

**Final
Record of Decision for
RVAAP-063-R-01 Group 8 Munitions Response Site
Version 1.0**

**Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio**

**Contract No. W912DR-15-D-0016
Delivery Order No. 0001**

Prepared for:



**US Army Corps
of Engineers®**

**U.S. Army Corps of Engineers
Baltimore District
2 Hopkins Plaza
Baltimore, Maryland 21201**

**Prepared by:
HydroGeoLogic, Inc. (HGL)
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September 25, 2020

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REPORT DOCUMENTATION PAGE

Form Approved
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14. ABSTRACT The U.S. Department of the Army (U.S. Army) is presenting this Record of Decision to document the determination for the former Ravenna Army Ammunition Plant, RVAAP 063-R-01 Group 8 MRS, located in Portage and Trumbull Counties, Ohio. This Record of Decision presents the U.S. Army's determination that munitions constituent contaminated soil removal is appropriate for addressing risk at the site. This Record of Decision will present (in the Final version, following Ohio EPA review and comment) the Ohio EPA concurrence with this determination and will summarize the response from the public during the 30-day public comment period held for the munitions response site.					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 66	19a. NAME OF RESPONSIBLE PERSON Kimberly Vaughn
a. REPORT U	b. ABSTRACT U	c. THIS PAGE U			19b. TELEPHONE NUMBER (Include area code) 512-658-6828

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Mike DeWine, Governor
Jon Husted, Lt. Governor
Laurie A. Stevenson, Director

October 22, 2020

TRANSMITTED ELECTRONICALLY

Mr. Kevin M. Sedlak
Army National Guard
Installations & Environment
Cleanup Branch IPA Designation
1438 State Route 534 SW
Newton Falls, OH 44444

RE: US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Project Records
Remedial Response
Portage County
ID # 267000859246

Subject: Final Record of Decision for RVAAP-063-R-01 Group 8 Munitions Response Site

Dear Mr. Sedlak:

The Ohio Environmental Protection Agency (Ohio EPA), Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) has received and reviewed the "Final Record of Decision for RVAAP-063-R-01 Group 8 Munitions Response Site, Version 1.0" dated September 25, 2020. It was prepared by HydroGeoLogic, Inc.

Ohio EPA has no comments on the Final Record of Decision (Final ROD). Based on the information contained in the Final ROD document, other investigation documents and reports, and Ohio EPA's oversight participation during the investigation, Ohio EPA concurs with the Final ROD document for the RVAAP-063-R-01 Group 8 Munitions Response Site recommending surface soil removal (≤ 0.5 feet below ground surface), and subsurface soil removal (> 0.5 feet below ground surface) as necessary.

As a precautionary response to COVID-19, Ohio EPA is currently operating with most staff working remotely. During this time, we will not be issuing hard-copy mail. This letter is an official response from Ohio EPA that will be maintained as a public record.

RECEIVED
OCT 22 2020

MR. SEDLAK
RVAAP-063-R-02 GROUP 8 MRS
FINAL ROD
PAGE 2 OF 2

If you have any questions concerning this letter, please contact Nicholas Roope at (330) 963-1235.

Sincerely,

Melisa Witherspoon

Melisa Witherspoon
Chief
Division of Environmental Response and Revitalization

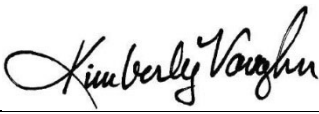
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CONTRACTOR'S STATEMENT OF INDEPENDENT TECHNICAL REVIEW

HydroGeoLogic, Inc., has completed the *Final Record of Decision for RVAAP-063-R-01 Group 8 Munitions Response Site*, Version 1.0 at the former Ravenna Army Ammunition Plant, Portage and Trumbull Counties, Ohio. Notice is hereby given that an independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of data quality objectives, technical assumptions; methods, procedures, and materials to be used; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets customer's needs consistent with law and existing United States Army Corps of Engineers policy.

Prepared/Approved by:  Date: September 25, 2020
Janardan Patel
Program Manager
HydroGeoLogic, Inc.

Reviewed/Approved by:  Date: September 25, 2020
Kimberly Vaughn
Project Manager
HydroGeoLogic, Inc.

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**Final
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September 25, 2020

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DOCUMENT DISTRIBUTION

Preliminary Draft Record of Decision for RVAAP-063-R-01 Group 8 Munitions Response Site, Version 1.0

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ARNG – Army National Guard

COR – Contracting Officer’s Representative

IED – Installation and Environment Division

OHARNG – Ohio Army National Guard

RVAAP – Former Ravenna Army Ammunition Plant

USACE – United States Army Corps of Engineers

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ACRONYMS AND ABBREVIATIONS

amsl	above mean sea level
ARAR	applicable or relevant and appropriate requirement
ARNG	Army National Guard
ASR	Archives Search Report
bgs	below ground surface
CB&I	CB&I Federal Services, LLC
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act</i>
CFR	Code of Federal Regulations
CJAG	Camp James A Garfield Joint Military Training Center
COC	contaminant of concern
COPEC	chemical of potential ecological concern
CSM	conceptual site model
DERP	Defense Environmental Restoration Program
DFFO	<i>Director's Final Findings and Orders</i>
DGM	digital geophysical mapping
DMM	discarded military munitions
DoD	U.S. Department of Defense
e ² M	engineering-environmental Management, Inc.
EPA	U.S. Environmental Protection Agency
ERA	ecological risk assessment
FS	<i>Final Feasibility Study for RVAAP-063-R-01 Group 8 Munitions Response Site</i>
FWCUG	Facility-Wide Human Health Cleanup Goal
HE	high explosive
HGL	HydroGeoLogic, Inc.
HHRA	human health risk assessment
HRR	<i>Final Military Munitions Response Program Historical Records Review</i>
ISM	Incremental Sampling Methodology
kg-dw/kg-day	kilogram food dry weight per kilogram body weight per day
LUC	land use control
MC	munitions constituents
MD	munitions debris
MDAS	material documented as safe
MEC	munitions and explosives of concern
mm	millimeter
MMRP	Military Munitions Response Program
MPPEH	munitions potentially presenting an explosive hazard
MRS	Munitions Response Site
MRSP	Munitions Response Site Prioritization Protocol

ACRONYMS AND ABBREVIATIONS (continued)

NCP	<i>National Oil and Hazardous Substances Pollution Contingency Plan</i>
NPDES	National Pollutant Discharge Elimination System
O&M	operation and maintenance
OHARNG	Ohio Army National Guard
Ohio EPA	Environmental Protection Agency
PCB	polychlorinated biphenyl
PP	Proposed Plan
PRG	Preliminary Remediation Goal
PTW	principle threat waste
RAO	remedial action objective
RDX	Research Department Explosives
RI	Remedial Investigation
RI Report	<i>Final Remedial Investigation Report</i>
RME	Risk Management Evaluation
ROD	Record of Decision
RSL	Regional Screening Level
RVAAP	Ravenna Army Ammunition Plan
SAIC	Science Applications International Corporation
SI	Site Inspection
SRC	site-related chemical
TNT	2,4,6-Trinitrotoluene
USACE	U.S. Army Corps of Engineers
USP&FO	U.S. Property and Fiscal Officer
UU/UE	unrestricted use/unlimited exposure
UXO	unexploded ordnance

PART I: DECLARATION

A. SITE NAME AND LOCATION

The Army National Guard (ARNG) developed this Record of Decision (ROD) for the RVAAP-063-R-01 Group 8 Munitions Response Site (MRS), which is located at the former Ravenna Army Ammunition Plant (RVAAP) in Portage and Trumbull counties, Ohio (**Figure 1**). The former RVAAP is now known as Camp James A. Garfield Joint Military Training Center (CJAG). The Group 8 MRS is located just north of the southern facility boundary of CJAG (**Figure 2**). CJAG was previously known as Camp Ravenna Joint Military Training Center (Camp Ravenna), and that name is used in some historical reports.

The federally owned CJAG facility comprises 21,683 acres and is located in Portage and Trumbull counties, Ohio, approximately 3 miles east-northeast of the City of Ravenna (**Figure 1**). Administrative accountability for CJAG was transferred to the U.S. Property and Fiscal Officer (USP&FO) for Ohio in multiple transfers, the last occurring in September 2013. The facility is licensed to the Ohio Army National Guard (OHARNG) for use as a military training facility (Federal Facility ID No. OH213820736).

To maintain a distinction between historical operations and current activities, the term “RVAAP” will be used for historical discussions, and “CJAG” will be used when referring to the current facility activities.

B. STATEMENT OF BASIS AND PURPOSE

The ARNG is the lead federal agency for environmental response actions at CJAG. This ROD was prepared under the Military Munitions Response Program (MMRP) and presents the selected remedy for the Group 8 MRS. The selected remedy was chosen in accordance with the requirements of the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) of 1980, as amended by the *Superfund Amendments and Reauthorization Act* of 1986, which requires the issuance of RODs for remedial action taken pursuant to Sections 104, 106, 120, and 122. The *National Oil and Hazardous Substances Pollution Contingency Plan* (NCP) establishes the regulatory requirements for this ROD in Chapter 40 of the *Code of Federal Regulations* (CFR), Section 300.430(f)(5).

The Ohio Environmental Protection Agency (Ohio EPA), the supporting state regulatory agency, reviewed and concurred with the *Final Proposed Plan for RVAAP-063-R-01 Group 8 Munitions Response Site Version 2.0* (HydroGeoLogic, Inc., [HGL], 2020). ARNG’s decision is based on information contained in the Administrative Record file for the Group 8 MRS. The Proposed Plan (PP) presented the ARNG’s preferred remedy for addressing the Group 8 MRS and invited public involvement during the comment period (March 4, 2020, through April 4, 2020) and at a public meeting held March 11, 2020. The selected remedy under CERCLA at the Group 8 MRS satisfies the requirements of the *Director’s Final Findings and Orders* (DFFO) (Ohio EPA, 2004), specifically by documenting the Ohio EPA’s concurrence with the closeout of the MMRP investigation conducted for this MRS under Section XII, paragraph 26.

C. ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect the public health or welfare or environment from actual or threatened releases of hazardous substances to the environment.

D. DESCRIPTION OF THE SELECTED REMEDY

This ROD addresses U.S. Department of Defense (DoD) military munitions and related soil contamination at the Group 8 MRS. Based on the information currently available, ARNG believes the selected remedy meets the threshold criteria and provides the best balance of tradeoffs among other alternatives, with respect to the balancing and modifying criteria (detailed in Section J). ARNG expects the selected remedy to satisfy the requirements of CERCLA by protecting human health, complying with applicable or relevant and

appropriate requirements (ARARs), being cost-effective, and utilizing permanent solutions to the maximum extent practical. No unacceptable ecological risk was identified at the Group 8 MRS; therefore, the remedy does not address ecological receptors. However, the Northern long-eared bat is a federally threatened species that is listed for the CJAG and will be considered during project and construction activities.

The selected remedy for the Group 8 MRS is Alternative 3 – Munitions Constituent (MC)-Contaminated Soil Removal. Mechanical and manual excavation techniques will be used to remove MC-contaminated soil to a depth of 0.5 feet below ground surface (bgs). As summarized in the Final PP and in Section E.4.2 below, the only receptor with a complete exposure pathway for risk from MC-contaminated soil is the theoretical future Resident Receptor. This remedy is protective of the theoretical future Resident Receptor. This alternative is selected over the other alternatives because it provides the greatest protection of human health, results in complete removal of MC-contaminated soil at the MRS and provides the greatest long-term effectiveness. Furthermore, no remedial action-operation, long-term monitoring costs, or Five-Year Reviews would be required. The selected remedy for the Group 8-MRS includes the following activities:

- Removal of lead- and cadmium-contaminated soil to a depth of 0.5 feet bgs;
- Incidental to the surface soil removal, if any munitions debris is encountered, it will be segregated, inspected, and certified as material documented as safe (MDAS) before disposal;
- Confirmation soil samples will be collected to confirm that the extent of MC-contaminated soil has been removed; and
- Under this alternative, all MC-contaminated soil exceeding the **Preliminary Remediation Goals** (PRGs) would be removed, allowing for unlimited use/unrestricted access (UU/UE) at the MRS (although future residential use is not anticipated and is theoretical only).

E. STATUTORY DETERMINATION

The selected remedy for the Group 8 MRS is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions to the maximum extent possible. The selected remedy achieves the statutory preference for treatment as a principle element of the remedy (i.e., reduces toxicity, mobility, and volume associated with DoD military munitions or related MC contamination through treatment). The selected remedy was chosen since it reduces the volume of DoD military munitions or related MC contamination to current and future receptors. Because this remedy will not result in hazardous substances, pollutants, or contaminants remaining on site above levels that allow for UU/UE, Five-Year Reviews will not be required for this remedial action.

F. DATA CERTIFICATION CHECKLIST

The Data Certification Checklist fulfills a commitment made by the U.S. Environmental Protection Agency (EPA) to the General Accounting Office to ensure that RODs contain certain remedy selection information. The following information is included in the Decision Summary (Part II) of this ROD:

- DoD military munitions and site-related chemicals (SRCs) and their respective concentrations (*Part II, Section G*);
- Baseline risk and hazard represented by DoD military munitions and SRCs (*Part II, Section G*);
- Cleanup levels for DoD military munitions and the basis for levels (*Part II, Section D*);
- How source materials constituting principle threats are addressed (*Part II, Section J*);

- Current and future reasonably anticipated land use assumptions and current and future beneficial uses of groundwater (*Part II, Section F*);
- Potential land and groundwater use that will be available at the MRS as a result of the selected remedy (*Part II, Section F*);
- Estimated capital, annual operation and maintenance (O&M), total present value costs, discount rate, and number of years over which the remedy cost estimates are projected (*Part II, Section H*); and,
- Key factors that led to selecting the remedy (i.e., description of how the selected remedy provides the best balance of trade-offs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) (*Part II, Section I*).

Additional information can be found in the Administrative Record for the Group 8 MRS.

G. AUTHORIZING SIGNATURE

Approved:

HAMMETT.ANTHONY.SCOTT
OTT.1116575562

Digitally signed by
HAMMETT.ANTHONY.SCOTT.1116575562
Date: 2020.12.31 17:50:35 -05'00'

ANTHONY HAMMETT
Colonel, U.S. Army
Chief, G9 Army National Guard

12/31/20

Date

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PART II: DECISION SUMMARY

A. SITE NAME, LOCATION, AND DESCRIPTION

The former RVAAP, now known as the CJAG, is located in northeastern Ohio within Portage and Trumbull counties, approximately three (3) miles east/northeast of the City of Ravenna and one (1) mile north/northwest of the City of Newton Falls. The facility is approximately 11 miles long and 3.5 miles wide. The facility is bounded by State Route 5, the Michael J. Kirwan Reservoir, and the CSX System Railroad to the south; Garret, McCormick, and Berry Roads to the west; the Norfolk Southern Railroad to the north; and State Route 534 to the east. It is surrounded by the communities of Windham, Garrettsville, Charlestown, and Wayland (**Figure 1**). The facility is federal property, which has had multiple accountability transfers amongst multiple Army agencies making the property ownership and transfer history complex. The most recent administrative accountability transfer occurred in September 2013 when the remaining acreage (not previously transferred) was transferred to the USP&FO for Ohio and subsequently licensed to the OHARNG for use as a military training site (Camp James A. Garfield).

Administrative accountability of the 21,683-acre facility has been transferred to the USP&FO for Ohio, which subsequently licensed CJAG to the OHARNG for use as a military training site. The restoration program for the facility involves the remediation of areas affected by former use of Army munitions as well as industrial activities when the RVAAP was in operation.

The Group 8 MRS is a 2.65-acre area just north of the southern boundary of CJAG (**Figure 2**). The MRS is located between Buildings 846 and 849 and lies southeast of Load Line #12, just north of the southern facility boundary. **Figure 3** presents the current boundaries of the MRS.

The Group 8 MRS is being investigated under the MMRP, which was established under the Defense Environmental Restoration Program (DERP) to address DoD military munitions located on current and former defense sites. Sites that are eligible under the MMRP are non-operational ranges where military munitions are known or suspected to be present. The Group 8 MRS was determined to be eligible under the MMRP.

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The RVAAP was constructed in 1940 and 1941 for the assembly/loading and depot storage of ammunition. While serving as an ammunition plant, the RVAAP was a U.S. Government-owned and contractor-operated industrial facility. The ammunition plant consisted of 12 munitions assembly facilities, referred to as “load lines.” Load Lines 1 through 4 were used to melt and load 2,4,6-Trinitrotoluene (TNT) and Composition B (a mixture of TNT and Research Department Explosive [RDX]) into large-caliber shells and bombs. Operations on the load lines produced explosive dust, spills, and vapors that collected on the floors and walls of each building. Periodically, the floors and walls were cleaned with water and steam. After cleaning, the “pink water” wastewater, which contained TNT and Composition B, was collected in concrete holding tanks, filtered, and pumped into unlined ditches for transport to earthen settling ponds. Load Lines 5 through 11 manufactured fuzes, primers, and boosters. From 1946 to 1949, Load Line 12 produced ammonium nitrate for explosives and fertilizers; subsequently, it was used as a weapons demilitarization facility.

In 1950, the facility was placed on standby status, and operations were limited to renovation, demilitarization, normal maintenance of equipment, and munitions storage. Production activities resumed from July 1954 to October 1957 and again from May 1968 to August 1972. Demilitarization and production activities were conducted at Load Lines 1, 2, 3, and 12. Demilitarization activities included disassembling munitions and melting out and recovering explosives using hot water and steam processes. These activities continued through 1992.

In addition to production and demilitarization activities at the load lines, other activities conducted at the RVAAP included the burning, demolition, and testing of munitions. The locations used as burning and demolition grounds consisted of large, open areas and abandoned quarries. Other areas of concern associated with the RVAAP include a landfill, an aircraft fuel tank testing area, and various industrial support and maintenance facilities (CB&I Federal Services LLC [CB&I], 2015).

The Group 8 MRS covers 2.65 acres within the former RVAAP. The MRS is located between Buildings 846 and 849 and lies southeast of Load Line #12, just north of the southern facility boundary (**Figure 3**). The Group 8 MRS (formerly known as Area Between Building 846 and 849) was used to burn construction debris and rubbish for an unknown period. Before designation as an MRS, the area between Building 846 and 849 was used as a staging area for military vehicles. There are no records available documenting the disposal of munitions at the MRS; however, previous discoveries of munitions and explosives of concern (MEC) and of munitions debris (MD) indicated that munitions may have been disposed of at the Group 8 MRS.

There have been no CERCLA enforcement actions related to the Group 8 MRS.

C. COMMUNITY PARTICIPATION

Using the RVAAP restoration community relations program, ARNG and the Ohio EPA have interacted with the public through news releases, public meetings, reading materials, and a website. Specific items of the community relations program include the following:

- **Restoration Advisory Board:** A Restoration Advisory Board was established in 1996 to promote community involvement in environmental cleanup activities and to review and discuss the progress with decision makers and the public. Board meetings are generally held two to three times per year and are open to the public.
- **RVAAP Restoration Program Community Relations Plan:** The *Final Community Relations Plan for the Ravenna Army Ammunition Plant Restoration Program in Portage and Trumbull Counties, Ohio* (U.S. Army Corps of Engineers [USACE], 2019) was prepared to establish processes to keep the public informed of activities being conducted as part of the RVAAP restoration program.
- **RVAAP Restoration Program Website:** A website was established in 2004 dedicated to the RVAAP Restoration Program. The website provides information on the history of the RVAAP, areas of potential contamination, the cleanup program being implemented, current activities, and a schedule of upcoming events. This website is accessible to the public at www.rvaap.org.

In accordance with Section 117(a) of CERCLA, Section 300.430(f)(2) of the NCP and the *Final U.S. Army Military Munitions Response Program Munitions Response, Remedial Investigation/Feasibility Study Guidance* (U.S. Army, 2009), the ARNG released the Proposed Plan for the Group 8 MRS (HGL, 2020) in March 2020. The PP and other project-related documents were made available to the public as part of the Administrative Record maintained at CJAG and in the two Information Repositories at Reed Memorial Library in Ravenna, Ohio, and Newton Falls Public Library in Newton Falls, Ohio. The notice of availability for the PP was sent to the Tribune Chronicle and Record Courier, as specified in the Community Relations Plan (USACE, 2017). The notice of availability initiated the 30-day public comment period, which began on March 4, 2020, and ended on April 4, 2020 (Appendix A).

The ARNG held a public meeting on March 11, 2020, at the Shearer Community Center (Paris Township Hall), located at 9355 Newton Falls Road, Ravenna, Ohio 44266, to present the Proposed Plan to the public. At this meeting, representatives of the ARNG provided information about the history of the Group 8 MRS, the investigations, and current site conditions. ARNG/OHARNG also proposed the selected remedy of MC-Contaminated Soil Removal and answered questions about the results of the investigations. Responses to

the comments received at this meeting and during the public comment period are included in the Responsiveness Summary in Part III of this ROD.

The ARNG considered the community input received on the PP (HGL, 2020) and determined that MC-Contaminated Soil Removal is the appropriate remedy for DoD military munitions for the Group 8 MRS.

D. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The overall goal of the MMRP at RVAAP is to address risks to human health and the environment posed by DoD military munitions (i.e., **unexploded ordnance** [UXO] and discarded military munitions [DMM]) and MC-related contamination. Investigations conducted by the ARNG have determined that unacceptable risk is posed by DoD military munitions at the Group 8 MRS. The overall remedial strategy for the Group 8 MRS reflects the interests of both the ARNG and the Ohio EPA in mitigating risk and protecting potential human receptors (theoretical future Residential Receptor) where residual MC contamination associated with disposal of DoD military munitions remain. In keeping with this strategy, a selected remedy was determined for the MRS that constitutes the final response action for the Group 8 MRS. The ARNG's overall strategy will permanently reduce the toxicity, mobility, and volume of DoD military munitions presenting an explosive or toxic hazard at the MRS. Following the completion of the response action, conditions will allow for UU/UE.

E. SITE CHARACTERISTICS

This section provides a brief overview of the Group 8 MRS that includes the physical characteristics, previous investigations completed under the MMRP, the nature and extent of contamination, and the most current conceptual site model (CSM).

E.1 Physical Characteristics

The physical characteristics such as topography, geology, hydrogeology, and ecological characteristics that contributed to identifying potential transport pathways, receptors and exposure scenarios used to evaluate health and ecological risks are presented in this section.

E.1.1 Topography/Physiography

CJAG is located within the Southern New York section of the Appalachian Plateaus physiographic province, which is characterized by rolling hills, incised streams, and dendritic drainage patterns. Topography at the Group 8 MRS is flat, and the relative elevation is approximately 985 feet above sea level. There are no natural streams or ponds located within the MRS, and the MRS is not located within a flood plain. No bogs, kettle lakes, or kames are present at the MRS.

E.1.2 Geology and Soils

The Group 8 MRS is located over the Sharon Member conglomerate unit. The bedrock elevation is approximately 975 feet above mean sea level (amsl). The soils identified at the facility are generally derived from the Wisconsin-age silty clay glacial till. The majority of native soil at the facility has been reworked or removed during construction activities. The major soil types found in the Group 8 MRS are silt or clay loams, ranging in permeability from 6.0×10^{-7} to 1.4×10^{-3} centimeters per second (U.S. Department of Agriculture et al., 1978). The soil type at the Group 8 MRS is the Mahoning-Urban land complex with undulating 2 to 6 percent slopes (CB&I, 2015).

E.1.3 Surface Water

CJAG is located within the Ohio River Basin with a major surface stream running adjacent to the western portion of the facility that flows to the Mahoning River before joining the Michael J. Kirwan Reservoir. After leaving the reservoir, the west branch of the stream joins the Mahoning River east of the facility.

Surface water drainage for the Group 8 MRS generally flows into drainage ditches along the roadside where it eventually infiltrates the soil. A small wetland is present on the southeast corner of the MRS (Figure 3).

E.1.4 Hydrogeology

Although groundwater recharge and discharge areas have not been delineated at CJAG, it is assumed that the extensive uplands areas at the facility, primarily located along its western portion, are regional recharge zones. Sand Creek, Hinkley Creek, and Eagle Creek are presumed to be major groundwater discharge areas. The Group 8 MRS is not situated in the upland areas that are considered to be regional recharge zones.

No groundwater monitoring wells have been specifically installed for the Group 8 MRS. Based on the data collected at CJAG under the Facility-Wide Groundwater Monitoring Program, the groundwater elevation at the MRS and the immediate vicinity is approximated at a potentiometric high of 960 feet amsl (OHARNG, 2016). Groundwater flow direction is toward the southeast. The approximate depth to groundwater in the unconsolidated aquifer at the Group 8 MRS is 15 to 20 feet bgs (CB&I, 2015).

E.1.5 Ecology

CJAG is home to a range of vegetation and habitat resources. The habitat at the Group 8 MRS has been influenced and impacted by man-made improvements, including gravel roads. Additionally, historical use of the Group 8 MRS as a burning area has influenced the habitat at the site. The vegetation community present at the Group 8 MRS is categorized as “other land,” in the Anderson Classification, which refers to disturbed areas and/or paved areas lacking identifiable vegetation communities (CB&I, 2015).

The CJAG Integrated Natural Resources Management Plan and U.S. Fish and Wildlife Service Threatened and Endangered Species List indicate that one federally listed threatened species, the Northern Long-eared Bat, is known to reside within CJAG (OHARNG, 2014 and U.S. Fish and Wildlife Service, 2018). Additionally, the Ohio Department of Natural Resources has identified several state-listed threatened and endangered plant and animal species. Twelve state listed endangered species (1 mammal, 1 fish, 1 insect, 8 bird, and 1 plant species) and 10 state listed threatened species (5 bird, 1 insect, 4 plants species) are included on the Camp Ravenna Rare Species List. No confirmed sightings of these species within the Group 8 MRS have been reported, and no critical habitats are present within the MRS (CB&I, 2015) (OHARNG, 2014). No federally listed endangered species have been identified within CJAG. No unacceptable ecological risk was identified at the Group 8 MRS; therefore, the remedy does not address ecological receptors.

E.2 Site Investigations

This section summarizes the CERCLA investigations that were completed at the Group 8 MRS under the MMRP.

E.2.1 2004 Archives Search Report

In 2004, the USACE conducted an archives search under the DERP that included a historical records search, interview process, and site visit to search for the presence of MEC at the facility. The USACE prepared the Final Archives Search Report (ASR) and therein identified 12 areas of concern and 4 additional locations with the potential for containing MEC. Notably, the Group 8 MRS was not identified as one of the original sites that contained MEC as part of the 2004 ASR (USACE, 2004).

E.2.2 2007 Historical Records Review Summary

The *Final Military Munitions Response Program Historical Records Review* (HRR) described the Group 8 MRS as the 2.65-acre “Area Between Buildings 846 and 849” and documented the requested name change to the Group 8 MRS. At the time of the HRR records research, the OHARNG was using the area as a vehicle

staging area. Historical activities at the MRS included burning construction debris and rubbish. The time frame for these activities is not known.

In 1996, MEC was found at the MRS, in the form of a single antipersonnel fragmentation bomb containing high explosives (HEs). MD was found in the form of a demilitarized (i.e., cut in half) 175-millimeter (mm) projectile. The antipersonnel fragmentation bomb with HE was removed and detonated at Open Demolition Area #2. The 175mm projectile (determined to be MD) was also removed from the MRS and was taken to Building 1501 (engineering-environmental Management, Inc. [e²M], 2007).

E.2.3 2007 Site Inspection Summary

In 2007, the ARNG completed an MMRP Site Inspection (SI) at CJAG that included the Group 8 MRS. **Magnetometer** and metal detector-assisted UXO surveys were conducted during the SI field activities over 100 percent of the MRS. Two unidentifiable T-bar fuzes were found partially buried in the southwest portion of the MRS and were determined at that time to be munitions potentially presenting an explosive hazard (MPPEH). Because the scope of the SI did not include any intrusive work or handling/disposal of MPPEH, the fuzes were left in place during the inspection. However, the items were not found during the subsequent Remedial Investigation (RI), and their final disposition is unknown. Because they were not inspected by UXO qualified personnel, it was conservatively assumed the fuzes contained explosive material and meet the definition of MEC. MD items identified during the SI field activities included metal fragments from casings and projectiles, burster tubes, and fragments of fuzes. Most of the MD items found had most likely been pressed into the surface soils by the heavy equipment and vehicles that had been stored at the MRS before the SI. **Figure 4** shows the locations of the SI survey lines and of the T-bar fuzes found during the SI field activities. In addition to the MPPEH and MD, a significant amount of non-munitions related debris consisting of metal trash, fence materials, and wood scraps were found in the general areas where the MPPEH and MD were found. No MPPEH or other debris was identified on the ground surface at the northeast portion of the MRS during the SI. Five surface soil samples were collected at the MRS during the SI field activities using **Incremental Sampling Methodology (ISM)**. The samples were analyzed for explosives, propellants, and target analyte list metals. Lead and thallium were detected in all five samples above the facility screening criteria for **background values** and one-tenth of the EPA residential soil PRGs.

Thallium was dismissed as an MC as it was non-munitions related. Antimony, arsenic, aluminum, cadmium, copper, iron, lead, and manganese were detected in at least one sample at concentrations greater than the facility screening criteria and were considered MC. Explosives and propellants were detected at estimated concentrations (i.e., below the method detection limit); however, no concentrations exceeded one-tenth of the PRGs (e²M, 2008).

E.2.4 2011 Remedial Investigation Summary

Between October 31, 2011, and November 14, 2011, CB&I performed a digital geophysical mapping (DGM) investigation to identify potential subsurface areas of MEC at the Group 8 MRS. Full coverage DGM data was collected on 2.563 acres at the Group 8 MRS. Data were acquired in all accessible areas of the MRS on a line spacing of approximately 2.5 feet. The area surveyed equates to nearly 97 percent coverage over the 2.65-acre MRS. A small portion could not be investigated because of trees, utility poles, and barbed wire fence.

A total of 264 anomalies were **reacquired** during the intrusive investigation of 14 trenches within the three areas of high **anomaly** density. From these intrusive investigations, 359 individual items of MPPEH that weighed approximately 1,418 pounds were recovered from a maximum depth of 4 feet bgs. The maximum depth of MPPEH was established in the RI to be no deeper than 4 feet bgs (CB&I, 2015). Once the item was determined not to be munitions related, it was temporarily removed from the excavation and the Schonstedt magnetometer was used to confirm no additional ferrous items were located beneath the first

item. The investigation criteria for trenching were to excavate at a location until the target anomalies were identified; native material was identified and a clear, distinct boundary between the native and fill material was evident; a maximum depth of 10 feet was attained; or the water table was reached. The maximum depth that any of the trenches at the MRS were excavated to was 4 feet bgs, which is the maximum depth that native soils were encountered. Approximately 1,180 pounds (lbs) (277 individual MD items) of MD items were recovered from 9 trenches and 1,281 lbs of “Other Debris” were identified within all 14 trenches (CB&I, 2015). The **UXO-qualified personnel** documented that all these items were safe and classified them as MDAS (no MEC was identified). The locations of the items and other debris are shown in **Figure 5**. The MDAS was debris that came from the following munitions: M397 series 40mm HE grenades, M49 series 60mm mortars, 20mm projectiles, M72 series 75mm projectiles, M557 series fuzes, 175mm projectiles, HE anti-tank warheads, and assorted fuzes (CB&I, 2015). The MDAS items were solid and/or inert and did not pose an explosive safety hazard.

The MDAS identified during the RI was not consistent with the historically identified MDAS from the HRR and SI. The explosive hazards were re-evaluated during preparation of the Feasibility Study. Sampling for MC-related contamination was conducted during the RI field work. Four samples were collected using ISM from sampling units of the same size for the entire MRS at depths between 0 and 0.5 feet bgs. The locations of the surface soil samples are shown on **Figure 6**. Additional samples were proposed in areas with concentrated MD, and three additional ISM soil samples were collected from the bottom of three trenches. All trenches were excavated until native soils were encountered. The three ISM soil samples were collected at depths of 4 to 4.5 feet bgs, below the maximum depth of 4 feet bgs where MD was encountered during the intrusive investigation activities. The trench samples were evaluated/considered as subsurface samples in the human health and **ecological risk assessments (ERAs)**. Concentrations of cadmium, iron, lead, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, Aroclor-1254, and Aroclor-1260 were detected in the surface soil samples and were carried forward for evaluation in the **Human Health Risk Assessment (HHRA)**. The following 10 chemicals of potential ecological concern (COPECs) were recommended for evaluation under the Level III Baseline ERA evaluation after the Level II Screening in the RI: antimony, cadmium, copper, lead, mercury, zinc, bis(2-ethylhexyl)phthalate, di-n-butyl phthalate, Aroclor-1254, and Aroclor-1260. The RI Report concluded that no contaminants in subsurface soil were present at concentrations that pose a risk to either human or ecological receptors. Based on the historical discoveries of MEC, the MRS was assigned a **Munitions Response Site Prioritization Protocol (MRSP)** priority of 4 during the RI. A Priority 1 MRS contains the highest potential hazard, while a Priority 8 MRS contains the lowest potential hazard (HGL, 2020).

E.2.5 2019 Feasibility Study

A *Final Feasibility Study for RVAAP-063-R-01 Group 8 Munitions Response Site (FS)* was prepared for the Group 8 MRS by the ARNG in 2019. The FS evaluated possible alternatives in detail and provided a comparative analysis of those alternatives, based on criteria outlined in the NCP. The FS identified three possible alternatives to address the MC contamination at the Group 8 MRS. The alternatives consisted of (1) No Action, (2) **Land Use Controls (LUCs)**, and (3) MC-Contaminated Soil Removal (to achieve use of land for UU/UE). The FS also developed the **Remedial Action Objectives (RAOs)** based on the potential for MC-related contamination at the Group 8 MRS (HGL, 2019). The FS included a Risk Management Evaluation based on the previously collected RI data. The 2015 RI used the Facility-Wide Human Health Cleanup Goals (FWCUGs) (Science Applications International Corporation [SAIC], 2010) in the risk assessment prepared at that time. However, the EPA Regional Screening Levels (RSLs) can be used to reflect current toxicity information and exposure assumptions, as provided in the Technical Memorandum (ARNG, 2014). The Risk Management Evaluation (RME) was therefore performed in the FS to re-assess the contaminants of concern (COCs) using the RSLs, which are protective of the Resident Receptor. The COCs identified for the Resident Receptor in the RI report were re-evaluated with respect to the current

Residential Soil RSLs. The RI concluded that no MC-related contamination was present in subsurface soil. Therefore, the FS RME evaluated surface soil data collected in the RI. The FS concluded that cadmium in surface soil at the location of sample GR8SS-004M-0001-SO poses a risk to the theoretical future Resident Receptor (Adult and Child). Following the FS, the PP summarizes additional excavation to remove lead in surface soil (see paragraph E.2.6, below). Soil contaminants do not pose a risk to the Industrial Receptor, as the representative receptor under current site use. Additional detail summarizing the MC contamination present at the MRS is shown on **Figure 6**. The RME also re-assessed the ecological risk that was presented in the RI. Because the habitat quality is poor, few birds and mammals forage for food on the MRS. Consequently, the RI overestimated the food and soil ingestion rates and potential exposure to animals. The FS concluded that it is unlikely that site contaminants pose a risk to wildlife communities. The FS established cadmium in surface soil as the MC-related contamination present at the MRS.

The MEC items found in 1996 and 2007 were not consistent with the types of MDAS identified during the RI. No MEC has otherwise been reported since 2007 at the Group 8 MRS and the RI concluded with a 99 percent confidence level that no MEC are present. Only MDAS (which does not pose an explosive hazard) was recovered during the RI. The MRS has an incomplete exposure pathway for explosive hazards and no further action was recommended for MEC. Therefore, the MEC exposure pathway was re-evaluated during the FS phase and no explosive hazard is anticipated at the Group 8 MRS. The MEC exposure pathway is considered incomplete. The MRSPP priority was also re-evaluated during the FS phase. The project team determined that the MEC items identified historically (during the site inspection) are not representative of the explosive hazards present at the MRS, as demonstrated by the findings during the RI fieldwork and the conclusions of the RI. As a result, the MRSPP was revised, and the Group 8 MRS was assigned a score of 5 during the FS phase.

E.2.6 2020 Proposed Plan

In 2020, the ARNG completed the PP (HGL, 2020) for the Group 8 MRS. The PP documented the preferred alternative (Alternative 3 – MC-Contaminated Soil Removal) to address MC contamination. The PP summarized the determination that no further action was required for MEC, and the FS and the PP both addressed risks present due to MC-related contamination. Following the FS, as documented in the PP, the ARNG and Ohio EPA agreed to include additional excavation to remove lead in surface soil at GR8SS-001M and GR8SS-003M to ensure maximum protectiveness is achieved to meet Unrestricted (Residential) Land Use. The concentrations of soil contaminants (COCs) do not pose risks to the Industrial Receptor, which is the Representative Receptor under current site use. Therefore, the PP recommended remediation of the lead and cadmium contamination in GR8SS-004M and the lead contamination in GR8SS-001M and GR8SS-003M (**Figure 6**) to eliminate potential risks to human health under Unrestricted (Residential) Land Use, for a theoretical future Resident Receptor. Remediation of the lead and cadmium contamination in the Group 8 MRS will eliminate potential risks to human health under Unrestricted (Residential) Land Use. The PP established lead and cadmium as the MC-related contamination present in surface soil at the MRS.

E.2.7 History of CERCLA Enforcement Activities

To date, there have been no CERCLA enforcement actions at the Group 8 MRS.

E.3 Nature and Extent of Contamination

The RI Report (CB&I, 2015), as supplemented by the FS and PP evaluations, concluded that MEC was not present at the Group 8 MRS. MC-related contamination only is present at the MRS. Data gathered by the ARNG during the SI and subsequent RI for the Group 8 MRS effectively characterized the nature and extent of MC-related contamination at the MRS. Soil samples were collected for the evaluation of MC-related contamination during the RI at areas with concentrated surface and subsurface MD. Soil samples consisted of surface soil ISM samples (collected from 0 to 0.5 feet bgs) and subsurface soil ISM samples (collected

from 4 to 4.5 feet bgs). The RI concluded that no MC-related contamination was present in subsurface soil (Section E.2.4, above). The additional evaluations provided in the FS and PP concluded that lead and cadmium are the MC-related contamination present in surface soil (0 to 0.5 feet bgs) at the Group 8 MRS.

E.4 Conceptual Site Model

A CSM is a representation of an MRS and its environment that is used to facilitate understanding of the MRS and the potential contaminant exposure pathways that might be present. The CSM describes potential contamination sources and their known or suspected locations, humans and/or ecological receptors present, and the interactions between them. The CSM summarizes which potential receptor “exposure pathway” for contamination (is/are or may be) “complete” and which is/are (and likely) to remain “incomplete.” A pathway is considered complete when a source is known to exist and when receptors have access to the MRS while engaging in some activity that results in contact with the source. A pathway is considered potentially complete when a source has not been confirmed but is suspected to exist and when receptors have access to the MRS while engaging in some activity that results in contact with the source. Lastly, an incomplete pathway is any case where one of the four components (source, activity, access, or receptors) is missing from the MRS. The following sections provide the CSM for DoD military munitions confirmed as MC-related contamination as determined by the investigations conducted under the MMRP for the Group 8 MRS.

E.4.1 Source

A MEC source is the location where MPPEH or ordnance is situated or is expected to be found. The Group 8 MRS was reportedly used for the open burning of debris trash for an undetermined amount of time, and as evidenced by the RI findings, the burning activities may have included munitions demilitarization. These activities may have resulted in the potential for MEC to be present in surface and subsurface soils at the MRS. MEC was found at the MRS prior to the RI field activities. In 1996, OHARNG personnel found one antipersonnel fragmentation bomb with HE on the ground surface. In addition, the 2007 SI field activities documented the presence of MEC items that consisted of two T-bar fuzes in shallow surface soils (i.e., partially buried). Based on historical operations at the MRS and the RI findings, any MEC would be expected to be found on the surface and/or subsurface soils. Numerous MDAS of various types were identified at the MRS during the RI intrusive investigation activities; however, all of the MDAS were classified by UXO-qualified personnel in the field as containing no explosive hazards. No MEC was found during the RI field work. The depths of the MD ranged from 1 inch to 4 feet bgs. The maximum depth of MPPEH was established in the RI to be no deeper than 4 feet bgs (Section E.2.4 above and CB&I, 2015).

The SI recommended the MRS proceed to the RI phase because MEC had been identified historically at the MRS. However, the findings in the RI phase were inconsistent with the historical findings documented in the SI as the items documented in the SI are inconsistent with the types of MDAS recovered during the RI intrusive investigation. Only MDAS (which does not pose an explosive hazard) was recovered during the RI. Consequently, the post-RI conclusion for the MRS is an incomplete exposure pathway for explosive hazards. Therefore, no further action is required for MEC and as a result, the FS and the PP address the risks present due to MC-related contamination in surface soil only.

Previous investigations concluded the extent of MC-related contamination is surface soil from 0 to 0.5 feet bgs. The soil conditions at the MRS are considered low to moderately permeable, and the depth to groundwater is approximately 15 to 20 feet, 11 feet below the maximum depth that MD was found (Section E.2.4 RI Summary, above). The detected concentrations of constituents are expected to remain in the top several inches of soil or in subsurface soils beneath concentrated areas of buried MD where they were deposited. Based on this rationale, it is not expected that the likely human and ecological receptors will come into contact with groundwater beneath the MRS and the groundwater exposure pathway is considered incomplete for all receptors (HGL, 2020). The source for MC-related contamination at the Group 8 MRS is lead and cadmium present in surface soil from 0 to 0.5 feet bgs.

E.4.2 Receptors

A receptor is any organism (human or ecological) that comes into physical contact with MEC or MC. Human receptors identified for the Group 8 MRS include both current and anticipated future land users. Ecological receptors (biota) are based on animal species that are likely to occur in the terrestrial habitats at the MRS. The primary MRS-specific biota identified for the MRS include terrestrial invertebrates (earthworms), voles, shrews, robins, foxes, barn owls, and hawks (HGL, 2019).

Current activities at the Group 8 MRS include natural resource management, environmental sampling, and use for access to adjacent buildings through the existing road network. Based on these activities, land use at the Group 8 MRS is commercial/industrial. The human health risk assessment in the RI evaluated the potential risks to the National Guard Trainee and Resident Receptor (Adult and Child). Based on current land use, however, the most likely receptor is the Industrial Receptor. Because the Resident Receptor has a greater potential to experience an adverse effect than an Industrial Receptor, conditions protective of the Resident Receptor will also be protective of the Industrial Receptor and National Guard Trainee receptor.

Because of its small size, presence of roads and structures, lack of vegetation and other habitat features required by most organisms, and human presence, the Group 8 MRS represents a low-quality habitat for most ecological receptors other than ruderal plants and some small-range receptors (i.e., robins, mice, etc.) (HGL, 2020).

Therefore, the human receptor that has the greatest opportunity for exposure at the MRS is the Industrial Receptor. The Industrial Receptor represents a full-time occupational receptor at the MRS whose activities are consistent with full-time employees or military personnel who are expected to work daily at CJAG over their career. The maximum depth that the Industrial Receptor is expected to access as part of their planned activities is 4 feet bgs (ARNG, 2014); however, no risk due to MC contamination is present in soils for the Industrial Receptor. During the RME performed for the FS and during preparation of the PP, it was concluded that cadmium in surface soil (GR8SS-004M) and lead in surface soil (GR8SS-001M and GR8SS-003M) at depths of 0 to 0.5 feet bgs poses a risk to the theoretical future Resident Receptor (Adult and Child), and the soils would be removed. The concentrations of soil contaminants do not pose risks to the Industrial Receptor, who is the Representative Receptor under current site use.

E.4.3 Interactions

Interaction describes ways that receptors contact a source and includes both access and activity considerations. Activity describes ways that receptors come into contact with a source. Access describes the degree to which DoD military munitions are available to potential receptors. A receptor may contact DoD military munitions on the surface by walking or handling if picked up. A receptor may contact DoD military munitions in the subsurface when performing intrusive activities. The location of Group 8 MRS is near existing buildings that are outside the MRS boundary. Current activities at the MRS include maintenance, natural resource management, environmental sampling activities, and use as access to adjacent buildings through the existing road network, which primarily involve foot traffic only but may also include minimal intrusive activities. The future land use at the MRS and surrounding area is expected to remain the same with the potential for military training activities, summarized as Commercial/Industrial Land Use. Current activities at the Group 8 MRS include maintenance, natural resource management, sampling, and use as access to adjacent buildings through the existing road network. Future land use for this MRS is expected to include the current activities and potentially military training activities, summarized as Commercial/Industrial Land Use. The Industrial Receptor is the most representative of receptors that may also access the MRS as part of current land use activities. The Industrial Receptor is the current receptor for this MRS, with a subsurface exposure depth defined as 4 feet bgs. Based on the theoretical

future land uses which may include military training or residential land use, the theoretical future receptors include the Industrial Receptor and the theoretical future Resident Receptor (Adult and Child) (HGL, 2020).

E.4.4 CSM Analysis

The RI was completed in 2015 and determined the nature and extent of MEC and MC at the Group 8 MRS as well as the hazards and potential risks posed to the likely receptors identified at that time. Based on the CSM findings in the RI, it was recommended that the MRS proceed to an FS as the next course of action under the MMRP. The applicable receptors presented in the RI report CSMs were revised in the FS CSMs. The RI CSMs presented the National Guard Trainee and Biota as the applicable receptors. RI reports that were substantially in progress at the time of the Technical Memorandum's approval on February 11, 2014 (ARNG, 2014), as was the case for the *Final Remedial Investigation Report for RVAAP-063-R-01 Group 8 MRS, Version 1.0* (Final RI Report; CB&I, 2015), were not revised to include an evaluation of the Industrial Receptor in the human health risk assessment process. If Unrestricted (Residential) Land Use was not achieved for explosive hazards and/or MC during the risk assessment process in the RI, then the Industrial Receptor would be evaluated during the FS when there is a possibility that a full-time occupational exposure may occur on the MRS. For the RME completed in the FS, the RSLs were used for evaluation of MC, per the Technical Memorandum (ARNG, 2014). The MC CSM for the Group 8 MRS is presented in **Figure 7**.

F. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

The current land use activities at the MRS are maintenance, natural resource management, sampling, and an access route to adjacent buildings through the existing road network. The MRS is not currently used for military training, but military training is a potential future land use. The RI report identified the National Guard Trainee as the Representative Receptor based on the potential future land use of military training. The future land use activities at the MRS are maintenance, natural resource management, environmental sampling, and military training. The FS evaluated the Industrial Receptor and the National Guard Trainee as potential receptors because these receptors best reflect current land use and are representative of potential future land use. The primary media of concern for the Industrial Receptor is surface and subsurface soils to a maximum exposure depth of 4 feet bgs. Both the National Guard Trainee and the Industrial Receptor were evaluated as potential receptors for MC risk in the surface soils at the Group 8 MRS, and no risk was identified. However, as summarized in Section E.4.2, "Receptors" above, a risk to a theoretical future Resident Receptor (Adult and Child) was identified from MC-related contamination from 0 to 0.5 feet bgs, when the RME was conducted using the RSLs per the Technical Memorandum (ARNG, 2014).

G. SUMMARY OF SITE RISKS

Brief summaries of the explosive hazards evaluated, HHRA, and ERA that were completed for the Group 8 MRS are provided in this section.

G.1 MEC Hazard Assessment

The potential presence of MEC was investigated during the historical investigations. Complete (100 percent) surface DGM coverage of the MRS was conducted during the RI field activities. The DGM data were processed and interpreted, and the DGM quality metrics were achieved for all data collected. Based on the findings in the RI (CB&I, 2015) and the evaluations of the FS and PP, a complete exposure pathway does not exist for DoD military munitions verified as MEC in surface and subsurface soils.

The items documented in the SI as MEC, for which the SI recommended additional investigation, were inconsistent with the types of MDAS recovered during the RI intrusive investigation. No additional MEC items have been recovered since the identification of the two items in 1996 and the T-bar fuzes in 2007. Only MDAS, which does not pose an explosive hazard, was recovered during the RI. For these reasons, the historically identified MEC items were removed from consideration for update of the CSM, resulting in an incomplete exposure pathway for explosive hazards at the MRS. Based on this CSM update, no further

action is recommended for MEC, and as a result, this FS addresses only the risks posed by MC-related contamination present at the MRS (CB&I, 2015).

G.2 Summary of Baseline Risk Assessments

The HHRA estimates the risk that MC-related contamination at the MRS poses to human receptors if no cleanup action were taken. It also provides the basis for acting and identifies the contaminants and the exposure pathways that need to be addressed by the remedial action. The ERA evaluates the potential for adverse effects posed to ecological receptors from the release of MC-related contamination at a MRS. This section of the ROD summarizes the results of the baseline HHRA and ERA completed for the MRS.

G.2.1 Evaluation for Site-Related Chemicals (SRCs)

Data from the RI surface soil samples were screened to identify SRCs representing current conditions at the Group 8 MRS. The SRC screening data for surface soil (not including field duplicates or quality control samples) included samples G8SS-001M-0001-SO, G8SS-002M-0001-SO, G8SS-003M-0001-SO, and G8SS-004M-0001-SO. These samples were collected using the ISM, and the sample depth for each increment was from 0 to 0.5 feet bgs.

The ISM samples were collected at grid locations that encompassed the entire MRS, and each sample was representative of one quarter of the MRS to characterize the entire MRS for residual MC in surface soils. All ISM surface soil samples collected during the RI sampling event were submitted for laboratory analysis for metals, explosives, nitrocellulose, semivolatile organic compounds, polychlorinated biphenyls (PCBs), total organic compounds, and pH. Metals analysis consists of inorganic MCs that are attributed to munitions historically used or disposed at an MRS and may be expected to be found at that MRS (CB&I, 2015).

During the FS that followed the RI, an RME was completed based on the previously collected data. The 2015 RI used the FWCUGs (SAIC, 2010) in the risk assessment prepared at that time. However, the EPA RSLs can be used to reflect current toxicity information and exposure assumptions. The RME performed in the FS was completed to re-assess the COCs using the RSLs, which are protective of the Resident Receptor. The COCs identified for the Resident Receptor in the RI report were re-evaluated with respect to the current Residential Soil RSLs. The FS concluded that cadmium in surface soil at the location of sample GR8SS-004M-0001-SO poses a risk to the theoretical future Resident Receptor (Adult and Child). Soil contaminants do not pose a risk to the Industrial Receptor, who is the representative receptor under current site use. Additional detail summarizing the MC contamination present at the MRS is shown on **Figure 6**.

Following the FS, as documented in the PP, the ARNG and Ohio EPA agreed to include additional excavation to remove lead in surface soil at GR8SS-001M and GR8SS-003M to ensure maximum protectiveness is achieved to meet Unrestricted (Residential) Land Use. The COCs do not pose risks to the Industrial Receptor, who is the Representative Receptor under current site use. Therefore, the PP recommended remediation of the lead and cadmium contamination in GR8SS-004M and of the lead contamination in GR8SS-001M and GR8SS-003M (**Figure 6**) to eliminate potential risks to human health under Unrestricted (Residential) Land Use. Remediation of the lead and cadmium contamination present from 0 to 0.5 feet bgs in the Group 8 MRS will eliminate potential risks to human health under Unrestricted (Residential) Land Use.

G.2.2 Summary of Human Health Risk Assessment

The HHRA conducted as part of the RI (CB&I, 2015) determined that COCs in surface soils pose potential risks to the representative receptors at the Group 8 MRS (Resident Receptor [Adult and Child] and the National Guard Trainee). Specifically, the HHRA conducted during the RI identified the potential for cadmium and lead in site soil to pose a risk to the theoretical future Resident Receptor at the Group 8 MRS. Due to the establishment of the *Final Technical Memorandum: Land Uses and Revised Risk Assessment Process for the Ravenna Army Ammunition Plant (RVAAP) Installation Restoration Program* (Technical Memorandum; ARNG, 2014), the Industrial Receptor was not evaluated during completion of the RI

Report. The FS assessed potential risks to the Industrial Receptor based upon this memorandum and determined that no risk from MC was present. The FS RME summarized that soil contaminants (cadmium and lead) do not pose a risk to the Industrial Receptor, who is the receptor under current land use, not the Resident Receptors and the National Guard Trainee.

The Resident Receptors were required to be evaluated to meet UU/UE guidelines because of the MC risk summarized in the FS. Accordingly, the National Guard Trainee was required to be evaluated as a potential future receptor that may perform military training on the MRS. The FS concluded that any remediation accomplished for the Resident Receptor (Adult and Child) by remediating cadmium and lead at GR8SS-004M will also be considered protective of the National Guard trainee and the Industrial Receptor (HGL, 2019). These receptors were evaluated during development of the remedial action objectives (RAOs). After submittal of the FS (HGL, 2019), receptors and receptor pathways were evaluated further. Ultimately, the conclusion was reached that the **human receptor** that has the greatest opportunity for exposure to a hazard at the MRS is the Industrial Receptor, who represents a full-time occupational receptor at the MRS and whose activities are consistent with full-time employees or military personnel expected to work daily at CJAG over their career.

Based on the HHRA completed in the Final RI Report (CB&I, 2015) and the RME presented in the FS (HGL, 2019), the soil contaminants do not pose a risk to the Industrial Receptor, who is the representative receptor under current and anticipated future site use. Though there are no current plans for the MRS to change from an industrial land use to a residential land use, consideration of the theoretical future Resident Receptor is included. Therefore, consideration of the unacceptable risk to Resident Receptors and the National Guard Trainee in surface soil was evaluated, becoming the driver in creating the RAO and the selection of the remedial alternative (HGL, 2020).

G.2.3 Summary of Ecological Risk Assessment

An ERA was also conducted during the RI and determined that COPECs in surface soil have the potential to impact soil invertebrates and small range receptors. For several reasons, the ERA included in the RI report was considered overly conservative. First, habitat quality is poor. As shown in the aerial photograph on **Figure 6**, the site is surrounded by buildings and roads and a gravel road cuts through the middle of the site. Where there is no gravel, vegetation consists of mowed grass and ruderal plants. The buildings are used for storage and vehicles traverse the site to access the buildings. These conditions are not conducive to foraging by birds and mammals. Second, for the short-tailed shrew, which is the species used to represent insectivorous mammals, the ERA used a food ingestion rate of 0.56 kilogram food dry weight per kilogram body weight per day (kg-dw/kg-day) and a soil ingestion rate equal to 13 percent of the dry food ingestion rate. EPA's Ecological Soil Screening Levels for insectivorous mammals, which were developed by EPA to provide conservative screening values, are based on a food ingestion rate of 0.209 kg-dw/kg-day and soil ingestion rate that is only 3 percent of the food ingestion rate (CB&I, 2015). Based on current guidance, the food and soil ingestion rates used in the ERA substantially overestimate potential exposure by insectivorous mammals. Given these considerations, HGL concluded that no significant ecological risk exists at the MRS.

G.2.4 Baseline Risk Assessment Evaluation Summary

Soil samples were collected during the RI for analysis for MC-related contamination at seven locations. Four surface soil sampling locations were randomly selected in a grid to represent the MRS as part of the ISM. Three subsurface locations were chosen in areas with high-density geomagnetic anomalies. The RI confirmed that risks associated with MC-related contamination in subsurface soil do exist at the Group 8 MRS. In accordance with current guidance, humans are typically considered as the primary, and often the only, receptor to DoD military munitions; therefore, no ecological receptors are identified for the MRS (HGL, 2020).

H. REMEDIAL ACTION OBJECTIVES

The RAOs were developed based on the hazards, receptors, and exposure pathways identified at the Group 8 MRS and the analysis of ARARs. The ARARs are:

- Erosion and Sediment Control Regulations (Ohio Administrative Code 1501.15-1-04) – State rule requiring that sediment and erosion controls be employed in areas of denudation and land disturbance. Describes management and conservation practices that will control wind or water erosion of the soil and minimize the degradation of water resources by soil and sediment; and
- Toxic Substances Control Act (TSCA) (40 CFR 761.61) – Describes the cleanup and disposal of remediation of waste specific to PCBs.

The potential TBCs are:

- EPA RSLs – Provides industrial and residential risk-based screening levels for soil; and
- FWCUGs for Former RVAAP – Provides residential risk-based screening levels for soil.

The theoretical future Resident Receptor (Adult and Child) and the National Guard Trainee were evaluated for this MRS. Achievement of the RAOs for the Industrial Receptor will be protective of the Resident Receptor. The RAOs are:

- Prevent exposure of a Resident Receptor (Child and Adult) to lead and cadmium present in surface soil (0 to 0.5 feet bgs) at GR8SS-004M; and
- Prevent exposure of a Resident Receptor (Child and Adult) to lead present in surface soil (0 to 0.5 feet bgs) at GR8SS-001M, GR8SS-003M and GR8SS-004M.

I. DESCRIPTION OF REMEDIAL ALTERNATIVES

Remedial alternatives that were developed to address MC-contamination at the Group 8 MRS were:

- No Action,
- LUCs, and
- MC-Contaminated Soil Removal.

Following the preliminary evaluation of the developed remedial alternatives, all three remedial alternatives were retained for further consideration in the detailed analysis in the FS (HGL, 2019) and are described below. The individual components of the remedial alternatives that were developed are in **Table 1**.

Table 1 Components of Remedial Alternatives

Remedial Alternative	Individual Components
<p style="text-align: center;">No Action (Alternative 1)</p>	<ul style="list-style-type: none"> • No components • Continued use of the MRS in its current condition, with no removal action for MC-contaminated soil taken • No Five-Year Reviews
<p style="text-align: center;">LUCs (Alternative 2)</p>	<ul style="list-style-type: none"> • No planned physical removal action for MC-contaminated soil taken • Engineering controls (existing controls currently in place) • Educational awareness training program • Annual monitoring (i.e., inspections)

Table 1 Components of Remedial Alternatives (Continued)

Remedial Alternative	Individual Components
LUCs (continued) (Alternative 2)	<ul style="list-style-type: none"> • Five-Year Reviews • Achieves protection for the current site conditions for the Industrial Receptor with a Commercial/Industrial land use
MC-Contaminated Soil Removal (Alternative 3)	<ul style="list-style-type: none"> • Mechanical and/or manual excavation to remove MC-contaminated soil to a depth of 0.5 feet bgs minimum • Confirmation Soil Sampling • Additional excavation down to 2 feet bgs if MC concentrations immediately below 0.5 feet bgs exceed remediation goals • Site restoration activities (grading and installation of clean soil to backfill and level all excavated areas) • Attains UU/UE that is protective of all Receptors (the Industrial Receptor and the theoretical future Resident Receptor) with a theoretical future Residential Land Use • Attaining UU/UE is a CERCLA preference • No Five-Year Reviews

*bgs denotes below ground surface
DoD denotes U.S. Department of Defense
LUC denotes land use control
MRS denotes Munitions Response Site.
UU/UE denotes unlimited use/unrestricted exposure*

I.1 No Action (Alternative 1)

The No Action alternative consists of continued use of the Group 8 MRS in its current condition with no action taken whatsoever, including administrative, remedial, or other action to locate, remove, dispose, or prevent exposure to MC-contaminated soil at the MRS. Consideration of the No Action alternative is required by the NCP for baseline comparison with other alternatives. There are no costs associated with the No Action alternative.

I.2 Land Use Controls (Alternative 2)

The LUCs alternative does not include any planned removal of MC-contaminated soil at the MRS. Instead it would restrict residential use through educational controls (annual LUC briefing) and annual monitoring (annual inspection events) that were developed through the Institutional Analysis in the FS Report (HGL, 2019).

*Capital Cost:..... \$20,445
O&M Cost: \$77,608
Periodic Cost: \$27,841
Present Worth Cost:..... \$125,904
Five-Year Reviews: \$94,175
Construction Time Frame:..... <1 year
Operation Time Frame: 30 years*

The alternative would consist of annual awareness training to notify authorized personnel of existing conditions, existing engineering controls, and proper procedures for MC risk mitigation at the MRS. Annual

inspections would be conducted and the Property Management Plan Inspection Form would be completed to monitor the LUCs. Educational controls to be implemented would include different levels of general **awareness training** that would depend on the personnel and activities to be conducted at the MRS. Full time-employees at the facility would receive annual general awareness training to notify them of existing conditions, existing engineering controls, and proper procedures for MC risk mitigation. Annual monitoring (i.e. inspections) would be conducted to ensure that the LUCs remain effective and protective of employees, training units, visitors, and contractors. **Five-Year Reviews** would be required to ensure the effectiveness of this alternative, because LUCs do not allow for UU/UE at the MRS (HGL, 2020).

I.3 MC-Contaminated Soil Removal (Alternative 3)

The MC-Contaminated Soil Removal alternative would combine mechanical and manual excavation techniques to remove the contaminated soil to a depth of 0.5 feet bgs in the area of the MRS that exceeds the PRG for lead or cadmium.

Capital Cost:..... \$747,187
O&M Cost: \$0
Periodic Cost: \$0
Present Worth Cost:..... \$747,187
Five-Year Reviews: \$0
Construction Time Frame:..... ~2 years
Operation Time Frame:N/A

Incidental to the surface soil removal, if any munitions debris is encountered, it would be segregated, inspected, and certified as MDAS before disposal. Under this alternative, all MC-contaminated soil exceeding the PRG would be removed, allowing for UU/UE at the MRS (although residential use is not anticipated).

Confirmation soil samples would be collected to confirm that the extent of MC-contaminated soil exceeding the remediation goal for cadmium and/or lead is removed. The confirmation soil samples for laboratory analysis would be collected immediately below the 0.5 feet to confirm all MC contamination has been removed. Samples of excavated soils will be collected and analyzed to determine if the soil meets the definition of characteristic hazardous waste, pursuant to 40 CFR Part 261 using the Toxicity Characteristic Leaching Procedure for disposal. For MC-contaminated soil shown to meet non-hazardous disposal criteria, the soil would be transported to a non-hazardous landfill for proper disposal. The excavation locations within the MRS will be planned so that areas containing contaminants at potentially hazardous levels are managed separately. If characterization results indicate that excavated material is hazardous, it would be segregated from non-hazardous soils for proper off-site disposal.

The area of MC-contaminated soil proposed in the FS was 0.66 acre, the area of the ISM unit G8SS-004M. Following the FS, the ARNG and Ohio EPA agreed to include additional excavation to remove lead in surface soil at GR8SS-001M and GR8SS-003M to ensure maximum protectiveness is achieved to meet Unrestricted (Residential) Land Use (HGL, 2020). This increase in excavation extent was described in the PP. After the initial excavation of the GR8SS-001M, GR8SS-003M, and GR8SS-004M footprints have been conducted, confirmation samples (from 6-inches to 1-foot bgs) would be collected from the excavations to confirm that MC-contaminated soil to a depth of 6 inches has been excavated and removed. A minimum depth of 0.5-foot bgs would be excavated. If required, up to 2.0 feet bgs may be excavated, based on the results of confirmation sampling, with up to 2.0 feet of excavation included in the cost estimate. The minimum depth of excavation to 0.5 feet bgs will encompass the extent of MC-related contamination established in previous investigations. If indicated, localized areas may require further limited excavation to deeper than 6 inches after the confirmation sampling occurs. This additional excavation would be accomplished, and additional confirmation samples would be collected from any new excavation areas to

confirm the MC contamination extent has been removed. Discrete confirmation samples will be collected at a density of 1 per 400 square feet of excavation floor. MC-Contaminated Soil Removal would be complete following receipt and evaluation of confirmation soil sample laboratory analyses. Based on the RI recommendations, the estimated minimum contaminated soil volume is 1,603 cubic yards (excavation to 0.5 feet bgs), and the maximum contaminated soil volume is 4,008 cubic yards (excavation to 2 feet bgs, if required by confirmation laboratory soil sampling results). MC risks will be addressed through removal of confirmed MC-contaminated soil.

Additional site restoration activities would be conducted, including grading the site and installing confirmed clean soil to backfill and level all excavated areas. The excavated areas would be reseeded with native vegetation or gravel would be replaced to restore the existing roadway within the MRS (HGL, 2020).

J. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The alternatives were evaluated with respect to the nine comparative analysis criteria outlined by CERCLA. The nine criteria are categorized into three groups: Threshold Criteria, Primary Balancing Criteria, and Modifying Criteria. These criteria groups are as follows:

Threshold Criteria must be met for the alternative to be eligible for selection as a remedial option:

1. Overall protection of human health and the environment
2. Compliance with ARARs

Primary Balancing Criteria are used to weigh major trade-offs among alternatives:

1. Long-term effectiveness and permanence.
2. Reduction of toxicity, mobility, and volume through treatment
3. Short-term effectiveness
4. Implementability
5. Cost

Modifying Criteria may be considered to the extent that information is available during development of the FS (HGL, 2019) but can be fully considered only after public comment on the Proposed Plan (HGL, 2020).

1. State acceptance
2. Community acceptance

The comparative analysis evaluates the relative performance of the alternatives with respect to each of the nine criteria. This approach helps identify the relative strengths of the preferred alternative. These strengths, combined with risk management decisions made by the ARNG and Ohio EPA, as well as input from the community, serve as the basis for the selected alternative.

J.1 Threshold Criteria

Overall Protection of Human Health and the Environment

The No Action alternative would not involve any measures to limit exposures to MC-contaminated soil or be protective of human health. Thus, the No Action alternative does not meet the overall protection of human health and the environment criteria. The MC-Contaminated Soil Removal (UU/UE) alternative provides the greatest level of overall protection to human health through the removal of MC-contaminated soil to 0.5 feet bgs at GR8SS-004M, GR8SS-001M, and GR8SS-003M. Alternative 2, LUCs, would not actively treat or remove MC at the MRS; however, it would isolate receptors from potential exposure to MC through behavior controls (i.e., awareness training, existing engineering controls, and risk mitigation procedures).

Compliance with ARARs

There are no ARARs associated with the No Action alternative that would restrict or modify implementation. Nor are ARARs triggered for the LUCs alternative (i.e., no location- or action-specific ARARs identified and all to be considered); furthermore, concentrations are less than the cleanup standard in the Toxic Substances Control Act, which is the only chemical-specific ARAR. The MC-Contaminated Soil Removal alternative can be performed in a manner that complies with all chemical-specific and action-specific ARARs. The soil sampling to be accomplished after the performance of the MC soil removal would verify that soil remaining at the MRS does not exceed the chemical-specific to be considered and chemical-specific ARARs. Some vegetation clearance (i.e., grubbing, brush removal) at the MRS is anticipated with this alternative. Although excavation of soil might potentially cause soil erosion, the site would be restored with clean backfill materials once the absence of MC contamination is confirmed. MC contamination excavation will disturb an area of 1.99 acres; therefore, best management practices for erosion control would be used and adherence to the Ohio General National Pollutant Discharge Elimination System (NPDES) Permit and Erosion and Sediment Control requirements would be required. The facility would need to comply with all NPDES permit requirements and erosion control requirements.

J.2 Balancing Criteria

Long-Term Effectiveness and Permanence

Long-Term Effectiveness and Permanence – Alternative 1 (No Action) takes no action, and therefore does not provide long-term effectiveness and permanence. There are different degrees of long-term effectiveness and permanence associated with Alternative 2 (LUCs) and Alternative 3 (MC-Contaminated Soil Removal). Because Alternative 2 relies on LUCs, its effectiveness and permanence depend on (1) maintaining the educational controls emplaced to modify behavior and (2) conducting an annual inspection to evaluate the conditions at the MRS to ensure the LUCs are protective. An educational briefing on the use of Siebert stakes would be conducted for full-time employees as an interim control for the MRS, and the OHARNG/CJAG would need to be willing to maintain educational controls and conduct annual inspections over the long term. Because the MRS will remain under OHARNG/CJAG control, Alternative 2 is effective in the long term and permanent. However, MC-contaminated soils constituting a risk to potential future Residential Receptors would not be permanently removed under Alternative 2, in comparison to Alternative 3, which would involve the removal of MC-contaminated soils to 0.5 feet bgs for MC constituting a risk to the theoretical future Residential Receptor. Confirmation soil samples would verify that all MC-contaminated soils were removed before site restoration. The magnitude of the chemical hazards would be eliminated under Alternative 3, and no residuals or untreated waste with potential for exposure to the Industrial Receptor would remain. As a result, Alternative 3 best achieves long-term effectiveness and permanence at the MRS.

Reduction of Toxicity, Mobility, and Volume Through Treatment

Alternative 1 takes no actions and does not provide reduction of toxicity, mobility, or volume through treatment of MC at the MRS. Alternative 2 provides no treatment or removal of MC-contaminated soils. Therefore, Alternative 2 does not satisfy the statutory preference for employing treatment as a principal element. Alternative 3 includes the removal of MC in soil that would result in a negligible probability of exposure for the Residential Receptor (i.e., allow for UU/UE). Therefore, the reduction of toxicity, mobility, and volume, through removal of MC at the MRS under Alternative 3 is greatest. Again, Alternative 3 meets the statutory preference.

Short-Term Effectiveness

The No Action Alternative and Alternative 2 (LUCs) risk due to MC is unaltered in the short-term; moreover, No Action has no adverse short-term effects. Under Alternative 2 (LUCs), no removal actions would be conducted at the MRS that eliminate any potential for worker exposure or short-term risks to facility employees beyond the baseline conditions. The LUCs to be implemented under Alternative 2 could be quickly established and would further reduce short-term risks by mitigating the potential for exposure to MC at the MRS through behavior controls. Therefore, the short-term effectiveness for Alternative 2 is considered acceptable. While short-term effectiveness of Alternative 3 (MC-Contaminated Soil Removal) is affected by the handling, removal, and restoration activities associated with complete excavation of the MRS to a depth of 0.5 feet bgs and so soil disturbance is potentially significant; however, short-term risks would be minimized by adherence to erosion control requirements. The short-term effectiveness of Alternative 3 is low in comparison to Alternatives 1 and 2; however, the short-term risk is considered acceptable because of the measures that would be taken to mitigate risks associated with exposure to chemical hazards.

Implementability

Although easy to technically implement, the No Action alternative would be the least administratively feasible to implement because the stakeholders are not likely to accept it as the Preferred Alternative. The LUCs alternative would be technically feasible to implement, since there is no specialized equipment required and awareness training and annual inspections are already being conducted at CJAG. Thus, the LUCs alternative is administratively feasible to implement. By contrast, the MC-Contaminated Soil Removal would require specialized equipment and personnel to implement. However, the excavation of MC-contaminated soils at the MRS under Alternative 3 is implementable with appropriate planning and coordination, and the services and equipment are readily available. Overall, the degree of implementability for the MC-Contaminated Soil Removal alternative involving the actual removal of MC-contaminated soil would be more complex than the No Action alternative and the LUCs alternative, which do not include any planned removal actions.

Cost

There are no costs associated with the No Action alternative. The LUCs alternative has the lowest total **present worth** costs (\$125,904) compared to the MC-Contaminated Soil Removal alternative (\$747,187). Additionally, Five-Year Reviews would be required for the LUCs alternative, since UU/UE is not attained. The present worth costs associated with the Five-Year Reviews over the 30-year performance period would be \$94,175 for the LUCs alternative. Present worth costs are dollar amounts estimated using current prices for goods and services.

J.3 Modifying Criteria

Although remedial alternatives cannot be evaluated against modifying criteria at this time, available information is provided below:

State Acceptance – The Ohio EPA concurrence will be evaluated during their review of this document, while draft, and will be described in the Final ROD.

Community Acceptance – Community acceptance of the Preferred Alternative was evaluated during the public comment period of the PP and is described in this ROD.

K. PRINCIPLE THREAT WASTE

UXO or DMM, if any, that remain present at CJAG may constitute a principle threat to human health at the Group 8 MRS due to the potential for it to pose an explosive hazard if it is moved, handled, or disturbed. If

UXO or DMM are later encountered on surfaces in those areas originally addressed by the selected remedy, UXO-qualified personnel, or similarly qualified personnel, would evaluate the material to determine if it poses an explosive hazard. Such material that is determined to pose an explosive hazard (which may be categorized as MEC) would normally be treated on site or removed for destruction per applicable DoD explosives safety standards and environmental laws and regulations. The ARNG and the Ohio EPA would consult, in accordance with the terms of the DFFO (Ohio EPA, 2004), to make a determination as to whether the material encountered and determined to pose an explosive hazard, should be classified as a principle threat waste (PTW), as defined by CERCLA, the NCP, and EPA guidance. If the material is determined to be a PTW, the ARNG would take the necessary actions to ensure protectiveness of human health and the environment to address unacceptable risks posed by the material designated as PTW.

L. SELECTED REMEDY

The selected remedy for the Group 8 MRS is Alternative 3 – MC-Contaminated Soil Removal. Alternative 3 satisfies the RAOs for the Group 8 MRS by reducing the unacceptable hazards for the theoretical future Resident Receptor in surface soils at the MRS. The magnitude of the chemical hazards would be eliminated under Alternative 3, and no residuals or untreated waste that would represent the potential for exposure to the receptors would remain. Though there are no current plans for the MRS to change from an industrial land use to a residential land use, there will be no unacceptable risks to potential future residential receptors from explosive hazards or MC-related contamination following implementation of the selected remedy.

L.1 Description of the Selected Remedy

The MC-Contaminated Soil Removal alternative combines mechanical and manual excavation techniques to remove the contaminated soil to a depth of 0.5 feet bgs in the area of the MRS that exceeds the PRG for lead and/or cadmium. Incidental to the surface soil removal, if any munitions debris is encountered, it will be segregated, inspected, and certified as MDAS before disposal. Under this alternative, all MC-contaminated soil exceeding the PRG will be removed, allowing for UU/UE at the MRS (although residential use is not anticipated).

Confirmation soil samples will be collected to confirm that the extent of MC-contaminated soil exceeding the remediation goals are removed. The confirmation soil samples for laboratory analysis will be collected immediately below the 0.5 feet to confirm all MC contamination has been removed. Samples of excavated soils will be collected and analyzed to determine if the soil meets the definition of characteristic hazardous waste, pursuant to 40 CFR Part 261 using the Toxicity Characteristic Leaching Procedure for disposal. For MC-contaminated soil shown to meet non-hazardous disposal criteria, the soil will be transported to a non-hazardous landfill for proper disposal. The excavation locations within the MRS will be planned so that areas containing contaminants at potentially hazardous levels are managed separately. If characterization results indicate that excavated material is hazardous, it will be segregated from non-hazardous soils for proper off-site disposal.

After the initial excavation of the GR8SS-001M, GR8SS-003M, and GR8SS-004M footprints has been conducted, confirmation samples (from 6-inches to 1-foot bgs) will be collected from the excavations to confirm that MC-contaminated soil to a depth of 6 inches has been excavated and removed. A minimum depth of 0.5-foot bgs will be excavated. The assumption that up to 2.0 feet bgs may be required to be excavated, based on the results of confirmation sampling, was used to establish the cost estimate. If indicated, localized areas may require further limited excavation to deeper than 6 inches after the confirmation sampling occurs. This additional excavation would be accomplished, and additional confirmation samples collected from the new excavation to confirm the extent has been removed. Discrete confirmation samples will be collected at a density of 1 per 400 square feet of excavation floor. MC-Contaminated Soil Removal will be accomplished following additional sampling activities and laboratory

analysis. Based on the RI recommendations, the estimated minimum contaminated soil volume is 1,603 cubic yards (excavation to 0.5 feet bgs), and the maximum contaminated soil volume is 4,008 cubic yards (excavation to 2 feet bgs, if required by confirmation laboratory soil sampling results). MC risks will be addressed through removal of confirmed MC-contaminated soil.

Additional site restoration activities will be conducted, including grading the site and installing confirmed clean soil to backfill and level all excavated areas. The excavated areas will be reseeded with native vegetation or gravel will be replaced to restore the existing roadway within the MRS (HGL, 2020).

L.2 Remedy Cost Estimate Summary

The estimated capital cost, O&M cost, periodic cost, total cost, and total present value for Alternative 3 are presented in **Table 2**. Changes to the selected remedy cost estimate are likely to occur as the engineering design for the remedial alternative is further developed and refined as part of the Remedial Design process.

Table 2 Cost Estimate Summary for Alternative 3 – MC-Contaminated Soil Removal

Capital	\$747,187
O&M	\$0
Periodic	\$0
Total Cost	\$747,187
Present Worth (Capital + O&M + Periodic Costs)	\$747,187

O&M denotes operation and maintenance

Costs are intended to have an accuracy of +50%/-30%

L.3 Expected Outcome of the Selected Remedy

Following implementation of the selected remedy, risks to human health will be mitigated by the removal of MC-contaminated soil at the Group 8 MRS, and the RAOs will be achieved. No unacceptable ecological risks were identified for the Group 8 MRS.

M. STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment and satisfies the requirements of CERCLA §121(b). The selected remedy complies with ARARs, is cost effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent possible.

N. DOCUMENTATION OF NO SIGNIFICANT CHANGE

The PP (HGL, 2020) for the Group 8 MRS was released for public comment on March 4, 2020. The PP (HGL, 2020) recommended MC-Contaminated Soil Removal as the selected remedy under the MMRP and pursuant to CERCLA requirements for the Group 8 MRS. After the public comment period (March 4, 2020, though April 4, 2020), no significant changes regarding the selected remedy, as originally identified in the PP (HGL, 2020), were necessary or appropriate.

PART III: RESPONSIVENESS SUMMARY FOR PUBLIC COMMENTS ON THE PROPOSED PLAN FOR RVAAP-063-R-01 GROUP 8 MRS

A. Overview

In March 2020, the ARNG/OHARNG released the PP. On March 11, 2020, ARNG held a public meeting for the MRS at the Shearer Community Center (Paris Township Hall), at 9355 Newton Falls Road, Ravenna, Ohio 44266. Present for the meeting were ARNG/OHARNG, Ohio EPA, and USACE as well as a member of the community. The 30-day public comment period was held from March 4, 2020, to April 4, 2020.

B. Summary of Stakeholder Issues and Lead Agency Responses

There were no comments received verbally during the public meeting. The transcript from the meeting was incorporated into the Administrative Record.

B.1 Oral Comments from Public Meeting

There were no comments received verbally during the public meeting.

B.2 Written Comments from Public Meetings

One written comment was received from a citizen describing general concerns about the polyfluoroalkyl substances. The citizen expressed concern for potential PFAS contamination in their drinking water. Additionally, the citizen was concerned about traffic impacts to roadways. Lastly, the citizen expressed concern about the outcome of removing bats from the local area. The citizen also recommended the location of the meeting be placed at the top of the public notice in the newspaper. Comments that were not specific to the Group 8 MRS were not relevant and did not require revisions to the Proposed Plan.

ARNG staff responded to the citizen's comments in writing by email, indicating that her emailed comments would be incorporated. Suggestions for clarifying the meeting location in the public notice were noted and will be evaluated for future public notifications for future meetings. For comments related to former RVAAP in general, and not the Group 8 MRS, specifically, those suggestions were taken into consideration.

B.3 Telephone Comments from Public

No telephone comments or questions were received from members of the public during the public comment period.

C. Technical and Legal Issues

There were no technical or legal issues raised during the public comment period.

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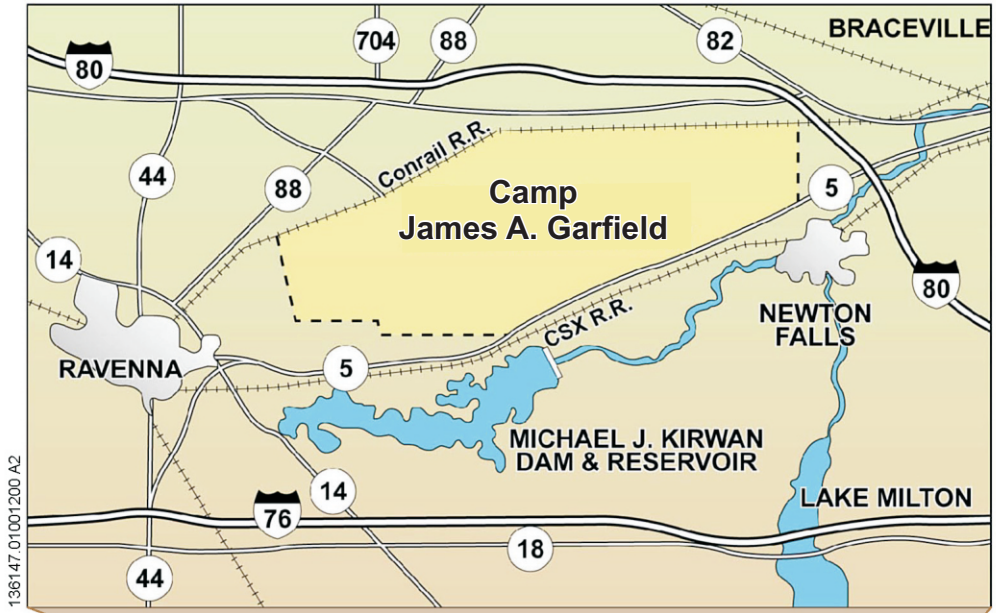
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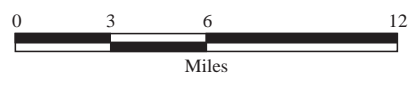
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FIGURES

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 (1-01)Location_Map.cdr
 3/21/2019 JG
 Source: CB&I

Legend

 Camp James A. Garfield

Note:
 RVAAP=Ravenna Army Ammunition Plant

Figure 1
Location Map
Camp James A. Garfield/
Former RVAAP
Portage and Trumbull
Counties, Ohio



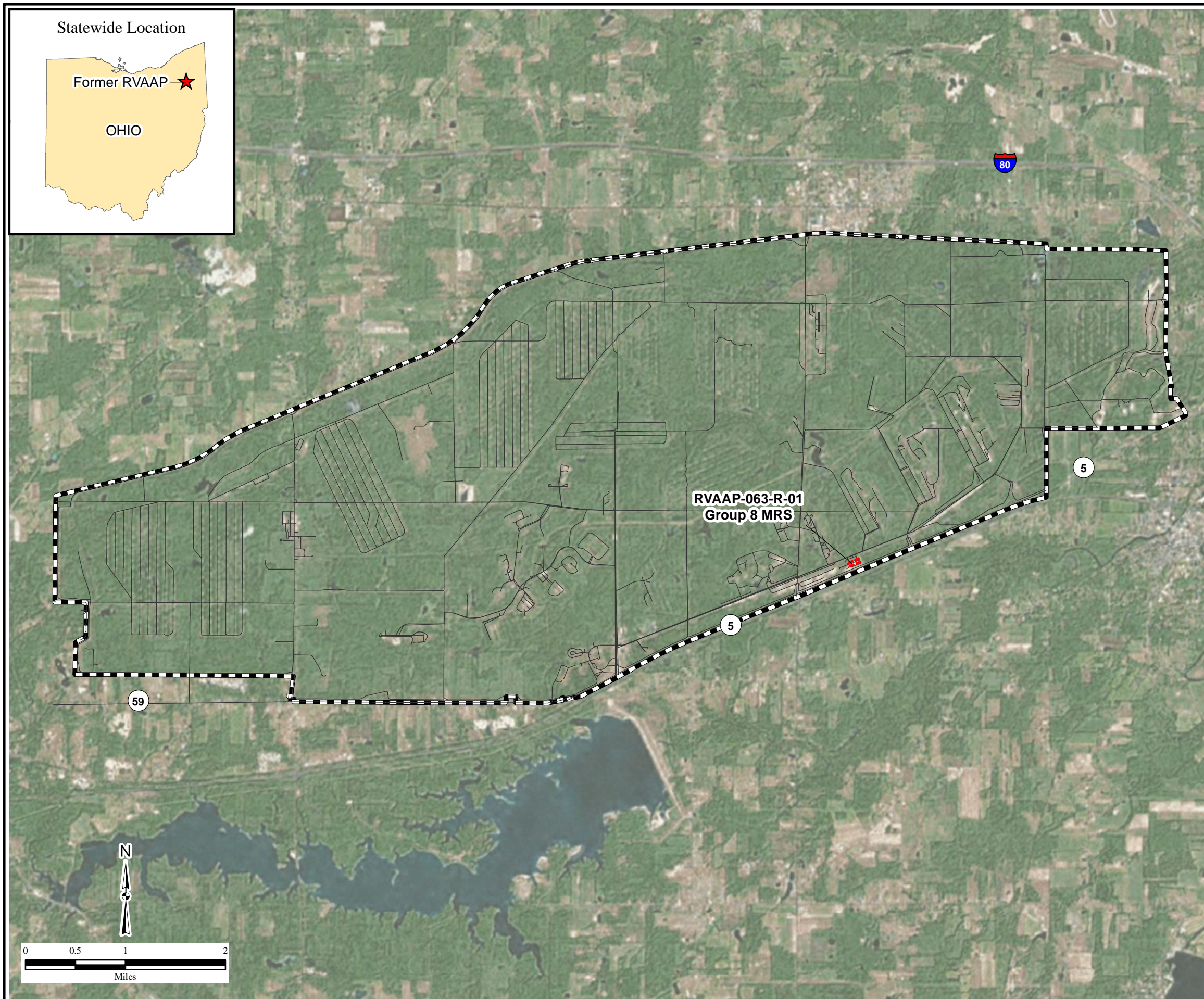
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Figure 2
MRS Location
Group 8
Former RVAAP
Portage and Trumbull
Counties, Ohio

Legend

- Road
- ▭ MRS
- ▭ Installation Boundary

Notes:
MRS=munitions response site
RVAAP=Ravenna Army Ammunition Plant







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Source: HGL, CB&I, USACE, e2M
ArcGIS Online Imagery



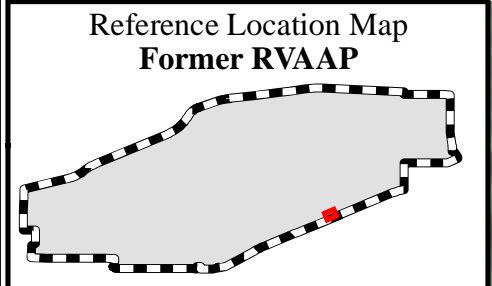
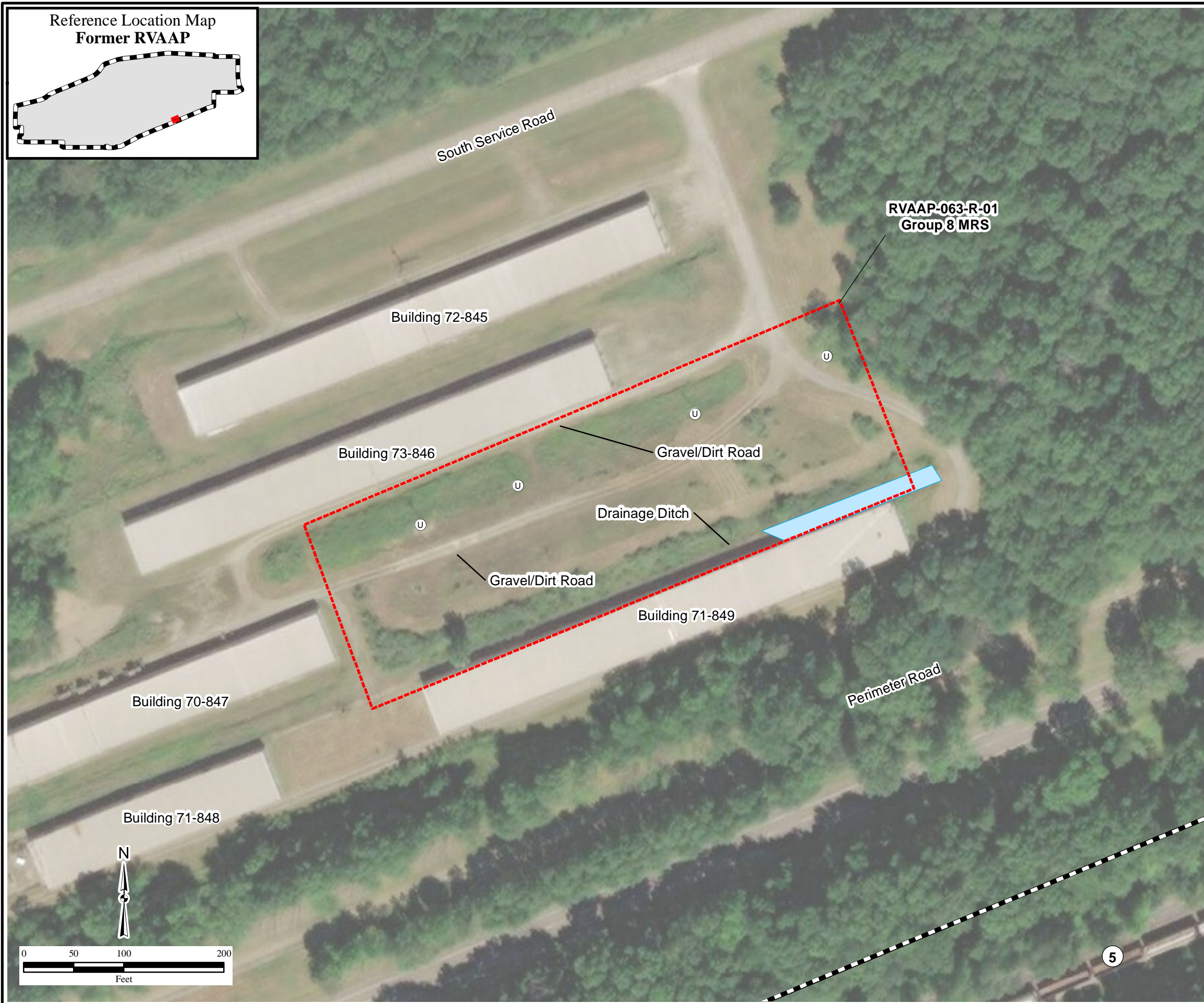
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Figure 3
Site Features
Group 8 MRS
Former RVAAP
Portage and Trumbull
Counties, Ohio

Legend

-  Utility Pole
-  Standing Water
-  MRS
-  Installation Boundary

Notes:
MRS=munitions response site
RVAAP=Ravenna Army Ammunition Plant









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Source: HGL, CB&I, USACE, e2M
ArcGIS Online Imagery



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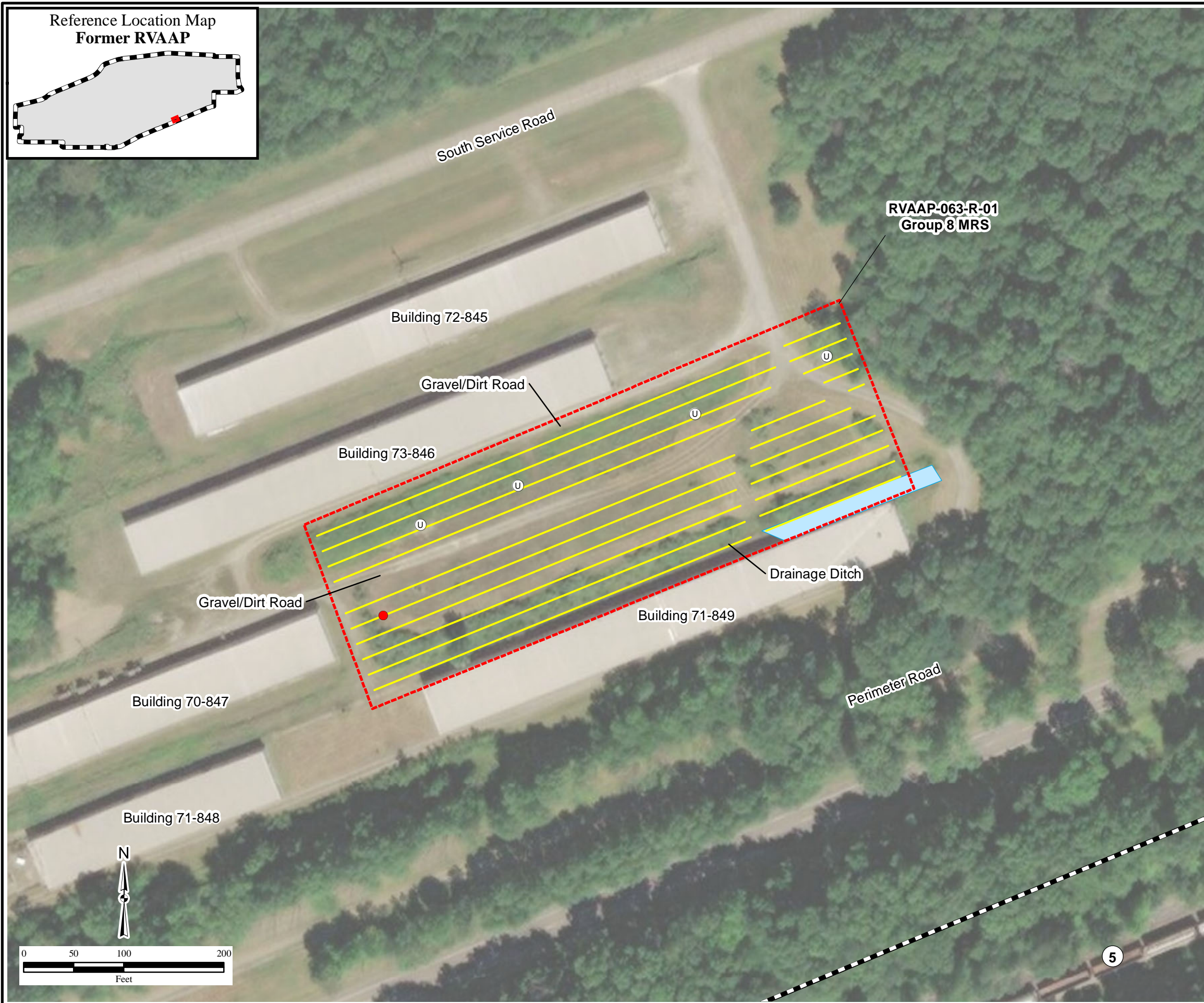
Figure 4
2008 Site Inspection Results
Group 8 MRS
Former RVAAP
Portage and Trumbull
Counties, Ohio

Legend

-  MPPEH (T-Bar Fuzes)
-  Utility Pole
-  Line Abreast Survey Area
-  Standing Water
-  MRS
-  Installation Boundary

Notes:
MPPEH=material potentially presenting an explosive hazard
MRS=munitions response site
RVAAP=Ravenna Army Ammunition Plant

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6/23/2020 JG
Source: HGL, CB&I, USACE, e2M
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Figure 5 2015 Remedial Investigation Results Group 8 MRS Former RVAAP Portage and Trumbull Counties, Ohio

Legend

Single Anomaly Results

- ▽ Control Point (QC)
- MDAS
- Other Debris
- Surface Metal

Trench Results

- MDAS Identified
- MDAS and Other Debris Identified
- Other Debris Identified

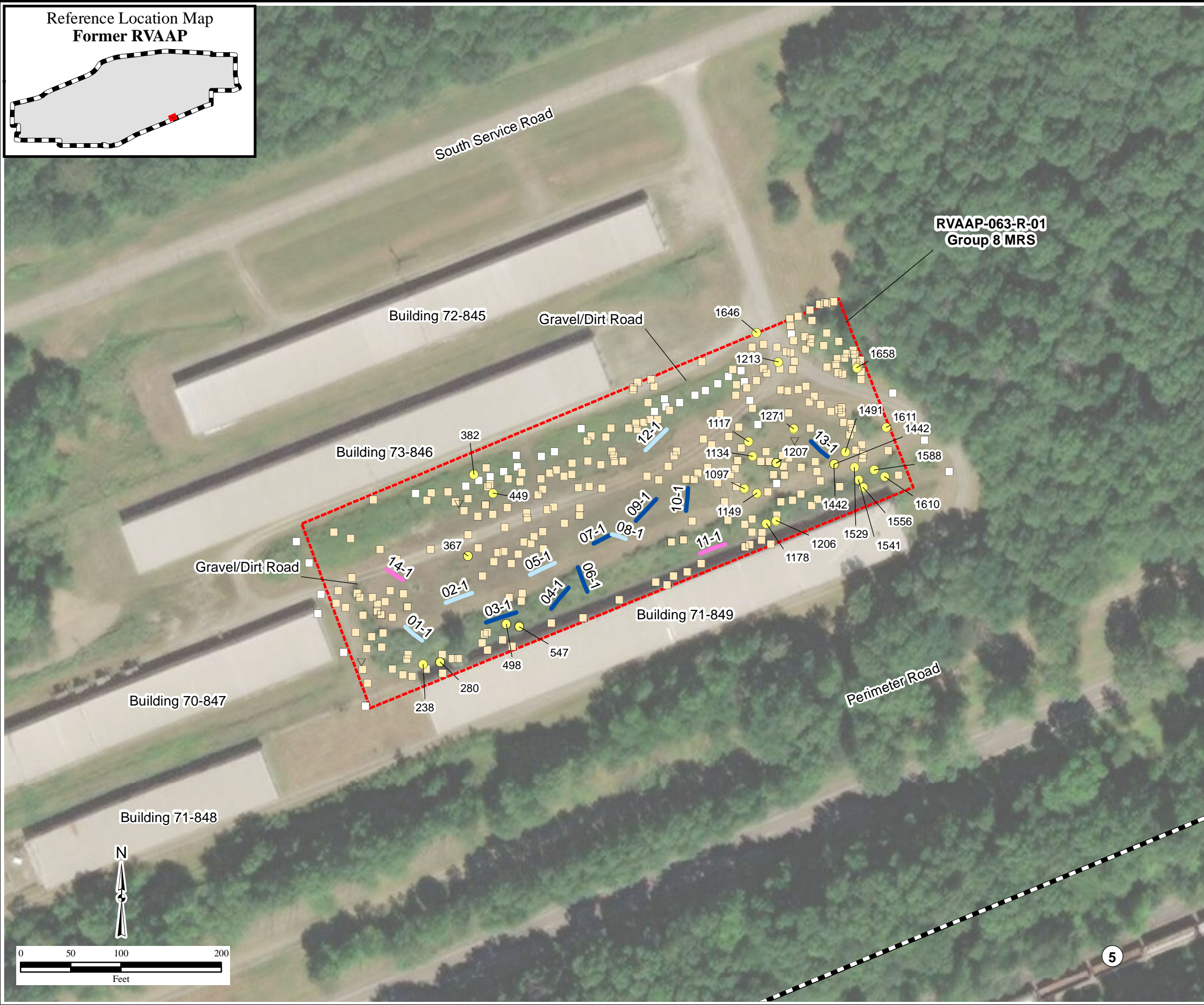
▭ MRS

▭ Installation Boundary

Notes:

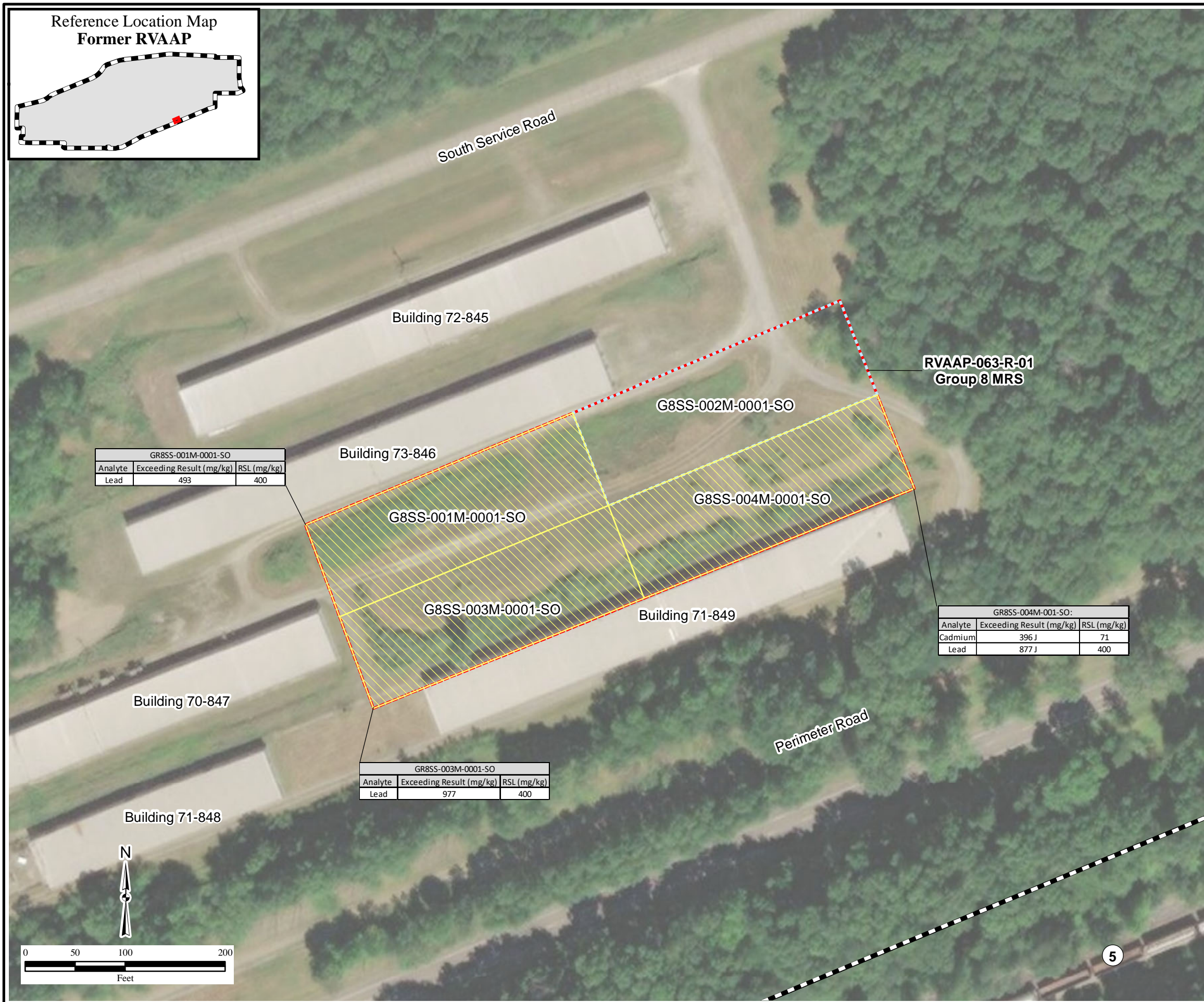
- MDAS=material documented as safe
- MRS=munitions response site
- QC=quality control
- RVAAP=Ravenna Army Ammunition Plant

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6/23/2020 TH
Source: HGL, CB&I, USACE, e2M
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Figure 6
2019 Feasibility Study
Risk Management Evaluation
Delineated MC Contamination
Former RVAAP
Portage and Trumbull Counties, Ohio



Legend

-  Excavation Area
-  Surface ISM Soil Sample Area
-  MRS
-  Installation Boundary

GR8SS-001M-0001-SO		
Analyte	Exceeding Result (mg/kg)	RSL (mg/kg)
Lead	493	400

GR8SS-003M-0001-SO		
Analyte	Exceeding Result (mg/kg)	RSL (mg/kg)
Lead	977	400

GR8SS-004M-001-SO:		
Analyte	Exceeding Result (mg/kg)	RSL (mg/kg)
Cadmium	396 J	71
Lead	877 J	400

HHRA COCs - Surface Soil Only	
Resident Receptor	
Cadmium	
Lead	

Notes:
Surface soil defined as 0 ft bgs to 0.5 ft bgs.

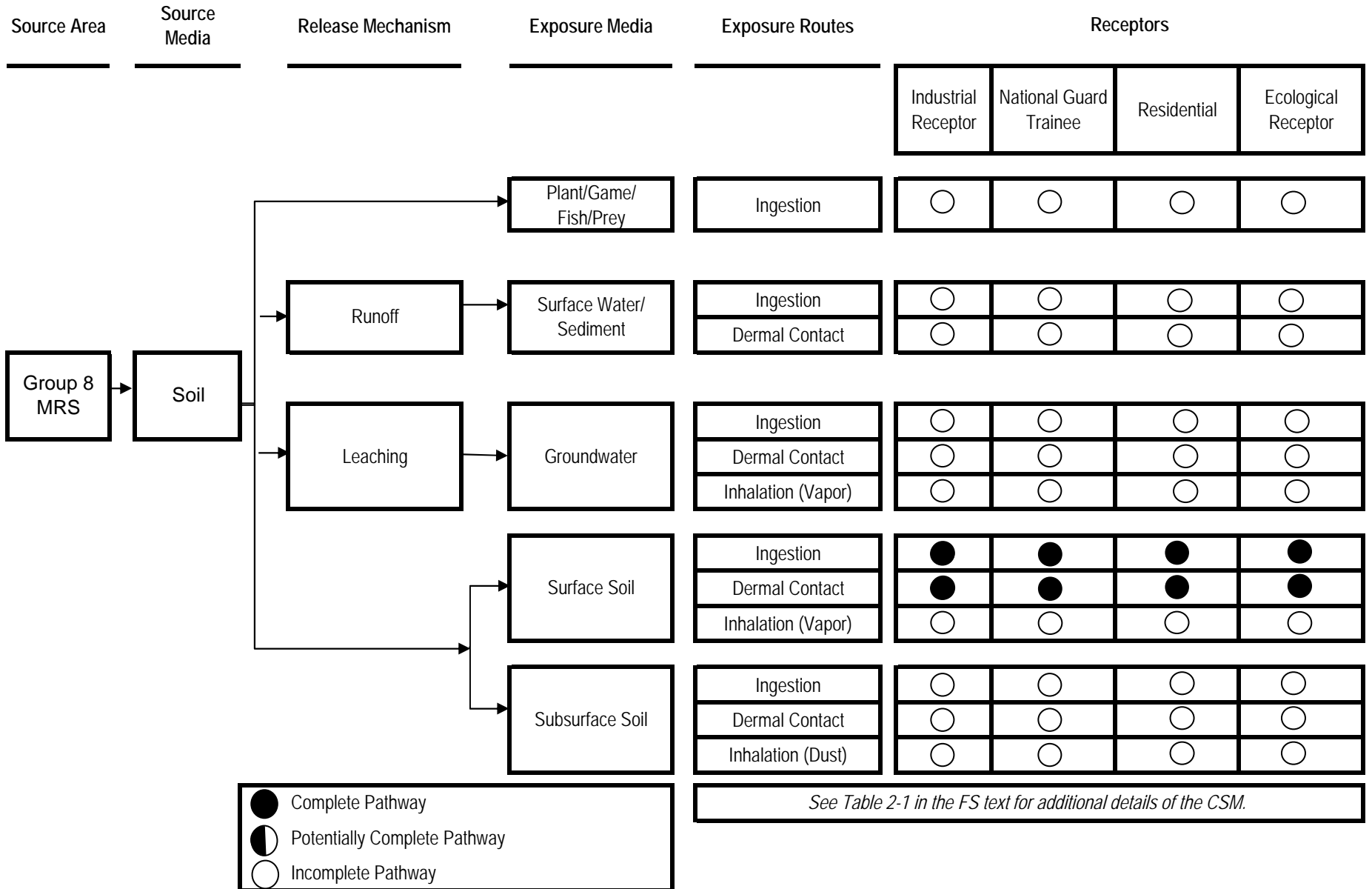
COC=Chemical of Concern
ft bgs=feet below ground surface
HHRA=Human Health Risk Assessment
ISM=incremental sampling method
J=estimated value
MC=munitions constituent
mg/kg=milligrams per kilogram
MRS=munitions response site
RVAAP=Ravenna Army Ammunition Plant

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(06)Group8_Delineated_MC.mxd
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Source: HGL, CB&I, USACE, e²M
ArcGIS Online Imagery



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FIGURE 7. MC CONCEPTUAL SITE MODEL
RVAAP-063-R-01 GROUP 8 MRS



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Appendix A
Public Notice of the Proposed Plan

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PUBLIC NOTICE
Camp James A. Garfield Joint
Military Training Center
Environmental Office

1438 State Route 534 SW – Newton Falls, OH 44444
614-336-6136

Public meeting to be held Wednesday, March 11, 2020
for Army National Guard Release of the Proposed Plan
for the Group 8 Munitions Response Site
at the Former Ravenna Army Ammunition Plant

Ravenna – The Army National Guard, in consultation with the Ohio Environmental Protection Agency, submits for public review and comment a Proposed Plan for the Group 8 Munitions Response Site (MRS) at the former Ravenna Army Ammunition Plant (RVAAP) in Portage and Trumbull counties, Ohio.

The Group 8 MRS is within the former RVAAP (now known as Camp James A. Garfield [CJAG]) in Portage and Trumbull Counties, Ohio. The Group 8 MRS is being addressed under the Military Munitions Response Program (MMRP) in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The Proposed Plan presents the current status and information regarding the MRS. The Proposed Plan details the recommendation for future remediation and provides the rationale for the recommendations.

On Wednesday, March 11, 2020, a public meeting will be held at the Shearer Community Center (Paris Township Hall) at 9355 Newton Falls Road, Ravenna, Ohio 44266 beginning at 6:00 p.m. The first half hour will be an informal open house when technical staff will be available to answer questions. At 6:30 p.m., the Army National Guard will briefly describe the assessment of the MRS, present the recommendations, and then request comments from the public. Written comments regarding this recommendation may be submitted to the Army National Guard during the 30-day comment period from March 4, 2020 to April 4, 2020. All written comments should be addressed to CJAG Environmental Office; 1438 State Route 534 SW, Newton Falls, OH 44444 or sent via email to Kathryn.s.tait.nfg@mail.mil.

In accordance with CERCLA, the recommendation presented in the Proposed Plan was summarized and presented in earlier remedial investigation and feasibility study reports. These reports are now available for public review at the RVAAP Restoration Program Information Repositories at the Reed Memorial Library (167 East Main Street, Ravenna) and the Newton Falls Public Library (204 South Canal Street, Newton Falls). The reports are also available online at www.rvaap.org.

The final remedy for the MRS will be selected based, in part, on public comments. In coordination with Ohio Environmental Protection Agency, the Army National Guard will select a final remedy after reviewing and considering all public comments submitted during the 30-day public comment period from March 4, 2020 to April 4, 2020. The Army National Guard encourages the public to review and comment on the recommendation presented in this document.

For more information or to participate in the review, please visit the RVAAP Restoration Program website (www.rvaap.org) or call Kathryn Tait at 614-336-6136.

RC, March 1, 8, 2020, 12633378

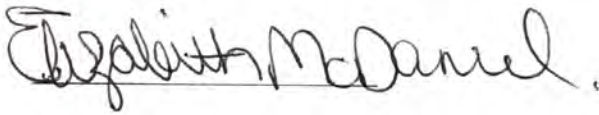
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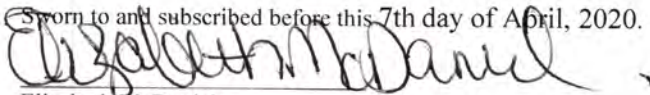
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614-336-6136

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#061-2T-March 1 & 8, 2020 #4859

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