FINAL WORK PLAN ADDENDUM
MEC Verification Study at
RVAAP-03 Open Demolition Area #1

Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio
Project No. 453698

September 3, 2019

Prepared By:

United States Army Corps of Engineers
Baltimore District

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McCoun, Travis R.

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USACE - Baltimore District
2 Hopkins Plaza Attn: CENAB-ENE-M, Room 09-F-04
Baltimore, MD 21201

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U.S. Army Corps of Engineers, Louisville District
600 Martin Luther King Jr. Place
PO Box 59
Louisville, Kentucky 40202-0059

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14. ABSTRACT

This Work Plan Addendum was prepared by the U.S. Army Corps of Engineers (USACE), Baltimore District, and describes the technical approach including details for implementation, quality control, and quality assurance for the Munitions and Explosives of Concern (MEC) Verification Study at the RVAAP-03 Open Demolition Area #1 (ODA1) site, located at the Former Ravenna Army Ammunition Plant (RVAAP), now known as the Camp James A. Garfield (CJAG), in Ravenna, Ohio. In July 2001, a Base Realignment and Closure (BRAC) funded Interim Removal Action (IRA) removed approximately six (6) acres of soil hot spots containing high levels of metals and explosives from ODA1. A MEC removal was conducted as part of this action, but was limited to those grids being disturbed as a result of soil excavation and removal. Inspection and certification documentation for MEC recovered during the removal action was limited. In 2010, a geophysical investigation was conducted to investigate if there had been a release of MEC at the site . The geophysical investigation identified significant magnetic anomalies in the subsurface, however, these anomalies were never intrusively investigated. The presence or absence of MEC was not verified. The purpose of this action is to conduct a MEC Verification Study at ODA1 to collect information needed to determine if an explosive hazard exists at the site. Information collected will be used to prepare a Probability Assessment for MEC.

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Ohio Environmental Protection Agency

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

September 13, 2019

RE: US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Correspondence
Remedial Response
Portage County
ID # 267000859187

Mr. David Connolly
Army National Guard Directorate
Environmental Programs Division
ARNG-ILE-CR
111 South George Mason Drive
Arlington, VA 22204

Subject: Approval of Final Work Plan Addendum MEC Verification Study at RVAAP-03 Open Demolition Area #1

Dear Mr. Connolly:

The Ohio Environmental Protection Agency (Ohio EPA), Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) has reviewed the Final Work Plan Addendum MEC Verification Study submitted for the RVAAP-03 Open Demolition Area #1, received on September 5, 2019.

Ohio EPA approves the document.

If you have any questions or concerns, please do not hesitate to contact me at (330) 963-1170, or by email at ed.damato@epa.ohio.gov.

Sincerely,

Edward D'Amato
Site Coordinator
Division of Environmental Response and Revitalization

ED/sc

ec: David Connolly, ARNG
Kevin Sedlak, ARNG, Camp James A. Garfield
Katie Tait, OHARNG, Camp James A. Garfield
Craig Coombs, USACE Louisville
Nathaniel Peters, USACE Louisville
Rebecca Shreffler, Chenega Tri-Services, LLC
Natalie Oryshkewych, Ohio EPA, NEDO, DERR
Megan Oravec, Ohio EPA, NEDO, DERR
Bob Princic, Ohio EPA, NEDO, DERR
Nicholas Roope, Ohio EPA, NEDO, DERR
Thomas Schneider, Ohio EPA, SWDO, DERR

STATEMENT OF TECHNICAL REVIEW

PN: 453698

NAME OF PROJECT: MEC Verification Study, Open Demolition Area #1 (ODA1) (RVAAP-003)

LOCATION: Former Ravenna Army Ammunition Plant, OH

PROJECT MANAGER: Travis McCoun

DOCUMENT/DELIVERABLE: MEC Verification Study Work Plan, ODA1, Preliminary Draft

An independent technical review (ITR) that is appropriate to the level of risk and complexity inherent in the project has been conducted as defined in the Project Management Plan. During the ITR, compliance with established policy, principles, and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level obtained; and reasonableness of the result, including whether the product meets the stakeholders' needs consistent with law and existing USACE policy. The signatures of each of the disciplines below affirm that the ITR was accomplished and all comments resulting from ITR have been resolved.

TECHNICAL DISCIPLINE	REVIEWER	SIGNATURE
Explosive Safety	Marty Holmes	HOLMES.MARTY.ALAN.1017090972 Digitally signed by HOLMES.MARTY.ALAN.1017090972 Date: 2019.05.13 07:14:27 -04'00'
Munitions Response	Wayne Davis	DAVIS.WAYNE.F.1289107378 Digitally signed by DAVIS.WAYNE.F.1289107378 Date: 2019.05.16 08:13:12 -04'00'

CERTIFICATION OF INDEPENDENT TECHNICAL REVIEW

As noted above, all concerns resulting from independent technical review of the project have been fully resolved.

TECHNICAL TEAM LEAD
Travis R. McCoun, P.G.
Program Manager, NAB MMDC

MCCOUN.TRAVIS.REID.1252769753 Digitally signed by MCCOUN.TRAVIS.REID.1252769753 Date: 2019.05.16 09:34:57 -04'00'

DATE 10 MAY 2019

CHIEF, EMDC
Michael J. Rogers, P.E., PMP
Chief, Environmental & Munitions
Design Center USACE Baltimore District

Digitally signed by ROGERS.MICHAEL.J.1229256420 Date: 2019.05.16 09:56:36 -04'00'

DATE 10 MAY 2019

DISCLAIMER STATEMENT

FINAL WORK PLAN ADDENDUM
MEC Verification Study at
RVAAP-03 Open Demolition Area #1

Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio
Project No. 453698

September 3, 2019

Prepared By:

United States Army Corps of Engineers
Baltimore District

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MEC Verification Study at
RVAAP-03 Open Demolition Area #1
Former Ravenna Army Ammunition Plant

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ARNG = Army National Guard.
I&E = Installations and Environment.
NE- DERR = Northeast District – Division of Environmental Response and Revitalization
OHARNG = Ohio Army National Guard.
Ohio EPA = Ohio Environmental Protection Agency.
SWDO = Southwest District Office.
USACE = U.S. Army Corps of Engineers.

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LIST OF FIGURES

List of Abbreviations and Acronyms

ARNG	Army National Guard
AOC	Area of Concern
ATF	Bureau of Alcohol, Tobacco, and Firearms
BEM	Buried Explosion Module
BIP	Blow-in-Place
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulation
DDESB	Department of Defense Explosive Safety Board
DFW	Definable Feature of Work
DID	Data Item Description
DoDI	Department of Defense Instruction
DoDM	Department of Defense Manual
DoD	Department of Defense
DQCRs	Daily Quality Control Reports
DQOs	Data Quality Objectives
ESQD	explosive safety quantity distance
ESS	Explosive Safety Submission
EESS	Environmental and Explosive Safety Section
FAA	Federal Aviation Administration
FSA	Field Staging Areas
FSP	Field Sampling Plan
FWSAP	Facility-Wide Sampling and Analysis Plan
FWFSP	Field Sampling Plan
FWQAPP	Facility-Wide Quality Assurance Project Plan
GIS	Geographic Information System

GPS	Global Positioning System
HFD	Hazard Fragmentation Distance
ID	Identification
IDW	Investigation-Derived Waste
LRL	Lakes and Rivers Louisville (District)
MC	Munitions Constituents
MDAS	Material Documented as Safe
MDEH	Material Documented as an Explosive Hazard
MEC	Munition of Explosive Concern
MGFD	munition with the greatest fragmentation distance
MIS	Multi-Incremental Sample
MPPEH	Material Potentially Posing an Explosive Hazard
MSD	Minimum Separation Distance
MS/MSD	matrix spike / matrix spike duplicate
NAB	North Atlantic Baltimore (District)
NAD	North Atlantic Datum
NGB	National Guard Bureau
OB/OD	Open Burn / Open Detonation
ODA2	Open Demolition Area #2
OESS	Ordnance and Explosive Safety Specialist
OHARNG	Ohio Army National Guard
PPE	Personal Protective Equipment
QAPP	Quality Assurance Project Plan
QAR	Quality Assurance Reports
QC	Quality Control
QCP	Quality Control Plan
RI	Remedial Investigation

REIMS	Ravenna Environmental Information Management System
RTK	Real Time Kinematic
SAP	Sampling and Analysis Plan
SDSFIE	Spatial Data Standards for Facilities, Infrastructure, and Environment
SOP	Standard Operation Procedure
SUXOS	Senior UXO Supervisor
SVOC	Semi-volatile Organic Compound
TCRA	Time Critical Removal Action
TNT	trinitrotoluene
TOC	Total Organic Content
USATCES	U.S. Army Technical Center for Explosives Safety
USP&FO	United States Property and Fiscal Officer
UTM	Universal Transverse Mercator
VOC	Volatile Organic Compound
DQCR	Daily Quality Control Report
USACE	U.S. Army Corps of Engineers
UXO	Unexploded Ordnance
UXOQCS	Unexploded Ordnance Quality Control Officer
UXOSO	Unexploded Ordnance Safety Officer

1.0 INTRODUCTION

1.1 GENERAL

This Work Plan Addendum was prepared by the U.S. Army Corps of Engineers (USACE), Baltimore District, and describes the technical approach including details for implementation, quality control, and quality assurance for the Munitions and Explosives of Concern (MEC) Verification Study at the Open Demolition Area #1 (ODA1) (RVAAP-03) site, located at the Former Ravenna Army Ammunition Plant (RVAAP), now known as the Camp James A. Garfield (CJAG), in Portage and Trumbull counties, Ohio (**Figure 1**).

This MEC Verification Study is being conducted to collect information needed to determine if an explosive hazard exists at ODA1. Information collected will be used to prepare a Probability Assessment for MEC.

All work being conducted at ODA1 is similar to previous work conducted for the ODA2 Time Critical Removal Action (TCRA). Therefore, all work being conducted at ODA1 will be in accordance with the methods and procedures described in the TCRA Work Plan for Open Detonation Area #2 (ODA2) (USACE, 2016), and as specified in this document. This addendum provides site specific information for ODA1.

1.1.1 Project Description

The ODA1 investigation areas is 8.16 acres and was used to thermally treat munitions by open burn/open detonation (OB/OD) (**Figure 2**). The Area of Concern (AOC is approximately six acres in size and consist of the southern portion of the investigation area. The AOC contains a circular 1-foot berm surrounding a grass-covered area of approximately 1.5 acres. The entire AOC is located within the National Advisory Committee on Aeronautics (NACA) Test Area AOC. The site was operational from 1941 through 1949 and is known to contain munitions debris (MD) (including scrap metal, small arms primers, and fuzes) outside the bermed area (kickout area). ODA1 has been the subject of several cleanup actions under the Installation Restoration Program (IRP); however, the site has not been fully evaluated for MEC.

In July 2001, a Base Realignment and Closure (BRAC)–funded Interim Removal Action (IRA) removed approximately six (6) acres of soil hot spots containing high levels of metals and explosives from ODA1 (**Figure 3**). A MEC removal was conducted as part of this action, but was limited to those grids being disturbed as a result of soil excavation and removal. Inspection and certification documentation for MEC recovered during the removal action was limited. Concern remained over the potential for MEC to be present beyond the area addressed by the IRA due to former kick-out/push-out activities at the site.

In 2010, a geophysical investigation was conducted to investigate if there had been a release of MEC at the site (USACE, 2011). A final report was published in January 2011. The geophysical investigation identified significant magnetic anomalies in the subsurface, however, these anomalies were never intrusively investigated (**Figure 4**). The presence or absence of MEC was not verified by this study.

The ODA1 was identified in the real property records and the Ohio Army National Guard (OHARNG) Federal Installation Support Plan as an operational (active) range and not a demolition range. It was included as part of the larger adjacent maneuver area (Training Area - TAG) and deemed to be an "operational range."

The purpose of this action is to conduct a MEC Verification Study at ODA1 to collect information needed to determine if an explosive hazard exists at the site. Information collected will be used to prepare a Probability Assessment for MEC.

1.1.2 Purpose

The purpose of this action is to conduct a MEC Verification Study at ODA1 to collect information needed to determine if an explosive hazard exists at the site. Information collected will be used to prepare a Probability Assessment for MEC. The study will identify and investigate the nature of subsurface features including single-point and multi-point anomalies. In addition, this study will evaluate the vertical and horizontal extent of subsurface anomalous features and delineate the boundary of the kickout area at ODA1. The goal of the study will be to verify if MEC is present at the site.

1.1.3 Scope

The scope of the MEC Verification Study involves the following activities:

Ferrous Instrument-Assisted Survey of the OB/OD Area – Conduct ferrous instrument-assisted survey of the OB/OD site. Investigate single-point anomalies to determine the presence or absence of MEC in surface and subsurface soil at ODA1. Evaluate large anomalous features to identify: 1) highly disturbed areas (moderate anomaly density); and 2) disposal pits (high anomaly density).

Ferrous and Non-Ferrous Instrument-Assisted Survey of the Kickout Area – Conduct ferrous and non-ferrous instrument-assisted survey. Investigate single-point anomalies to determine the presence or absence of MEC in surface and subsurface soil in the kickout area. Delineate the boundary of the kickout area at ODA1.

Survey of Highly Disturbed Areas – Conduct intrusive investigations in highly disturbed areas (moderate anomaly density) to evaluate the presence or absence of MEC in surface and subsurface soil at ODA1. Investigation depth will be to depth-of-detection, or a maximum depth of 7 feet below ground surface (bgs).

Survey of Disposal Pits – Conduct intrusive investigations in disposal pits to evaluate the presence or absence of MEC in surface and subsurface soil at ODA1. Investigation depth will be to depth-of-detection, or a maximum depth of 7 feet bgs.

The scope of this MEC Verification Study includes the following tasks:

- Boundary marking and vegetation removal (as necessary).
- Establish 100′ × 100′ grid network for the ODA1 site and kickout area.
- Conduct single-point anomaly excavations in ODA1 and kickout area. Investigate low anomaly density areas to determine the presence or absence of MEC.

- Evaluate large anomalous features to identify highly disturbed areas (moderate anomaly density) and disposal pits.
- Conduct intrusive investigations in highly disturbed areas (moderate anomaly density). Investigate moderate anomaly density areas to determine the presence or absence of MEC.
- Conduct test pit investigations in disposal pits. Investigate high anomaly density areas to determine the presence or absence of MEC.
- Dispose of all MEC/MPPEH deemed acceptable to move to the BEM (located at ODA2).
- Dispose of any MEC deemed unacceptable to move by blow-in-place method.
- Dispose of all solid waste recovered from excavations.
- Prepare an After Action Report.

Prior to the start of field activities, an Explosives Safety Submission (ESS) will be prepared and submitted to the USACE Center of Expertise to be forwarded through the U.S. Army Technical Center for Explosives Safety (USATCES) to Department of Defense Explosive Safety Board (DDESB) for approval. No work will commence until approval of the ESS has been granted by DDESB or interim approval granted by USATCES. The Army National Guard (ARNG) and OHARNG will also review the ESS.

The scope of this action **does not include:**

- Remediation of munitions constituents (MC) in soil at ODA1. MC was investigated and remediated previously under the IRP. If evidence of MC in soil is observed during this action, intrusive activities will cease and the location will be marked, the excavation backfilled, and details of the observation provided to the installation.
- Remediation/removal of disposal pits. If a disposal pit is identified during this action, the boundaries of the disposal area will be delineated. Any solid waste recovered during excavation activities will be inspected and properly disposed. If required, the installation will coordinate sampling of solid waste prior to disposal. Solid waste will not be returned to the excavation. This action will not remediate/remove disposal pits from the site, if present.
- Complete removal of MEC, if present. Any MEC/MPPEH encountered during the MEC Verification Study will be inspected and certified as MDAS.
- Removal of MD: The ODA1 site is known to contain MD. Any MD encountered during the MEC Verification Study will be inspected and certified as MDAS. Any solid waste recovered during excavation activities will be inspected and properly disposed. If required, the installation will coordinate sampling of solid waste prior to disposal. MD will not be returned to the excavation. This action will not remediate/remove all MD from the site, if present.

All MEC Verification Study activities will be conducted in accordance with the DDESB-approved ESS.

1.2 SITE DESCRIPTION

The former RVAAP, now known as the Camp James A. Garfield (CJAG), is located in northeastern Ohio within Portage and Trumbull counties, is 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. In addition, the facility is surrounded by the communities of Windham, Garrettsville, Charlestown, and Wayland. The property location is depicted in **Figure 1**.

Administrative accountability for the entire 21,683-acre facility has been transferred to the United States Property and Fiscal Officer (USP&FO) for Ohio and subsequently licensed to the OHARNG for use as a military training site. The RVAAP restoration program involves cleanup of former production/operational areas throughout the facility related to past activities conducted at the former RVAAP.

Past Department of Defense (DoD) activities at the former RVAAP date back to 1940 and include the manufacturing, loading, handling, and storing of military explosives and ammunition. ODA1 was used to thermally treat munitions by OD/OD. The site now consists of a circular 1-foot berm surrounding a grassed area of approximately 1.5 acres. The site was operational from 1941 through 1949 and is known to contain MD (including scrap metal, small arms primers, and fuzes) outside the bermed area. ODA1 has been the subject of several cleanup actions under the Installation Restoration Program (IRP), however the site has not been fully evaluated for MEC. The kickout area may extend beyond the current ODA1 site boundary.

1.2.1 Sources of MEC

The principle sources of MEC at ODA1 are the result of intentional detonations, thermal treatment, and potential burial of military munitions and bulk explosives. These activities resulted in the potential for MEC to be present in surface and subsurface soil at ODA1 and kickout area.

Specific MEC which may be present at ODA1 may include any type of munition in the conventional ammunition inventory that was stored and/or utilized at RVAAP. This includes 20mm–155mm, grenades, rockets, bombs and their assorted components e.g. fuzes, burster tubes, etc.

To date, the largest munition identified at ODA1 has been the 75mm projectile.

1.3 PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIVITIES

In July 2001, a BRAC-funded IRA removed approximately six (6) acres of soil hot spots containing high levels of metals and explosives from ODA1 (**Figure 3**). A MEC removal was conducted as part of this action, but was limited to those grids being disturbed as a result of soil excavation and removal. Inspection and certification documentation for MEC recovered during the removal action was limited. Concern remained over the potential for MEC to be present beyond the area addressed by the IRA due to former kick-out/push-out activities at the site.

In 2010, a geophysical investigation was conducted to investigate if there had been a release of MEC at the site (USACE, 2011). A final report was published in January 2011. The geophysical

investigation identified numerous magnetic anomalies in the subsurface, however, these anomalies were never intrusively investigated (**Figure 4**). The presence or absence of MEC was not verified by this study.

Previous removal action results and geophysical survey data are illustrated on **Figure 5**, **Figure 6**, and **Figure 7**.

1.4 CURRENT AND ANTICIPATED LAND USE

ODA1 is currently restricted access while it is being investigated under the IRP. Once complete, the AOC will be used for military training.

1.5 WORK PLAN ORGANIZATION

This Work Plan Addendum was prepared following the format, content, and preparation instructions specified in Data Item Description (DID) MR-005-01 for a Type II Work Plan (USACE, 2009). Each section remains in the table of contents for reference and formatting purposes. Sections are organized as follows:

Section 1 – Introduction
Section 2 – Technical Management Plan
Section 3 – Field Operations Plan
Section 4 – Quality Assurance/Quality Control Plan
Section 5 – Waste Management Plan
Section 6 – Explosives Management Plan
Section 7 – Environmental Protection Plan
Section 8 – References

2.0 TECHNICAL MANAGEMENT PLAN

The Technical Management Plan details the approach, methods, and operational procedures that will be used for munitions response activities and technical operations for the MEC Verification Study at ODA1.

2.1 PROJECT OBJECTIVES

The objective of this action is to conduct a MEC Verification Study at the ODA1 site and kickout area. The technical approach of this project involves the following:

- **Mobilization** – Includes mobilization of field staff, equipment and consumable materials to the site; setup, maintenance, and testing of equipment and facilities; familiarizing project personnel with the site; and safety requirements.
- **Grid Survey and Site Delineation** – The ODA1 site and kickout area will be established and identified with survey stakes. A 100′ × 100′ grid system will be established in both areas before intrusive activities are conducted.
- **Installation of Silt Fence** – Silt fence will be installed as a sediment and erosion control to prevent migration of soil from the site during the investigation. The total area to be disturbed at any time is expected to be limited, however, silt fence will be installed and maintained as a preventative measure.
- **Surface Clearance** – OESS personnel will conduct a surface clearance for MEC in ODA1 and kickout area prior to brush clearing and intrusive activities.
- **Brush Clearing** – Minor vegetation removal will be necessary in the wooded areas in the kickout area. Vegetation removal within the ODA1 site will be limited to mowing tall grass and/or brush in open areas, if present.
- **Instrument-Assisted Survey** – OESS personnel will conduct ferrous and non-ferrous instrument-assisted surveys of the ODA1 site and kickout area. The survey will identify single-point anomalies (low anomaly density), highly disturbed areas (moderate anomaly density), and disposal pits (high anomaly density). For the purposes of this work plan, low anomaly density will be defined as 3 or less anomalies within a 6-foot diameter area, moderate anomaly density (highly disturbed areas) will be defined as 3 or more anomalies within a 6-foot diameter area, and high anomaly density (disposal pits) will be defined as having a saturated magnetic signature in a 6-foot diameter area. **Investigation of Single-Point Anomalies** – OESS personnel will intrusively investigate single-point anomalies in low density areas within the ODA1 site and kickout area. Single-point anomalies will be excavated and inspected to determine if the anomaly is MEC. Single-point anomalies will be excavated to depth-of-detection.
- **Evaluation of Large Anomalous Features –** OESS personnel will evaluate large anomalous features to identify highly disturbed areas (moderate anomaly densities) and disposal pits (high anomaly densities).
- **Survey of Highly Disturbed Areas –** OESS personnel will intrusively investigate highly disturbed areas having moderate anomaly densities within the ODA1 site and kickout area. Highly disturbed areas will be excavated and inspected to determine if the anomalies are MEC. Highly disturbed areas will be excavated to depth-of-detection, or to a depth of 7 feet bgs.

- **Survey of Disposal Pits –** OESS personnel will intrusively investigate disposal pits having high anomaly densities within the OB/OD area. Disposal pit are not expected to be present in the kickout area. Disposal pits will be excavated and inspected to determine if the anomalies are MEC. Disposal pits will be excavated to depth-of-detection, or to a depth of 7 feet bgs.
- **Demolition and Disposal** – Demolition/disposal of recovered MEC/MPPEH items will be accomplished using the BEM and procedures set forth in the ODA2 Work Plan and the approved ESS. All recovered MEC/MPPEH will be certified as MDAS upon inspection.
- **Site Restoration** – All excavations will be backfilled with the soils excavated from the location. The site will be planted with a grass seed mixture approved for use at the site.

2.2 PROJECT ORGANIZATION

2.2.1 Team Organization

The project team consists of USACE Staff from NAB and Lakes and Rivers Louisville (LRL) District, OHARNG, and ARNG. LRL is the Project Management District for RVAAP Restoration Program. NAB is the Designated Technical Lead for this action, and is responsible for overall management and execution of onsite activities for this action. An organizational chart for implementation of this Work Plan is presented in **Appendix B** of the ODA2 TCRA Work Plan (USACE, 2016). A summary of key personnel responsibilities is summarized in the following sections.

2.3 PROJECT PERSONNEL

The project will be executed using in-house labor resources. Team members include: Project Manager, Designated Technical Lead, Site Manager/ Senior UXO Supervisor (SUXOS), UXO Safety (UXOSO), Unexploded Ordnance Quality Control Officer (UXOQCS), Project Chemist, Contract Specialist, Ordnance and Explosive Safety Specialists (OESS), and support laborers. In addition, waste hauling will be procured. No contractors will be physically laboring onsite as part of this action.

The responsibilities for key positions for the field effort are described below:

- Project Manager – LRL is the Project Manager for RVAAP Restoration Program. The LRL Project Manager is responsible for ensuring all resources needed to complete the work are available, the work is or sufficient quality and being completed in accordance with the established schedule, and effective coordination is occurring between the project and installation staff. The Project Manager will participate in the bi-weekly contractor call and the bi-weekly Army-only call to update the project team of progress and/or problems.

- Designated Technical Lead – The NAB Designated Technical Lead is responsible for managing Military Munitions Design Center project resources, and ensuring that adequate and qualified technical resources are available to execute the field operations, and coordinating project status/issues with the installation and LRL Project Manager. The Designated Technical Lead assists the Project Manager in developing and executing the

technical approach for all actions taking place within ODA1 and kickout area and provides guidance to site personnel regarding compliance with local, state, federal and DoD regulations and guidelines. The Designated Technical Lead is the central point of contact for technical personnel, ensuring proper data flow, consistency of project execution and review of data and reports for accuracy, quality and completeness. The Designated Technical Lead will participate in the bi-weekly contractor call and the bi-weekly Army-only call to update the project team of progress and/or problems.

- Environmental and Explosive Safety Section (EESS) Chief – The EESS Chief will ensure qualified personnel are available to support the operation, manage and oversee site team members, monitor scheduling and funding expenditures and work closely with the Project Manager and Designated Technical Lead to assist as necessary with overall project management and technical issues.

- Site Manager / SUXOS – The Site Manager is responsible for day-to-day operations and completing the field effort. This includes, but is not limited to, safety, field coordination, field planning tasks, tracking progress of work, communicating with Project Manager and Designated Technical Lead, maintaining and submitting documentation, and schedule. The Site Manager coordinates and manages resources in coordination with the Project Manager. As the SUXOS, the site manager is also the senior subject matter expert in the field during the execution of the work. In addition to ordnance and explosive safety concerns, the SUXOS will also be responsible for the overall site safety.

- UXOSO/UXOQCS – The UXOSO/UXOQCS reports independently to the EESS Chief on safety and quality-related matters. The UXOSO/UXOQCS is responsible for monitoring all site activities to ensure strict compliance with established safety regulations and guidelines to include RVAAP specific guidance and to monitor all site activities to ensure that these activities are being carried out in accordance with established quality requirements and protocols as outlined in this Work Plan (USACE, 2016). The UXOSO/UXOQCS is responsible for conducting safety and Quality Control (QC) inspections of intrusive and explosives operations for compliance with the established procedures. The UXOSO/UXOQCS will perform daily surveillance of the work activities and issue corrective actions as necessary. The UXOSO/UXOQCS will maintain a daily log book and prepare daily Safety and Quality Assurance Reports (QAR) which addresses all aspects of site activities.

- Contract Specialist – The contract specialist will be responsible for assisting with contracting needs. Several blanket purchase agreements exist and will be utilized to support simplified acquisitions for the project. The support person will engage with the contractors and team leader to provide the request for proposals and resources.

- Field Support Team – The field support team members will be utilized to perform tasks which primarily require physical abilities and effort. They report to their assigned team supervisor.

All project personnel are responsible for understanding and complying with all requirements established in plans, procedures, and regulations for executing their work in accordance with

standard and accepted procedures. In addition, all personnel will be required to comply with the medical, training, experience and requirements for their respective field, and compliance with the Site Safety and Health Plan (USACE, 2019).

2.3.1 Site Operations

Site operations will be accomplished by members of the NAB Environmental and Explosive Safety Staff. NAB will use a 5–7 person team to accomplish site activities. At a minimum the team will include an OESS, a UXOSO/UXOQCS and Team Lead. Team size may increase or decrease dependent on the type of activity taking place.

2.4 PROJECT COMMUNICATION AND REPORTING

The project team will communicate clearly and effectively and will work collectively to make the MEC Verification Study a success. The Designated Technical Lead will be the primary point of contact with the customer at the OHARNG Environmental Office for this project. The Designated Technical Lead will ensure that equipment and staff are phased in based on the schedule requirements to ensure that maximum efficiency is achieved. All personnel will review the project plans and relevant site documents in advance of site activities to familiarize them with the technical scope, schedule, and requirements. During field operations the Designated Technical Lead with the support of others (e.g., Site Manager, EESS Chief) will schedule and direct work, monitor schedule adherence, ensure quality and safety standards are maintained, and develop and execute corrective action plans as necessary.

2.5 PROJECT DELIVERABLES

Following the completion of field activities, an After Action Report will be prepared and submitted to the stakeholders. The After Action will include a Probability Assessment for MEC. The content of the report will include at a minimum:

- Introduction and rationale for the MEC Verification Study at ODA1
- Site description and background
- Technical approach
- Discussion of all field activities
- Probability Assessment
- Results
- Summary and conclusions

If applicable, any problems encountered in implementing the MEC verification study, as well as corrective actions implemented, will be described in the Removal Action Report. The volume of materials removed and final disposition of those materials will be documented in a table, and trip tickets or manifests will be maintained and included in the report to support the tabular summary. The results of all testing performed to monitor site activities will be summarized and included in the after action report.

2.6 PROJECT SCHEDULE

The overall schedule of the project is presented in **Figure 8**.

2.7 CONTRACTOR MANAGEMENT

It is anticipated that contractors will be used for waste disposal services during the MEC Verification Study at ODA1. Contractors will only be onsite to drop off or pick up materials. All contractors will be escorted by USACE while onsite.

2.7.1 Laboratory Services

There will be no analytical sampling conducted as part of the MEC Verification Study at ODA1, except as described in 3.6.7 MEC Demolition and Disposal, if required.

2.7.2 Waste Disposal Services

Several waste streams will be generated throughout the work performance. Waste streams will include solid waste and scrap metal. All waste materials will be handled by a qualified waste hauler (yet to be determined). Waste characterization and handling procedures are discussed in **Section 5.0**. All items suitable for recycle (e.g. MDAS), will be provided to a qualified vendor for recycling.

2.7.3 Management of Field Operations

Field work will be coordinated within the USACE – Baltimore office. Field teams may be composed of USACE personnel and any necessary contract support. All resources will be managed by the Designated Technical Lead and Site Manager. The Site Manager will be responsible for identifying appropriate field staff and will confirm that the proposed project personnel have the necessary experience and required training for the project.

2.8 PROJECT COMMUNICATION AND REPORTING

The Site Manager will maintain a daily log provide site reports outlining daily site activities to the Designated Technical Lead who in turn will distribute to the project team. The UXOQCS will maintain a daily log and provide weekly QARs. The Site Manager will maintain a daily log and provide completed grid sheets to the UXOQCS.

3.0 FIELD OPERATIONS PLAN

3.1 OVERALL APPROACH TO MUNITIONS RESPONSE ACTIVITIES

The primary objective of this action is to conduct a MEC Verification Study at ODA1. The purpose of the MEC Verification Study is to collect information needed to determine if an explosive hazard exists at the site. Information collected will be used to prepare a Probability Assessment for MEC. A combination of visual surveys, surface and subsurface excavations, and trenching will be performed. Excavations will be conducted to a maximum depth of 7 feet bgs. Recovered MEC/MPPEH will be explosively destroyed in the BEM, using procedures outlined in the ODA2 TCRA Work Plan and the approved ESS. All recovered MEC/MPPEH will be certified as MDAS upon inspection.

3.2 APPLICABLE GUIDANCE AND REGULATIONS

Munitions response activities will be performed in accordance with DoD, DA, USACE and local, state, and federal regulations. Persons engaged in the handling and transport of explosives will comply with Title 18 United States Code (U.S.C.) 842 and 29 Code of Federal Regulations (CFR) 1910.120. Intrusive activities and demolition will be conducted in accordance with the project Site Safety and Health Plan (USACE, 2019) and the approved ESS.

3.3 ANTICIPATED MEC

Specific MEC which may be present at ODA1 may include any type of munition in the conventional ammunition inventory that was stored and/or utilized at RVAAP. This includes 20mm–155mm, grenades, rockets, bombs and their assorted components e.g. fuzes, burster tubes, etc. To date, the largest munition identified at ODA1 has been the 75mm projectile.

3.4 GEOGRAPHIC INFORMATION SYSTEM MANAGEMENT

NAB will establish and manage a project Geographic Information System (GIS) to meet applicable federal, DOD, and Army geospatial standards. In addition, the GIS project will comply with requirements for the Ravenna Environmental Information Management System REIMS. Verification Study results, including observations, and MEC/MPPEH recovery information will be tracked using the project GIS. GIS data will be created and managed in compliance with the following requirements:

- Data will adhere to all applicable federal, DoD, and Army geospatial standards, and be provided in Universal Transverse Mercator (UTM), Zone 18N, and WGS84 coordinate system.
- Spatial data and metadata will conform to the Federal Geographic Data Committee National Standards for Spatial Data Accuracy.
- Centroid coordinates and elevations of sampling locations will be supplied to REIMS as both an Excel file and a shapefile. The coordinate system, which will be clearly documented, will be in North Atlantic Datum (NAD) 83 Ohio State Plane North feet or NAD83 UTM Zone 17 North meters.
- Polygons for disposal pit discoveries will be supplied to REIMS as shapefiles or an ESRI compatible geodatabase.

- All data will comply with the standard for the National Guard: Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE) 2.6.

3.5 MOBILIZATION

This task will include mobilization of field staff; equipment (e.g., computers, detectors, vehicles) and consumable materials (e.g., flagging, stakes, spray paint, personal protective equipment [PPE]); setup, maintenance, and testing of equipment and facilities, computers, all-terrain vehicles, radios); familiarizing project personnel with the site and with work and safety requirements; coordination of planned field activities and schedules with Range Control; and obtaining utility clearances.

There will be no permanent site office established at ODA1. Site personnel will accomplish all administrative tasks from temporary facilities, their hotel room, or if necessary.

3.5.1 Grid Survey

A grid system will be established at ODA1 and kickout area. Grid location and configuration is illustrated on **Figure 5**, **Figure 6**, and **Figure 7**. The grid system will cover the area to be investigated and ensure full coverage is achieved in the MEC Verification Study. Field personnel will not investigate all grids. The investigation will begin in the AOC and field observations will be used to determine the need for step-out into surrounding areas/grids. The grid system will provide OESS personnel a mechanism to track and record observations and results during the study. The grid layout includes the following two primary steps; (1) establish boundary control points, (2) grid corner location survey. Each step is discussed in detail in the following sections:

3.5.1.1 Establish Boundary Control Points

- Boundary control points will be placed to accurately identify the bounds of the site. The boundary control points will also confirm that the surveyed boundary entirely overlaps each study area. The overlap will ensure full coverage of the ODA1 and kickout area.
- Boundary control points will be at selected boundary locations.
- Boundary control points will be established by licensed professional surveyor or will be surveyed by a Trimble Real Time Kinematic (RTK) Global Positioning System (GPS) or equivalent laser total station
- Each boundary control point located will be marked by a wooden stake with fluorescent flagging. The wooden stake will have the unique boundary control point identification (ID).

3.5.1.2 Grid Corner Location Survey

- The study area has been subdivided into a 100′ × 100′ grid system. The grid system will be used to track progress and results and to ensure complete coverage is achieved during the surface and subsurface removal actions.
- The grid layout/identification is a continuous 100′ × 100′ alphanumeric grid system. A map and list of grid corner coordinates will be provided in the site report.
- Grid corner positions will be marked with a wooden stake designated by a unique alpha-numeric identifier.

- Grid corner positions will be marked with a wooden stake designated by a unique alpha-numeric identifier.
- Once established, the grid corner location will be uploaded to the project GIS.

3.5.2 Installation of Silt Fence

Silt fence will be installed to control surface water runoff in the area of disturbance. The area to be disturbed at any one time is expected to be limited, however, silt fence will be installed and maintained as a preventative measure. The silt fence will remain in place until final grading and seeding and germination has occurred.

3.5.3 Brush Clearing

All vegetation removal will be closely coordinated with the OHARNG Environmental Office. Brush clearing will be conducted within the ODA1 and kickout areas needed to perform the MEC Verification Study, as necessary. Minimal vegetation removal is anticipated. There are no plans to remove any trees; however, if small tree removal is necessary, no trees larger than 3 inches will be removed. The goal is to accomplish the MEC Verification Study without significant impact to the surrounding environment. Brush will not be removed from the work site, rather fallen brush/trees will be managed within the respective work grids. Natural debris (i.e., fallen trees) that will interfere with activities will be cut and moved from the areas to be cleared as necessary. Brush clearing will be conducted immediately following the grid survey activities.

Areas with high grass will be mowed prior to April or after August due to the potential for disturbing grassland nesting species. Felling of trees is not anticipated, but in the event tree removal is necessary, all removal will occur between 1 October to 31 March. No cutting of trees is permitted between April and October due to the Northern Long Eared Bat.

3.5.4 Geophysical Instrumentation

Handheld analog instruments (magnetometers & all metals) will be used at ODA1 for both surface and subsurface investigation activities. All work will be conducted with either the Schonstedt GA-52Cx magnetic locator (or similar device) and the Vallon active pulse induction system (all metals detector) or similar device

The Schonstedt GA-52Cx magnetic locator is a handheld unit that detects changes in the Earth's ambient magnetic field caused by ferrous metal. Two fluxgate sensors are mounted a fixed distance apart and aligned in gradiometer configuration to eliminate a response to the Earth's ambient field. The magnetic locators generate an audio output and a meter deflection when either of the two sensors is exposed to a disturbance of the Earth's ambient field associated with a ferrous target and/or the presence of a permanent field associated with a ferrous target. Schonstedt detectors are a "go/no go" instrument and will be checked once every morning prior to removal activities. Instruments will additionally be checked periodically throughout the day during operations.

The Vallon all metals detector is a handheld unit that works by transmitting an electromagnetic field from the search coil into the ground. Any metal objects (targets) within the electromagnetic

field will become energized and retransmit an electromagnetic field of their own. The detector's search coil receives the retransmitted field and alerts the user by producing an audible target response. Vallon detectors are a "go/no go" instrument and will be checked once every morning prior to removal activities. Instruments will additionally be checked periodically throughout the day during operations.

3.6 SURFACE AND SUBSURFACE INTRUSIVE OPERATIONS

3.6.1 OESS Qualifications

All OESS personnel are fully qualified as SUXOS per the criteria established in DDESB TP 18, Minimum Qualifications for Unexploded Ordnance (UXO) Technicians.

3.6.2 MEC Verification Study Description

The following provides a description of activities and technical approach to be utilized during execution of this fieldwork. The methods to be used to complete this fieldwork are provided in subsequent sections.

Ferrous Instrument-Assisted Survey of the OB/OD Area

A ferrous instrument-assisted survey will be conducted at the OB/OD area of ODA1. OESS personnel will investigate single-point anomalies to determine the presence or absence of MEC in surface and subsurface soil at ODA1. OESS personnel will evaluate large anomalous features to identify: 1) highly disturbed areas (moderate anomaly density); and 2) disposal pits (high anomaly density).

Ferrous and Non-Ferrous Instrument-Assisted Survey of the Kickout Area

A ferrous and non-ferrous instrument-assisted survey will be conducted in the kickout area. OESS personnel will investigate single-point anomalies to determine the presence or absence of MEC in surface and subsurface soil in the kickout area. In addition, the boundary of the kickout area will be delineated.

Survey of Highly Disturbed Areas

An intrusive investigation will be conducted in highly disturbed areas (moderate anomaly density) to evaluate the presence or absence of MEC in surface and subsurface soil within the ODA1 and the kickout area. The investigation will be conducted to depth-of-detection, or a maximum depth of 7 feet bgs.

Survey of Disposal Pits

An intrusive investigation will be conducted in disposal pits to evaluate the presence or absence of MEC in surface and subsurface soil within the ODA1 and the kickout area. The investigation will be conducted to depth-of-detection, or a maximum depth of 7 feet bgs.

3.6.3 MEC Verification Study Procedures

3.6.3.1 Surface Clearance, Brush Clearing, and Instrument-Assisted Survey

Surface Clearance

OESS personnel will conduct a surface clearance for MEC in ODA1 and kickout area. This includes removal of items detected at ground surface either fully exposed or partially exposed using analog detection instruments. Tall grass, leaf litter and detritus will be removed down to the ground surface to investigate anomalies detected. If a detected anomaly is partially exposed it will be fully investigated.

Brush Clearance

It is anticipated that minimal brush clearing/mowing will be required in ODA1 and kickout area. Brush clearing activities will be conducted after the surface clearance has concluded. Brush clearing will be minimized to only those actions absolutely necessary to conduct MEC Verification Study activities. Brush clearing activities will be closely coordinated with the OHARNG Environmental Office to ensure that protected plant species are not removed.

*Ferrous Instrument-Assisted Survey of the OB/OD Area of ODA1*OESS personnel will conduct a ferrous instrument-assisted survey in the OB/OD area of ODA1. OESS personnel will identify and investigate single-point anomalies to determine the presence or absence of MEC. Single point anomalies will be investigated to depth-of-detection. The team will evaluate large multi-point anomalies for evidence of previous disturbance and potential disposal activities. Areas suspected of being highly disturbed or potential disposal pits will be marked/delineated on the surface for further evaluation. For the purposes of this work plan, low anomaly density will be defined as 3 or less anomalies within a 6-foot diameter area, moderate anomaly density (highly disturbed areas) will be defined as 3 or more anomalies within a 6-foot diameter area, and high anomaly density (disposal pits) will be defined as having a saturated magnetic signature in a 6-foot diameter area.

OESS personnel will install a grid system for site control. The grid layout is a continuous 100′ × 100′ numeric grid system with wooden stakes installed at grid corners. The grid boundaries will be established prior to performing surface removal activities. Instrument-assisted survey activities will be conducted using a Schonstedt GA-52cX and/or subsurface magnetometer following daily QC testing. The following grid survey approach will be performed by the OESS team:

- Each grid will be subdivided into 5-foot sweep lanes. OESS will travel along individual search lanes and overlapping the sweep area.
- Each lane will be surveyed to achieve complete coverage and overlap within the established grid boundaries.
- Visual observations will also be made by the team as each transect is traversed and significant observations (e.g. stressed vegetation/stained soil) recorded on the grid sheet and in the daily logbook.
- Grass, leaf litter and detritus will be removed to the ground surface to investigate items. If a metallic item is observed and/or detected, the OESS personnel will investigate the

item and remove it if exposed/partially exposed. Non-MEC/MPPEH related debris which is too large to move will be noted on the grid sheet and in the daily logbook.
- Investigation results will be noted on each grid sheet. Significant finds will be noted in the daily logbook and GPS coordinates taken.
- Multiple pin flags will be used to mark the boundary of highly disturbed areas (moderate anomaly density) and potential disposal pits (high anomaly density). Location data will be annotated on the grid sheet and in the daily logbook.

Ferrous and Non-Ferrous Instrument-Assisted Survey of the Kickout Area

OESS personnel will conduct a ferrous and non-ferrous instrument-assisted survey using all metals detectors in the kickout area. OESS personnel will identify and investigate single-point anomalies to determine the presence or absence of MEC due to kickout from former OB/OD activities. Single point anomalies will be investigated to depth-of-detection. Observations made in the field will be used to define the boundaries of the kickout area. The lateral extent of the kickout area will be defined by the presence or absence of MEC, MPPEH, or MD in these areas. Based on the geophysical survey data (**Figure 4**), evidence of significant disturbance or disposal activities is not anticipated in the kickout area. The grid survey approach in the kickout area will be identical to procedures described in the previous section.

3.6.3.2 Intrusive Investigations

Survey of Highly Disturbed Areas

An intrusive investigation will be conducted in highly disturbed areas (moderate anomaly density) to evaluate the presence or absence of MEC at ODA1. Data collected during the instrument-assisted survey will be correlated with previous removal action data (**Figure 5**) and geophysical survey data (**Figure 6**) to guide the intrusive investigation. During the survey of ODA1 area the OESS team will delineate highly disturbed areas (moderate anomaly density). OESS personnel will excavate anomalies to evaluate the presence or absence of MEC. Excavations will continue to depth-of-detection, or a maximum depth of 7 feet bgs. Handheld instruments, as previously discussed, will be used for this survey. Visual observations will also be made by the team as they sweep and excavate the highly disturbed area, significant observations (such as soil staining, MD material, ash) will be documented through photo documentation and daily reporting.

Survey of Disposal Pits

An intrusive investigation will be conducted in disposal pits to evaluate the presence or absence of MEC at ODA1. During survey of ODA1 Area the OESS team will delineate potential Disposal Pits. All pits delineated will be evaluated for MEC. This will be done by excavating a trench across the length of delineated areas center, near left edge and near right edge (more or less depending on the size of the delineated area). All excavated materials will be laid out and inspected by the OESS team for MEC. Visual observations will also be made by the team as each trench is being excavated, significant observations (such as soil staining, MD material, ash) will be documented through photo documentation and daily reporting.

3.6.4 Munition with the Greatest Fragmentation Distance

As identified in the ESS, the 75mm Shrapnel projectile is the munition with the greatest fragmentation distance (MGFD). If a munition with a greater fragmentation distance is encountered during operations then that explosive safety quantity distance (ESQD) arc will be implemented immediately, work will continue and an amendment to the ESS submitted.

3.6.5 Minimum Separation Distances

The minimum separation distance (MSD) for the site is 121 feet, as identified in the ESS. Anomalies will be investigated by OESS teams only when an exclusion zone has been established around each anomaly location. The exclusion zone is based on the hazardous fragment distance (HFD) for the MGFD. No intrusive work will be performed until non-essential personnel are separated from the anomaly location by the HFD. The exclusion zone will be maintained by the OESS team until the excavation is complete. If an area cannot be blocked, spotters will alert the OESS team when non-essential personnel need to enter the exclusion zone. In this case, intrusive operations will be discontinued until the nonessential personnel leave the area.

3.6.6 Anomaly Investigation Procedures

The following investigation procedures will be used when investigating anomalies:

- The item will be considered MEC/MPPEH until it is positively identified. The exclusion zone for the anomaly will be maintained during excavation.
- For surface anomalies, leaf litter and detritus will be removed down to the ground surface to investigate items. If a detected anomaly is not exposed or partially exposed after moving leaf litter and detritus down to ground surface, investigation of the detected anomaly will cease and OESS personnel will continue with surface removal activities.
- For subsurface anomalies, excavation will commence adjacent to the anomaly and will continue until the depth of the anomaly has been reached.
- Excavations will be continually checked using a magnetometer/all metals detector to avoid direct contact with the item.
- The sidewall of excavations will then be expanded to expose the item for inspection and identification.
- Earth moving equipment (mini excavator) may be used when the depth of the item cannot be managed by manual excavation. Excavations will be performed in shallow lifts while the OESS performs anomaly avoidance procedures. Mechanical excavations will be used only until the excavation is within 12 inches from the item. Manual excavations will be used to remove the remaining soil cover.
- All recovered MEC and material presenting an explosive hazard (MPPEH) identified as material documented as an explosive hazard (MDEH) will be destroyed on the same day found. In the event this cannot occur due to weather or delay in explosive delivery, items will be guarded until disposal.
- All material potentially presenting an explosive hazard (MPPEH) procedures will be in accordance with DoDI 4140.62 and EM 385-1-97. All MPPEH will be assessed and its explosive safety status determined and documented prior to transfer within Department of

Defense (DoD) or release from DoD control. Prior to release to the public, MPPEH will be documented by authorized and technically qualified personnel as Material Documented as Safe (MDAS) after 100% inspection and an independent 100% re-inspection to determine that it is safe from an explosives safety perspective.

- If the subsurface contact proves to be non-munitions related, the item will be removed, and the hole re-checked with a magnetometer/all metals detector.
- When the anomaly has been resolved or the hole is deemed "clear" of additional metallic material, the excavation will be refilled and tamped.

If an item is discovered to be at depths below 7 feet, the OESS team will conspicuously mark the location with flagging and continue to the next anomaly. The Site Manager will determine if the anomaly warrants further investigation or should be left in the ground.

3.6.7 MEC Demolition and Disposal

NAB will conduct demolition activities on an as-needed basis and in accordance with ODA2 Work Plan, ESS, and the requirements of Technical Manual (TM) 60A-1-1-; EM 385-1-97, Explosives Safety and Health Requirements; and applicable Bureau of Alcohol, Tobacco, and Firearms (ATF), federal, state, and local regulations. MEC/MPPEH will be demolished in one of three ways: (1) blown-in-place (BIP) (2) relocated to the BEM for disposal, or (3) Explosive Ordnance Disposal (EOD) will respond. Demilitarization by explosive demolition of any item will not occur until it has been positively identified. Use of EOD will be limited to the following scenarios:

- MEC cannot be identified as a conventional explosive.
- The fuze cannot be identified by type or function.
- Chemical warfare materiel is suspected.

MEC/MPPEH that is not acceptable to move will be blown-in-place. MEC/MPPEH that is deemed acceptable to move will be relocated to the BEM for disposal. In the event of a BIP, MC sampling will occur post detonation as outlined in **Section 3.7** of the ODA2 TCRA Work Plan, SAP Addendum (**Appendix C**) (USACE, 2016). General demolition notifications will be made to the following:

- Range Control
- Security Dispatcher
- OHARNG Environmental Office

Additional notifications will be made as outlined in **Section 3.6.9 and Section 3.6.10**.

Detonations will be scheduled by the Site Manager based on the weather and logistical considerations. Prevailing weather condition information will be obtained from a reliable resource such as Youngstown Airport, www.wunderground.com, or www.weather.com. Weather data will be logged before each on-site detonation. The demolition charges will not be primed or connected for electrical firing during the approach or presence of a thunderstorm. Other weather conditions (high winds, dust storms, temperature inversions, low altitude clouds, or cloud coverage of more than 50%) may adversely impact planned demolition operations. The Site

Manager will consider these conditions when determining whether to conduct demolition operations.

The control of the demolition site must always be maintained during demolition operations. Nonessential personnel within the MSD, must evacuate to a safe area. All access roads entering the site will be blocked during demolition operations to ensure that no one enters the site. The UXOSO and Demolition Team Leader will ensure that the area is clear of unauthorized personnel and equipment prior to permitting the attachment of the initiation devices to the priming charge. The control of the initiation devices will remain with the Demolition Team Leader until attachment to the firing circuit. An observer will be stationed where there is a good view of the approaches to the demolition site. It will be the responsibility of the observer to notify the Team Leader to suspend firing if a vehicle or person is seen approaching the general demolition site. The demolition materials will always be accounted for by the demolition team. Only the number of explosives needed to complete the day's demolition operations will be transported to the demolition site.

BIP sites will be photographed with a digital camera prior to and after firing of the shot, and the photograph(s) will be saved electronically for After Action Report. At a minimum after each detonation, the detonation points and general demolition site will be inspected to ensure that all items have been consumed. The area where demolition operations are being conducted will remain secured until the UXOSO and Demolition Team Leader have given "all clear."

In the event of a fire or unplanned explosion, site personnel will be responsible for extinguishing the fire. If they are unable to do so, they will notify the Range Control and evacuate the area. **NOTE: Do not attempt to fight explosive fires.**

3.6.7.1 Buried Explosion Module

The BEM calculation is used as an engineering control precision safety tool. Its primary function is to provide burial depth information to prevent fragmentation from being propelled great distances when conducting demolition in an area that cannot sustain an unlimited exclusion area. Through the use of the BEM the HFD exclusion area can be minimized to zero feet. As a safety precaution, a minimum HFD of 200 feet exclusion area, for qualified UXO personnel, based on the MEC/MPPEH item.

Specifically, the BEM is a spreadsheet calculator that requires user input related to the specific MEC item being disposed of during demolition operations. This information comes from the DDESB Fragmentation Data Review Sheets that are periodically updated with new data. The user input requirements are the fragment weight in pounds, fragment velocity in feet per second, the single item trinitro-toluene (TNT) equivalent weight in pounds, total number of items, and total weight of all donor charges in pounds. The last piece of information to input is the depth of burial in feet. The depth of burial input can adjust the HFD exclusion area requirement from maximum exclusion area to zero feet. For example, if a M107 155mm high explosive projectile is used for calculation you can adjust the depth of burial from the maximum exclusion area of 2,894 feet to zero feet by adding more or less burial material (sand) to the demolition shot. This method is also known as tamping which is the process of placing mud, sand, clay or other dense material on and around an explosive charge that has been placed on the surface of the ordnance

item. It helps with reducing the initial pressure of the detonation and limiting the fragmentation exclusion area.

Use of the BEM on sites similar has resulted in limiting potential contamination by detonation to less than 3 feet. Buried explosion module specifications are included in the ODA2 TCRA Work Plan, **Appendix D** (USACE, 2016).

Buried Explosion Module Notification and Reporting Requirements

All MEC/MPPEH recovered during the MEC Verification Study and deemed acceptable to move will be transported to the BEM and destroyed. The BEM is physically located at ODA2 (**Figure 3** of the ODA2 TCRA Work Plan, [USACE, 2016]).

Notifications

OESS personnel will coordinate all required notifications in accordance with the ODA2 Work Plan prior to conducting any MEC/MPPEH demolition operations at the BEM. All notification will be through the OHARNG Environmental Office, as follows:

- Notification to the Ohio EPA before and after demolition.
- Notification to other outside agencies such as emergency contacts, Federal Aviation Administration (FAA), etc.

Standard Operating Procedures and Inspection Reporting

In addition, OESS personnel will provide SOPs and weekly inspection reports for BEM demolition operations to the OHARNG Environmental Office as follows:

- Net explosive weight of munitions that are blown-in-place or blown at the BEM (excluding donor charges).
- Inspection report for BEM structure
- Inventory of all munitions that are disposed at the BEM.
- Written SOP that describes specifics of the demolition operation.
- Log of each demolition shot, and all waste generated as part of the project (nonhazardous/scrap etc.).

All demolition activities on acceptable to move items will be conducted using the BEM. The BEM fully contains the demolition explosion and prevents a release of MC to the environment. Subsequently, no pre- or post-detonation media sampling will be conducted as part of this MEC Verification Study.

3.6.8 BIP Notification and Reporting Requirements

MEC/MPPEH deemed unacceptable to move will be destroyed using BIP methods. Pre-demolition and post-demolition information will be provided to the Ohio EPA through the OHARNG Environmental Office in accordance with the notification and reporting requirements outlined in (**Appendix E** of the ODA2 TCRA Work Plan, [USACE, 2016]).

3.6.9 Notifications for Work Occurring After Normal Business Hours

Removal activities will be fully coordinated with installation staff to ensure compatibility with operational requirements. As such, any work that will occur after 1630 hours during the week, or on a weekend, will be fully coordinated with the OHARNG Environmental Office and Range Control prior to it taking place.

3.6.10 Material Potentially Presenting an Explosive Hazard

The NAB OESS Team will classify recovered items as MEC/MPPEH. MEC will be disposed of as described in **Section 3.6.7**. MPPEH will be inspected to determine whether it is material documented as an explosive hazard (MDEH) or MDAS. MDEH will be disposed of by detonation as described in **Section 3.6.7**.

The OESS Team will ensure that all MPPEH items are inspected per the criteria established in DoD Instruction (DoDI) 4140.62, Engineering Manual (EM) 385-1-97 and Defense Explosive Safety Regulation (DESR) 6055.09 Edition 1 as follows:

- 100% inspection and 100% re-inspection by the OESS team.
- Verification of the inspection process by the UXOSO and Site Manager.
- Ensure that all MDEH is disposed of as in **Section 3.6.7**.
- Ensure that all certified MDAS is held in a secure container prior to final disposition.
- Ensure that appropriate documentation (DD Form 1348-1) is completed and accompanies the MDAS when released.

The DD Form 1348-1A will list the following:

- Basic material content.
- Estimated weight.
- Unique identification of each of the container and seal number.
- Location where the MDAS was obtained.

3.7 BLOW-IN-PLACE OPERATIONS

If required, blow-in-place operations will be conducted in accordance with the procedures described in Section 3.6.3 of the ODA2 TCRA Work Plan (USACE, 2016).

3.8 SITE RESTORATION

Excavation/detonation holes will be backfilled with the soils excavated from the location or with additional fill from neighboring excavations, as necessary. All disturbed areas will be graded and seeded with a seed mix approved by the installation.

3.9 WORK SCHEDULE

The OESS teams may be working up to a 50-hour work week to ensure that field activities are completed on schedule. The standard work schedule is from 0700–1430 hrs. Alternative hours and weekend work will be coordinated and preapproved with the RVAAP Restoration Office and Range Control.

4.0 QUALITY ASSURANCE/QUALITY CONTROL PLAN

Quality Assurance/Quality Control operations will be conducted in accordance with the procedures described in Section 4.0 of the ODA2 TCRA Work Plan (USACE, 2016).

5.0 WASTE MANAGEMENT PLAN

Minimal waste will be generated as a result of this action at ODA1; therefore, a waste minimization plan is not required.

6.0 EXPLOSIVES MANAGEMENT PLAN

Explosives management and operations will be conducted in accordance with the procedures described in Section 6.0 of the ODA2 TCRA Work Plan (USACE, 2016).

7.0 ENVIRONMENTAL PROTECTION PLAN

Environmental resources will be managed in accordance with the procedures described in Section 7.0 of the ODA2 TCRA Work Plan (USACE, 2016).

8.0 REFERENCES

DDESB, 2004. TP 18, Minimum Qualifications for Unexploded Ordnance Technicians and Personnel. 20 December.

DDESB, 2012. TP 16, Methodologies for Calculating Primary Fragment Characteristics. (Revision 4). August 2012.

DoD, 2008, EM 385-1-97, Explosives Safety and Health Requirements Manual

DoD, 2019.DESR 6055.09 Edition 9, Defense Explosives Safety Regulations. 13 Jan 2019.

DoD, 2014. DoDI 4140.62, Material Potentially Presenting an Explosive Hazard. 19 February.

DA, 2014. TM 60A-1-1-31, Explosive Ordnance Disposal Procedures, General Information on Explosives and Ordnance Disposal (EOD) Disposal Procedures (Revision 5). March.

USACE, 2009. Data Item Description (DID) MR-005-01 for a Type II Work Plan.

USACE, 2011. Final Digital Geophysical Mapping Report for the RVAAP-34 Sand Creek Disposal Road Landfill, RVAAP-03 Open Demolition Area #1, and RVAAP-28 Mustard Agent Burial Site, Version 1.0. January 2011.

USACE, 2016. Final Work Plan, Time Critical Removal Action, RVAAP-004-R-01 Open Demolition Area #2, Former Ravenna Army Ammunition Plant Ravenna, Ohio. March 2016.

USACE, 2019. Site Safety and Health Plan. MEC Verification Study, Open Demolition Area #1, May 2019

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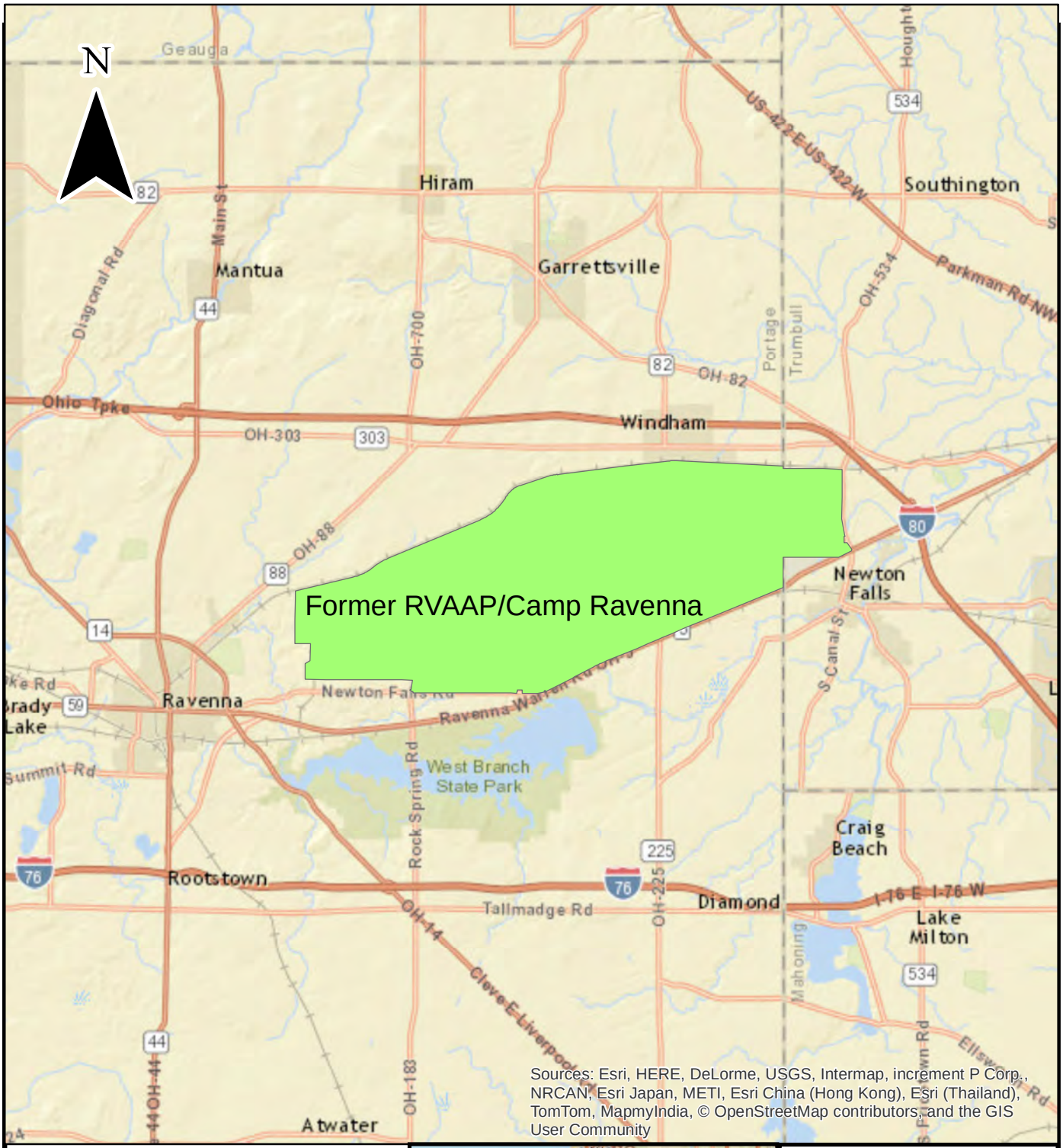
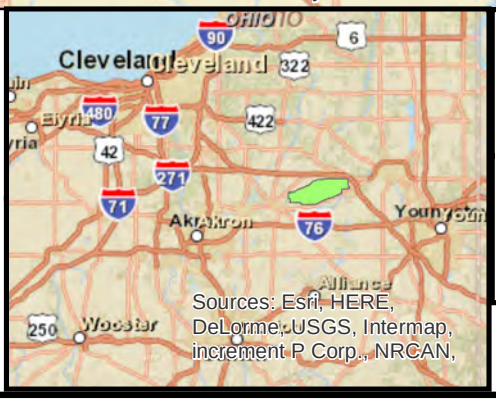
FIGURES

Figure 1: Installation Location Map



Camp Ravenna

0 1.25 2.5 5 Miles



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Baltimore District

Figure 1
Installation Location Map

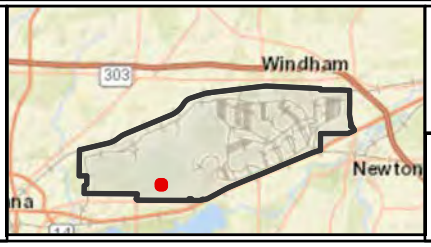
Figure 2: Open Demolition Area #1, Site Location Map

Legend

Open Demolition Area #1 Investigation Area (8.16 Acres)

0 75 150 300 Feet

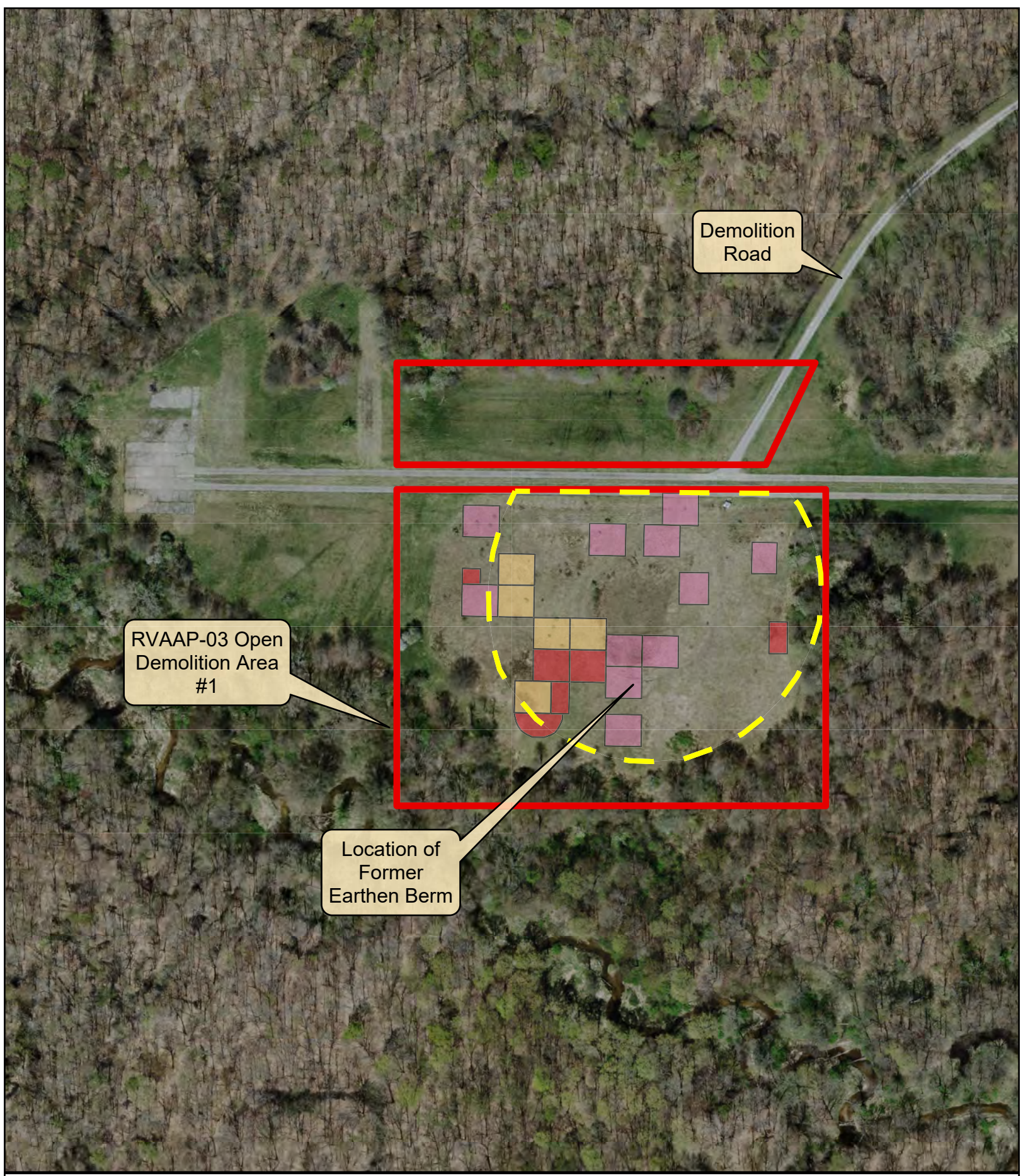
N



US Army Corps of Engineers
Baltimore District

Figure 2
Open Demolition Area #1, Site Location Map,
Former Ravenna Army Ammunition Plant,
Ravenna, Ohio

Figure 3: Open Demolition Area #1, Previous Removal Action Results



Legend

ODA1 AOC Boundary

Op e De olition Area #1 Investigation Area (8.16 Acres)

Explosives and Metals

MEC/MD

Metals

0 75 150 300 Feet

N

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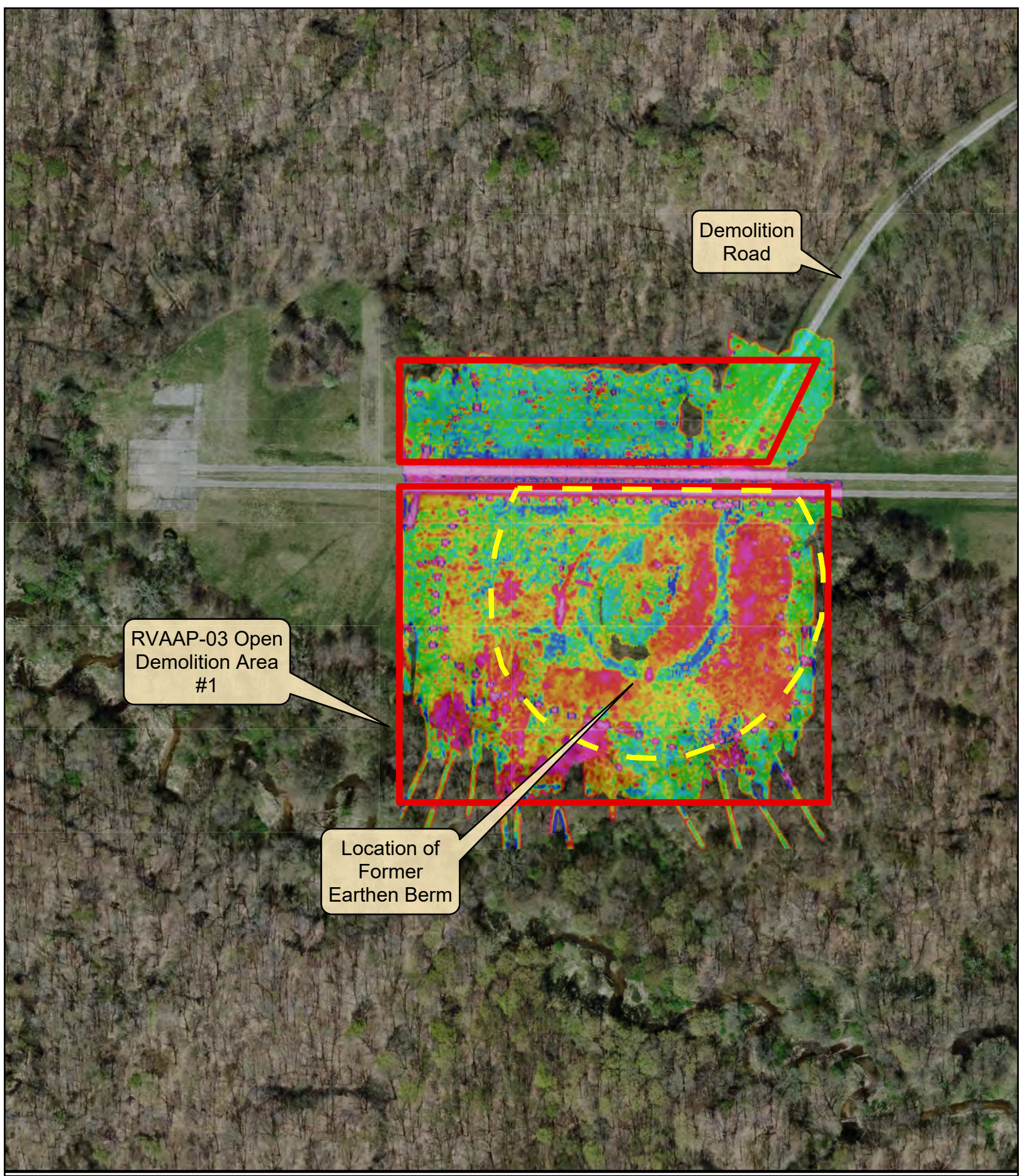
Baltimore District

Figure 3
Open Demolition Area #1, Previous Removal Action Results, Former Ravenna Army Ammunition Plant, Ravenna, Ohio

Figure 4: Open Demolition Area #1, Geophysical Survey Data



Legend

ODA1 AOC Boundary1

Open Demolition Area #1 Investigation Area (8.16 Acres)2

Red: Band_1

Green: Band_2

Blue: Band_3

0 75 150 300 Feet

N

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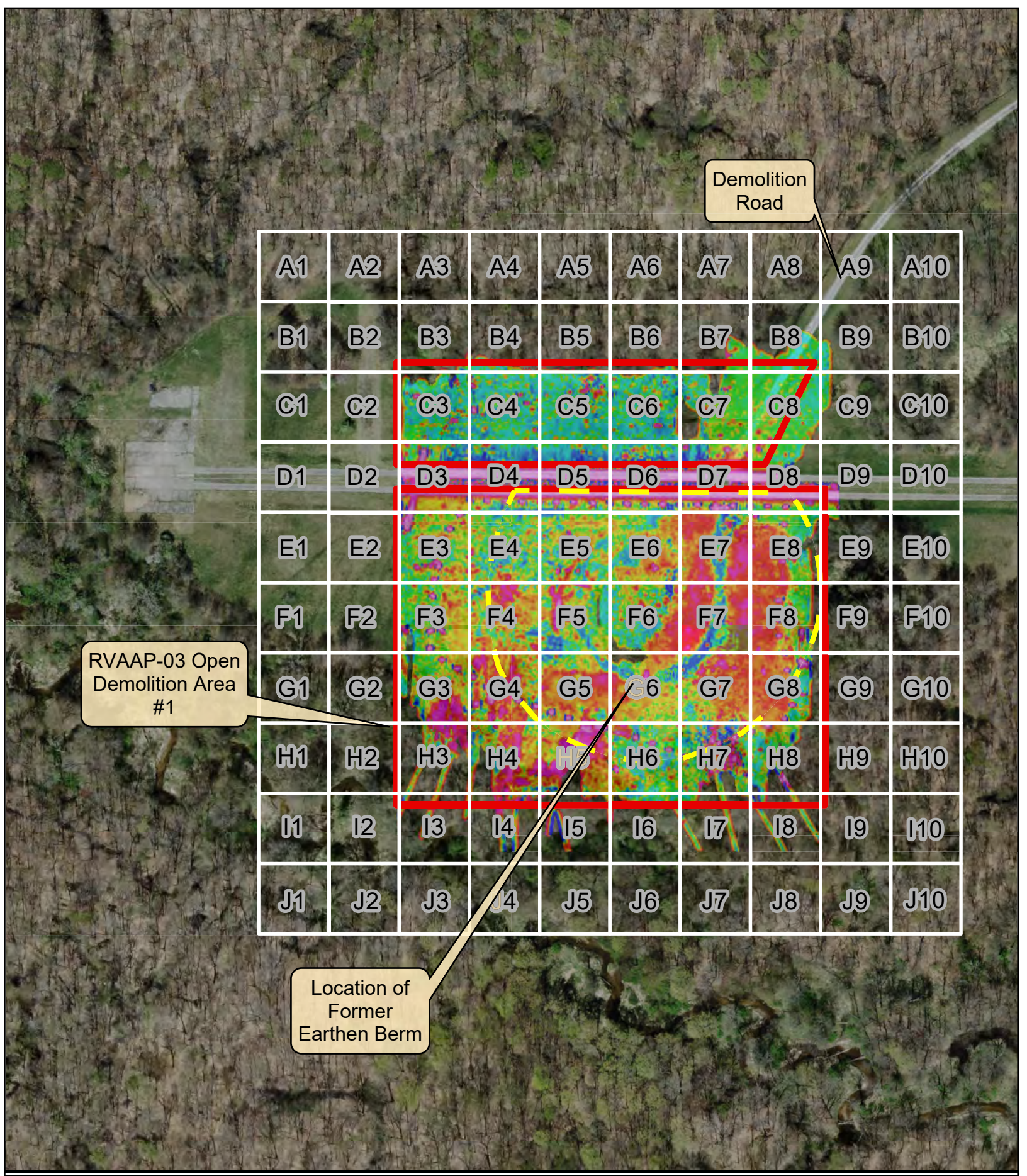
Figure 4
Open Demolition Area #1, Geophysical Survey Data,
Former Ravenna Army Ammunition Plant, Ravenna, Ohio

Figure 5: Open Demolition Area #1, MEC Verification Study Grid and Previous Removal Action Results



Legend

ODA1 AOC Boundary

Open Demolition Area #1 Investigation Area (8.16 Acres)

N

0 75 150 300 Feet

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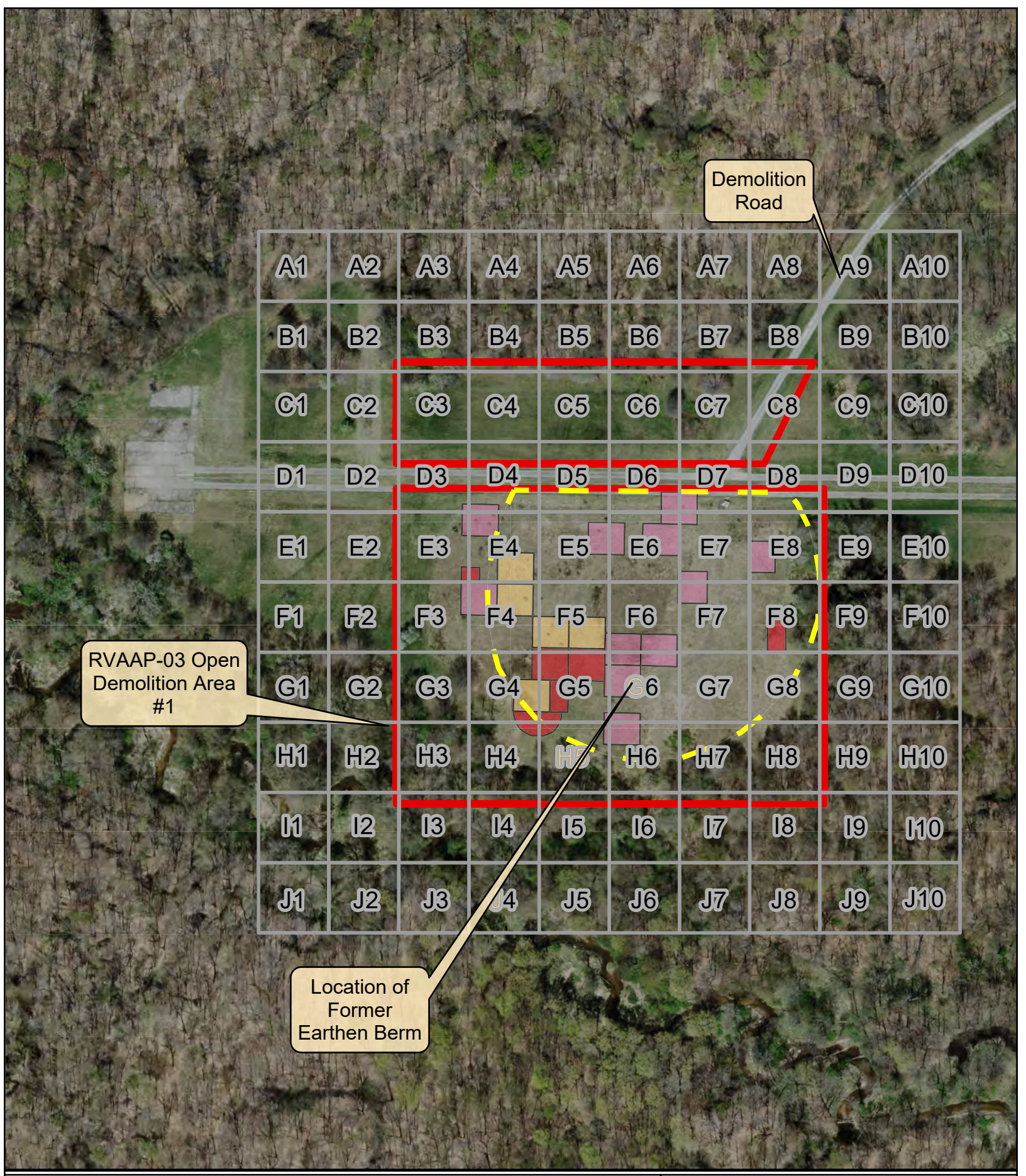
Baltimore District

Figure 6
Open Demolition Area #1, MEC Verification Study Grid and Geophysical Survey Data, Former Ravenna Army Ammunition Plant, Ravenna, Ohio

Figure 6: Open Demolition Area #1, MEC Verification Study Grid and Geophysical Survey Data



Legend

- ODA1 AOC Boundary
- Open Demolition Area #1 Investigation Area (8.16 Acres)
- Explosives and Metals
- MEC/MD
- Metals
- Site Grid

0 75 150 300 Feet

N

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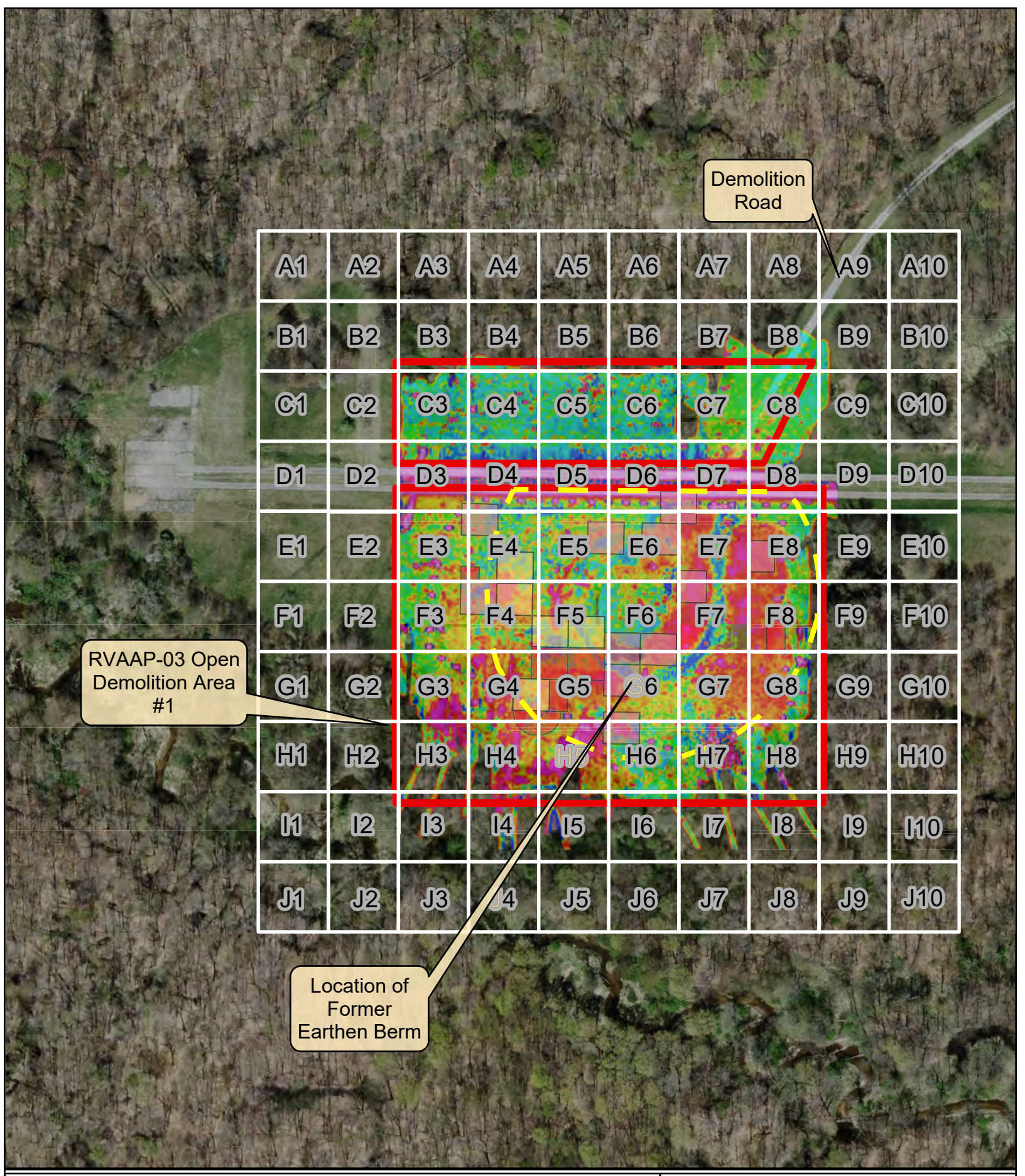
Baltimore District

Figure 5 - Open Demolition Area #1, MEC Verification Study Grid and Previous Removal Action Results, Former Ravenna Army Ammunition Plant, Ravenna, Ohio

Figure 7: Open Demolition Area #1, MEC Verification Study Grid, Previous Removal Action Results, and Geophysical Survey Data



Legend

- ODA1 AOC Boundary
- Open Demolition Area #1 Investigation Area (8.16 Acres)
- Explosives and Metals
- MEC/MD
- Metals
- Red: Band_1
- Green: Band_2
- Blue: Band_3

0 75 150 300 Feet

N

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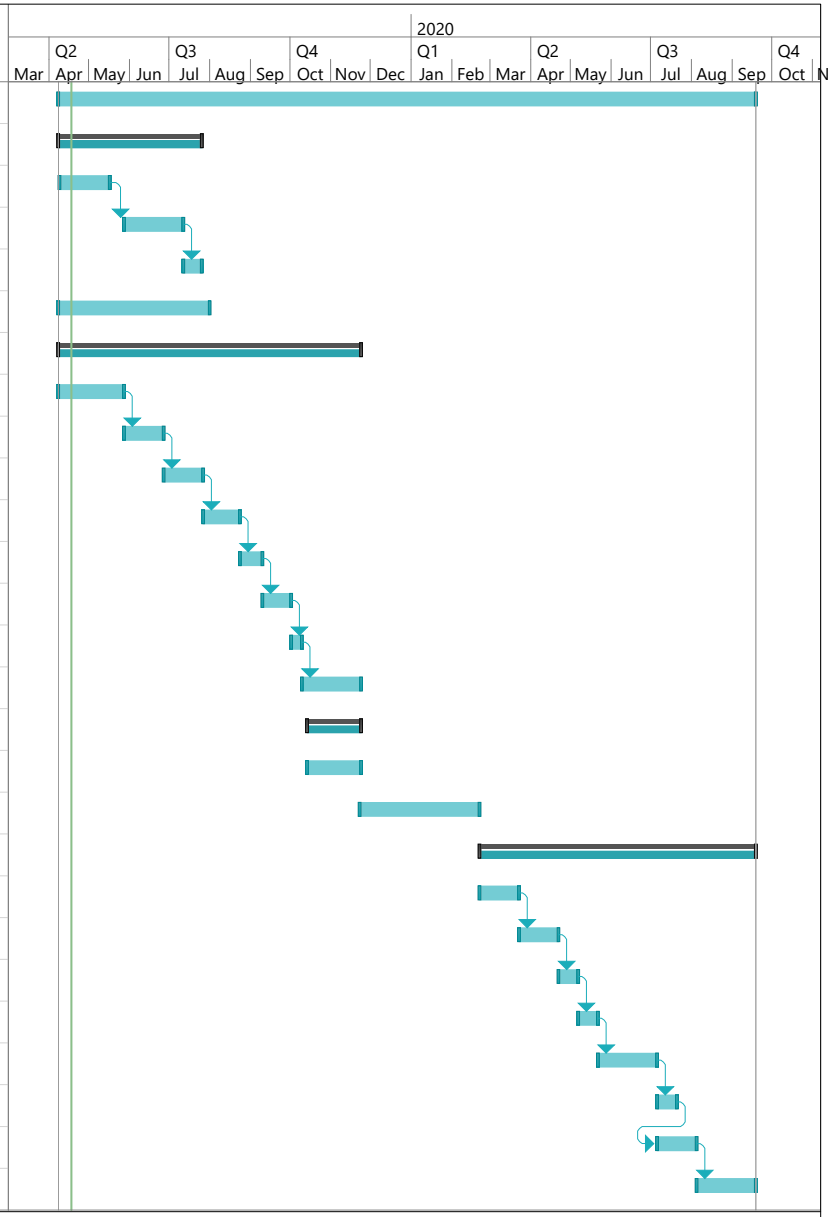
Baltimore District

Figure 7 - Open Demolition Area #1, MEC Verification Study Grid, Previous Removal Action Results, and Geophysical Survey Data, Former Ravenna Army Ammunition Plant, Ravenna, Ohio

Figure 8: Schedule

ID	Task Mode	Task Name	Start	Finish
1		**TASK 1: Project Management**	**Mon 4/8/19**	**Fri 9/18/20**
2		**TASK 2: Explosives Safety Submittal**	**Mon 4/8/19**	**Thu 7/25/19**
3		Explosive Safety Submittal	Tue 4/9/19	Thu 5/16/19
4		Coordinate Approvals with USATCES/DDESB	Tue 5/28/19	Thu 7/11/19
5		Coorrdinate Results with Installation	Fri 7/12/19	Thu 7/25/19
6		**TASK 3: Site Safety and Health Plan**	**Mon 4/8/19**	**Wed 7/31/19**
7		**TASK 4: MEC Verification Study Work Plan**	**Mon 4/8/19**	**Sat 11/23/19**
8		Prepare and Submit PD to Army	Mon 4/8/19	Mon 5/27/19
9		PD Review	Tue 5/28/19	Wed 6/26/19
10		PD Comment Resoultion	Thu 6/27/19	Fri 7/26/19
11		Prepare and Submit Draft to Army and Ohio EPA	Sat 7/27/19	Fri 8/23/19
12		Army and Ohio EPA Draft Review	Sat 8/24/19	Mon 9/9/19
13		Draft Comment Clarification	Tue 9/10/19	Tue 10/1/19
14		Prepare and Submit Final to Armyand Ohio EPA	Wed 10/2/19	Wed 10/9/19
15		Army and Ohio EPA Final Review and Approval	Thu 10/10/19	Sat 11/23/19
16		**TASK 5: Contracting Supplies/Equipment**	**Mon 10/14/19**	**Sat 11/23/19**
17		BPA Call for Heavy Equipment	Mon 10/14/19	Sat 11/23/19
18		**Task 6: Verification Study Fieldwork**	**Sat 11/23/19**	**Fri 2/21/20**
19		**Task 7: After Action Report**	**Sat 2/22/20**	**Fri 9/18/20**
20		Prepare and Submit PD to Army	Sat 2/22/20	Sun 3/22/20
21		PD Review	Mon 3/23/20	Tue 4/21/20
22		PD Comment Resoultion	Wed 4/22/20	Wed 5/6/20
23		Prepare and Submit Draft to Army and Ohio EPA	Thu 5/7/20	Thu 5/21/20
24		Army and Ohio EPA Draft Review	Fri 5/22/20	Sun 7/5/20
25		Draft Comment Clarification	Mon 7/6/20	Mon 7/20/20
26		Prepare and Submit Final to Army and Ohio EPA	Mon 7/6/20	Tue 8/4/20
27		Army and Ohio EPA Final Review and Approval	Wed 8/5/20	Fri 9/18/20



Project: Project2 test
Date: Thu 4/18/19

Task	Inactive Task	Manual Summary Rollup	External Milestone
Split	Inactive Milestone	Manual Summary	Deadline
Milestone	Inactive Summary	Start-only	Progress
Summary	Manual Task	Finish-only	Manual Progress
Project Summary	Duration-only	External Tasks	