote
Installation of Signs (10"x14")			50	EACH	$5	$273	MySafety Sign Quote
Reporting							
LUC Implementation Work Plan/QAPP			1	LS	$20,000	$20,000	
Land Use Restriction (Master Plan Update)			1	LS	$20,000	$20,000	
Dig Permit Process Update			1	LS	$5,000	$5,000	
UXO Awareness Program Plan			1	LS	$15,000	$15,000	
(includes public advisory and contractor control policies/procedures)							
SUBTOTAL						$688,773	
	Contingency		25%			$172,193	15% scope + 10% bid
	Project Management		8%			$55,102	
TOTAL CAPITAL COST						**$916,067**	

PERIODIC COSTS							
Description			**QTY**	**U/M**	**Unit Cost**	**Cost**	**Notes**
Site Inspection Mobilization			1	LS	$1200	$1,200	Engineer's Estimate
Site Inspection/Sign Maintenance			1	LS	$4,000	$4,000	Engineer's Estimate
Fence Maintenance			1	LS	$6,204	$6,204	Engineer's Estimate
UXO Construction Support			1	week	$5,000	$5,000	UXO Technician III + equipment
Master Plan Notation (GIS Database update)			40	hours	$55	$2,200	GIS Specialist
LUC Monitoring and Enforcement			40	hours	$100	$4,000	Engineer
UXO Awareness Program			40	hours	$75	$3,000	Public Affairs Specialist
Public Advisories (Notices/Fact Sheets/Website			1	LS	$1,200	$1,200	
Five Year Review Report-excluded							
SUBTOTAL						$26,804	
	Contingency		15%			$4,021	5% scope + 10% bid
	Project Management		10%			$2,680	
TOTAL PERIODIC COST						**$33,505**	

PRESENT VALUE ANALYSIS					Discount Factor (DF) =	0.7%	Real Discount Rate for terms ≥30 years (USOMB, Nov2016) for Federal facilities (USEPA, 2000)
	Description	**Year**	**Cost**	**Cost/Year**	**DF**	**Present Value**	**Notes**
	Capital Cost	0	$631,173	$631,173	1.000	$916,067.43	
	Periodic Costs	1	$27,085	$27,085	0.993	$26,896.81	
	Periodic Costs	2	$26,357	$26,357	0.986	$25,991.50	
TOTAL PRESENT VALUE OF ALTERNATIVE						**$968,956**	

APPENDIX C

ACTION MEMORANDUM OUTLINE

APPENDIX C: ACTION MEMORANDUM OUTLINE

USEPA recommends the following basic Action Memorandum outline:

Heading

I. Purpose

II. Site Conditions and Background

A. Site Description

1. Removal site evaluation
2. Physical location
3. Site characteristics
4. Release or threatened release into the environment of a hazardous substance, or pollutant or contaminant
5. NPL status
6. Maps pictures, and other graphic representations

B. Other Actions to Date

1. Previous actions
2. Current actions

C. State and Local Authorities' Role

1. State and local actions to date
2. Potential for continued State/local response

III. Threats to Public Health or Welfare or the Environment and Statutory and Regulatory Authorities

IV. Endangerment Determination

V. Proposed Actions and Estimated Costs

A. Proposed Actions

1. Proposed action description
2. Contribution to remedial performance
3. Engineering Evaluation/Cost Analysis (for non-time critical actions only)
4. Applicable or relevant and appropriate requirements
5. Project schedule

B. Estimated Costs

VI. Expected Change in the Situation Should Action Be Delayed or Not Taken

VII. Outstanding Policy Issues

VIII. Enforcement

IX. Recommendation

Attachment: Responsiveness Summary to Final EE/CA Report