

**Final Action Memorandum
Time-Critical Removal Action
RVAAP-004-R-01 Open Demolition Area #2
Former Ravenna Army Ammunition Plant
Ravenna, Ohio**

Project No. PN453698



Prepared by: U.S. Army Corps of Engineers
Baltimore District
10 South Howard Street
Baltimore, MD 21201



Prepared for: Army National Guard Directorate
111 South George Mason Drive
Arlington, VA 22204

30 October 2015

REPORT DOCUMENTATION PAGE

*Form Approved
OMB No. 0704-0188*

The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE (DD-MM-YYYY) 30-10-2015		2. REPORT TYPE Memorandum		3. DATES COVERED (From - To) From April 1, 2015 to August 1, 2018	
4. TITLE AND SUBTITLE Final Action Memorandum Time-Critical Removal Action RVAAP-004-R-01 Open Demolition Area #2, Former Ravenna Army Ammunition Plant				5a. CONTRACT NUMBER Project No. PN453698	
				5b. GRANT NUMBER NA	
				5c. PROGRAM ELEMENT NUMBER NA	
6. AUTHOR(S) Travis R. McCoun, PG Program Manager Military Munitions Design Center, Baltimore District				5d. PROJECT NUMBER NA	
				5e. TASK NUMBER NA	
				5f. WORK UNIT NUMBER NA	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Corps of Engineers, Baltimore, District 10 South Howard Street Baltimore, MD 21201				8. PERFORMING ORGANIZATION REPORT NUMBER NA	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Army National Guard Directorate 111 South George Mason Drive Arlington, VA 22204				10. SPONSOR/MONITOR'S ACRONYM(S) ARNG	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S) NA	
12. DISTRIBUTION/AVAILABILITY STATEMENT Reference distribution page					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT The purpose of this Action Memorandum is to document the rationale for conducting a TCRA at ODA2. This action is being taken to mitigate significant explosive safety hazards posed to National Guard Soldiers trainees due to exposure to MEC/MPPEH at the ODA2 MRS. The objective of the TCRA will be to reduce the overall potential for exposure to explosive hazards at the MRS in areas having a moderate to high probability for encountering MEC/MPPEH and to monitor and/or reduce the potential for MEC/MPPEH migration downstream during storm events while the TCRA is being implemented.					
15. SUBJECT TERMS Action Memorandum, Time-Critical Removal Action, Munitions Response Site, munitions and explosives of concern (MEC); material potentially presenting as explosive hazard (MPPEH), Explosive Safety Submission (ESS)					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 27	19a. NAME OF RESPONSIBLE PERSON Travis McCoun
a. REPORT U	b. ABSTRACT U	c. THIS PAGE U			19b. TELEPHONE NUMBER (Include area code) 410-962-6728

Reset

Page intentionally left blank

**Final Action Memorandum
Time-Critical Removal Action**

**RVAAP-004-R-01 Open Demolition Area #2
Former Ravenna Army Ammunition Plant
Ravenna, Ohio**

This Time-Critical Removal Action is intended to address the imminent threat to human health (safety), welfare, and the environment posed by munitions and explosives of concern/material potentially presenting an explosive hazard (MEC/MPPEH). This action is protective of human health and the environment, and is cost effective. This action will also contribute to the efficient performance of long-term cleanup objectives of the Military Munitions Response Program (MMRP).

The Army approves of the time-critical removal action activities described in this Action Memorandum as the most appropriate means to mitigate the imminent threat. Additional activities will be conducted under future response actions as necessary at this site.

APPROVED:



29 Oct 2015

MARK LEEPER, P.G.
Restoration/Cleanup Program Manager
ARNG Directorate

Date

Page intentionally left blank



John R. Kasich, Governor
Mary Taylor, Lt. Governor
Craig W. Butler, Director

December 17, 2015

Mr. Mark Leeper, P.G., MBA
Army National Guard Directorate
Environmental Programs Division
ARNGD-ILE-CR
111 South George Mason Drive
Arlington, VA 22204

Re: **US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Project Records
Remedial Response
Portage County
267000859089**

Subject: Approval for the "Final Action Memorandum, Time-Critical Removal Action, Open Demolition Area #2 MRS, RVAAP-004-R-01 at the Former Ravenna Army Ammunition Plant, Ravenna, Ohio," Dated October 30, 2015, Ohio EPA ID # 267-000859-089

Dear Mr. Leeper:

The Ohio Environmental Protection Agency (Ohio EPA), Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) has received and reviewed the document entitled, "Final Action Memorandum, Time-Critical Removal Action, Open Demolition Area #2 MRS, RVAAP-004-R-01 at the Former Ravenna Army Ammunition Plant, Ravenna, Ohio," dated October 30, 2015. This document, received by Ohio EPA's NEDO on November 3, 2015, was prepared for the Army National Guard Directorate by the U.S. Army Corps of Engineers (USACE) Baltimore District.

Ohio EPA has reviewed this documentation and has found no significant deficiencies. As a result, the "Final Action Memorandum, Time-Critical Removal Action, Open Demolition Area #2 MRS, RVAAP-004-R-01 at the Former Ravenna Army Ammunition Plant, Ravenna, Ohio," has been approved.

If you have any questions or concerns, please do not hesitate to contact me at (330) 963-1249.

Sincerely,

A handwritten signature in black ink, appearing to read "Andrew C. Kocher".

Andrew C. Kocher, Site Coordinator
Division of Environmental Response and Revitalization

ACK/nvr

cc: Paul E. Green, USACE, Baltimore District Travis R. McCoun, USACE, Baltimore District
Katie Tait/Kevin Sedlak, Camp Ravenna Haney/Harris, Vista Sciences, Newton Falls

ec: Rod Beals, NEDO, DERR Bob Princic, NEDO, DERR
Justin Burke, CO, DERR

Page intentionally left blank

**Final Action Memorandum
Time-Critical Removal Action
RVAAP-004-R-01 Open Demolition Area #2
Former Ravenna Army Ammunition Plant
Ravenna, Ohio**

Project No. PN453698

Prepared by: U.S. Army Corps of Engineers
Baltimore District
10 South Howard Street
Baltimore, MD 21201

Prepared for: Army National Guard Directorate
111 South George Mason Drive
Arlington, VA 22204

30 October 2015

Page intentionally left blank

DOCUMENT DISTRIBUTION

For the
Final Action Memorandum
Time-Critical Removal Action
RVAAP-004-R-01 Open Demolition Area #2 (ODA2)
Ravenna Army Ammunition Plant (RVAAP)
Ravenna, Ohio

Name/Organization	Number of Printed Copies	Number of Electronic Copies
Mark Leeper, ARNG-ILE- CR	0	1
Kevin Sedlak, ARNG – Camp Ravenna	0	Email W/Transmittal letter
Katie Tait, OHARNG – Camp Ravenna	0	Email W/Transmittal letter
Greg Moore, USACE PM, Louisville	0	Email W/Transmittal letter
Drew Kocher, Ohio EPA Project Manager Nick Roope, Ohio EPA NEDO Bob Princic, Ohio EPA NEDO	1	3
Rod Beals, Ohio EPA – NEDO	0	Email W/Transmittal letter
Justin Burke, Ohio EPA-CO	0	Email
Travis McCoun, USACE – Baltimore District	0	1
Gail Harris, AR Manager – Camp Ravenna	2	2

AR = Administrative Record

ARNG – Camp Ravenna = Army National Guard – Camp Ravenna Joint Military Training Center

ARNG-ILE-CR = Army National Guard – Installations Logistics Environmental – Cleanup Restoration

Camp Ravenna = Camp Ravenna Joint Military Training Center

OHARNG = Ohio Army National Guard

Ohio EPA – NEDO = Ohio Environmental Protection Agency – Northeast District Office

Ohio EPA – CO = Ohio Environmental Protection Agency – Central Office

Acronyms and Abbreviations

AAR	After Action Report
AM	Action Memorandum
APP	Accident Prevention Plan
ARNG	Army National Guard
BEM	Buried Explosion Module
bgs	below ground surface
Camp Ravenna	Camp Ravenna Joint Military Training Center
CRP	Community Relations Plan
ESS	Explosives Safety Submission
MEC	munitions and explosives of concern
MPPEH	material potentially presenting an explosive hazard
MRS	Munitions Response Site
OB/OD	Open Burn/Open Detonation
ODA2	RVAAP-004-R-01 Open Demolition Area #2
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
PA	Probability Assessment
PMP	Project Management Plan
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
RVAAP	former Ravenna Army Ammunition Plant
SSHP	Site Specific Safety and Health Plan
TCRA	Time-Critical Removal Action
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Command
WP	Work Plan

Table of Contents

DOCUMENT DISTRIBUTION i

Acronyms and Abbreviations ii

1.0 Declaration 1

 1.1 Site Description..... 1

 1.2 Site Location 2

 1.3 Purpose..... 2

 1.4 Previous Activities 2

 1.5 Description of Current Land-Use and Risk of Exposure 3

 1.6 Scope of the TCRA..... 3

2.0 Threats to Public Health, Safety, and Environment..... 4

3.0 Proposed Action and Estimated Cost..... 5

 3.1 Proposed Action Description 5

 3.2 Contribution to Remedial Performance 5

 3.3 Estimated Costs..... 5

 3.4 Schedule 6

 3.5 Community Relations 6

4.0 Recommendation 6

Figure 1 8

Figure 2 11

1.0 Declaration

This Action Memorandum documents the basis for conducting a Time-Critical Removal Action (TCRA) to mitigate the imminent threat to human health (safety), welfare, and the environment posed by the presence of munitions and explosives of concern (MEC) and material potentially presenting an explosive hazard (MPPEH) in an area of the former Ravenna Army Ammunition Plant (RVAAP) known as RVAAP-004-R-01 Open Demolition Area #2 (ODA2) Munitions Response Site (MRS). The Army will be conducting a removal action to reduce the explosive safety hazard posed by MEC/MPPEH in the surface and subsurface soil at the site.

1.1 Site Description

The former Ravenna Army Ammunition Plant (RVAAP), now known as the Camp Ravenna Joint Military Training Center (Camp Ravenna), 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, Camp Ravenna. The RVAAP restoration program involves cleanup of former production/operational areas throughout the facility related to former activities conducted under the RVAAP.

The ODA2 MRS is a former Open Burn/Open Detonation (OB/OD) area, dumping ground, and burial site that was used from 1948 until 1991. During this period, ODA2 was used to detonate large caliber munitions and off-specification bulk explosives that could not be deactivated or demilitarized by any other means due to their condition. ODA2 was also used to destroy white phosphorus and bombs.

A Remedial Investigation (RI) was conducted at the ODA2 MRS and the findings were reported in the Final RI Report (February 2015). The report concluded that a release of MEC/MPPEH had occurred at the site, and the MRS boundary was modified based on the results of the investigation. The revised MRS acreage is 317.4 acres.

1.2 Site Location

The Open Demolition Area #2 MRS is an approximately 317.4-acre MRS located in the central portion of the facility within Portage County. The 2.5-acre Operational Open Demolition Area is located at the north-central portion of the MRS and is an operational range. The operational range is not part of the MRS. The MRS location is illustrated on **Figure 2**.

1.3 Purpose

The purpose of this Action Memorandum is to document the rationale for conducting a TCRA at ODA2. This action is being taken to mitigate significant explosive safety hazards posed to National Guard Soldiers trainees due to exposure to MEC/MPPEH at the ODA2 MRS. Contributing factors supporting this action include:

1. Unrestricted access to the MRS by facility personnel and military trainees (i.e., there is no perimeter fence around the MRS);
2. Expanded OHARNG training mission has increased military troop traffic in the areas surrounding the MRS;
3. Close proximity to facility maintenance and military training facilities;
4. Known presence of surface MEC/MPPEH;
5. Potential for interaction with MEC/MPPEH by facility personnel, military trainees, and potential trespassers.

The U.S. Army has determined that the ODA2 MRS poses an immediate hazard to human health and safety. The removal of the known MEC/MPPEH from this area will significantly reduce the explosive hazard in a timely and cost-effective manner.

1.4 Previous Activities

The ODA2 MRS is a former OB/OD area, dumping ground, and burial site that was used from 1948 until 1991. During this period, ODA2 was used to detonate large caliber munitions and off-specification bulk explosives that could not be deactivated or demilitarized by any other means due to their condition. ODA2 was also used to destroy white phosphorus and bombs.

A Remedial Investigation was conducted at the ODA2 MRS and the findings were reported in the Final Remedial Investigation Report dated February 2015. The report concluded that a release of MEC/MPPEH had occurred at the site, and the MRS boundary was modified based on the results of the investigation. The revised MRS acreage is 317.4 acres.

In May 2015, the USACE conducted a Probability Assessment (PA) to assess the probability for MEC/MPPEH at the ODA2 MRS. The purpose of the assessment was to visually assess the difficulties posed by site access/egress and to verify specific areas within ODA2 with the highest concentrations of MEC/MPPEH. Specific objectives of the investigation included identifying areas that are inaccessible to potential receptors due to

terrain and/or vegetation barriers, and delineation of areas of moderate to high and low probability for encountering MEC.

The results of the field investigation confirmed that specific areas of low probability could be delineated within the MRS. In addition, some areas of the MRS were observed to be inaccessible to potential receptors due to heavy/thick vegetation. Further, field observations confirmed that conducting a removal action in accessible, moderate to high probability areas would be able to effectively reduce the probability to low probability for encountering MEC.

The results of the probability assessment were as follows (**Figure 2**):

- 170.4 acres were categorized as Moderate to High Probability
- 147 acres were categorized as Low Probability;
- 40 acres were identified as inaccessible.

The Army National Guard (ARNG) and other stakeholders including the U.S. Army Corps of Engineers (USACE), Ohio Environmental Protection Agency (Ohio EPA), Army National Guard (ARNG), Ohio Army National Guard (OHARNG), and the Army Environmental Command (AEC) have become concerned about the safety at ODA2 because of the known MEC/MPPEH hazard and the central location of the MRS on the facility which is in close proximity to military training assets. The increased demand and use of the facility for military training has also raised a concern about trespassing or accidental access into this area due to the fact that access is not restricted by a physical barrier (i.e. fence) and training occurs in the surrounding and adjacent areas. In addition, there is a potential for MEC/MPPEH to potentially migrate from the MRS downstream to surrounding areas on the facility during storm events impacting Sand Creek.

1.5 Description of Current Land-Use and Risk of Exposure

The former RVAAP is being used as a military training site, Camp Ravenna, by the OHARNG. Training, including range operations and mounted and dismounted training, occurs in the area surround the MRS and along the roads adjacent to the MRS.” With the exception of gates across vehicle access point and Siebert stakes and range impact signs along the perimeter of the MRS, there is no physical barrier (i.e., fence) to prevent unintentional trespassing. Further, the MRS is centrally located within the vicinity to multiple military training assets and operational ranges which are used on a regular basis. Over the past ten years or so, the use of the facility and the military presence at the facility has increased significantly. Consequently, the potential risk of exposure to the MEC/MPPEH from former operations at the MRS has also increased.

1.6 Scope of the TCRA

The objective of the TCRA will be to reduce the overall potential for exposure to explosive hazards at the MRS in areas having a moderate to high probability for encountering MEC/MPPEH and to monitor and/or reduce the potential for MEC/MPPEH migration

downstream during storm events while the TCRA is being implemented. The Scope of the Time Critical Removal Action (TCRA) will consist of the following work elements:

- 1) Prepare required documents including: Action Memorandum (AM), Explosives Safety Submission (ESS), TCRA Work Plan (WP), and TCRA After Action Report (AAR).
- 2) Coordinate public involvement and conduct public meeting.
- 3) Conduct MEC surface clearance in areas identified as having low probability for MEC.
- 4) Investigate subsurface anomalies in low probability areas at a rate of 10% by surface area to verify low probability conditions.
- 5) Conduct MEC clearance to 4 feet below ground surface (bgs) in areas having moderate to high probability for MEC, excluding known disposal areas.
- 6) Conduct MEC clearance to 2 feet bgs in known disposal areas including: Area 1, Area 2, Burial Site 1, Burial Site 2, and Bomb Disposal Area.
- 7) Identify and delineate areal extent of unknown disposal areas discovered in moderate to high probability areas.
- 8) Investigate and replace the culvert along the ODA2 access road to address MEC/MPPEH within culvert fill and to eliminate the potential for MEC/MPPEH to impact surface water.
- 9) Conduct magnetometer-assisted surface clearance of Sand Creek two (2) times per year to assess potential MEC/MPPEH migration from the ODA2 site, and potential for migration off the installation at creek exit points during the TCRA.
- 10) Stabilize the slope of Rocket Ridge with additional plantings and boulders in the area previously remediated.
- 11) Place boulders in stream diversion areas to slow flood waters along slope.
- 12) Develop and implement area-specific interim land-use controls for ODA2 to reduce the potential for exposure at these sites.
- 13) Prepare a Removal Action Report.

2.0 Threats to Public Health, Safety, and Environment

The Ohio Army National Guard has recently increased the training mission at Camp Ravenna significantly. Increased troop/training levels and operations in close proximity to ODA2 significantly increases the potential for interaction with MEC. Exposure to MEC at ODA2 could result in catastrophic results including the loss of life, significant injury and/or property damage.

The MRS is centrally located within the vicinity to multiple military training assets and operational ranges which are used on a regular basis. Over the past ten years or so, the use of the facility and the military presence at the facility has increased significantly. Consequently, the potential risk of exposure to the MEC/MPPEH from former operations at the MRS has also increased. Accidental exposure or contact to MEC at the MRS could potentially result in a catastrophic event including the loss of life, significant injury and/or property damage.

3.0 Proposed Action and Estimated Cost

3.1 Proposed Action Description

The proposed action will consist of preparing a Project Management Plan, Project Work Plan (including a site specific Safety and Health Plan, Accident Prevention Plan, and an investigation-specific Quality Assurance Project Plan), and Explosives Safety Submission; clearing and grubbing in accessible areas; conducting a MEC surface clearance in areas having low probability for MEC; intrusively investigating 10% of subsurface anomalies in areas having low probability for MEC; conducting a MEC clearance to a depth of 4 feet bgs in areas having moderate to high probability for MEC (excluding known disposal areas), marking and delineating areal extent of unknown disposal areas in areas having moderate to high probability for MEC; conducting a MEC clearance to a depth of 2 feet bgs in known disposal areas; investigation and replacement of the culvert on the ODA2 access road; stabilization of the slope at Rocket Ridge with vegetative plantings; placing boulders in stream diversion areas; destruction of MEC/MPPEH using a Buried Explosion Module (BEM); and submitting a comprehensive Removal Action Report describing the action taken to remove the immediate threat to human health and the environment, and describing the findings of the investigation. In addition, magnetometer-assisted surveys of Sand Creek will be conducted 2 times per year until a final remedial alternative is implemented for the site.

3.2 Contribution to Remedial Performance

By conducting this action and its associated work, the following contributions will be made to the short-term and long-term remediation of the site:

- 1) Removal of MEC/MPPEH items is consistent with the long-term cleanup objective of reducing the explosive hazards at ODA2.
- 2) Investigation of subsurface anomalies in low probability areas will support the findings of the Remedial Investigation Report, and provide additional data concerning the presence of MEC/MPPEH for evaluation of remedial alternatives in the Feasibility Study.
- 3) Identification and delineation of unknown disposal areas in moderate to high probability areas will provide additional data concerning the presence of MEC/MPPEH for evaluation of remedial alternatives in the Feasibility Study.
- 4) Removal of MEC/MPPEH will significantly reduce the potential for downstream and/or offsite migration.

3.3 Estimated Costs

The estimated cost of this action is \$3,700,000. This cost represents the direct cost of field work and related office costs.

3.4 Schedule

The ODA2 TCRA fieldwork will require two separate mobilizations and take approximately 14 working months to complete. Two separate mobilizations will be required due to unfavorable working conditions during winter months. The current project schedule including all planning, fieldwork, and reporting is September 2015 through October 2018. Major Milestones are as follows:

- 1) Approval of Final TCRA Work Plan: March 2015
- 2) Removal Action Fieldwork: April 2016 – October 2017
- 3) After Action Reporting: November 2017 – August 2018

3.5 Community Relations

The Army will conduct all appropriate public affairs and community relations activities to adequately notify the public of this action, and will be done in accordance with the existing Community Relations Plan (February 2015). The following community relations activities are planned:

- 1) Conduct Public Meeting to inform the local community of the planned removal action.
- 2) Publish a notice of availability of the administrative record within 60 days of the initiation of the removal activity.
- 3) Update the administrative record with all applicable documents.
- 4) Provide public comment period on applicable documents and provide written responses to significant comments.

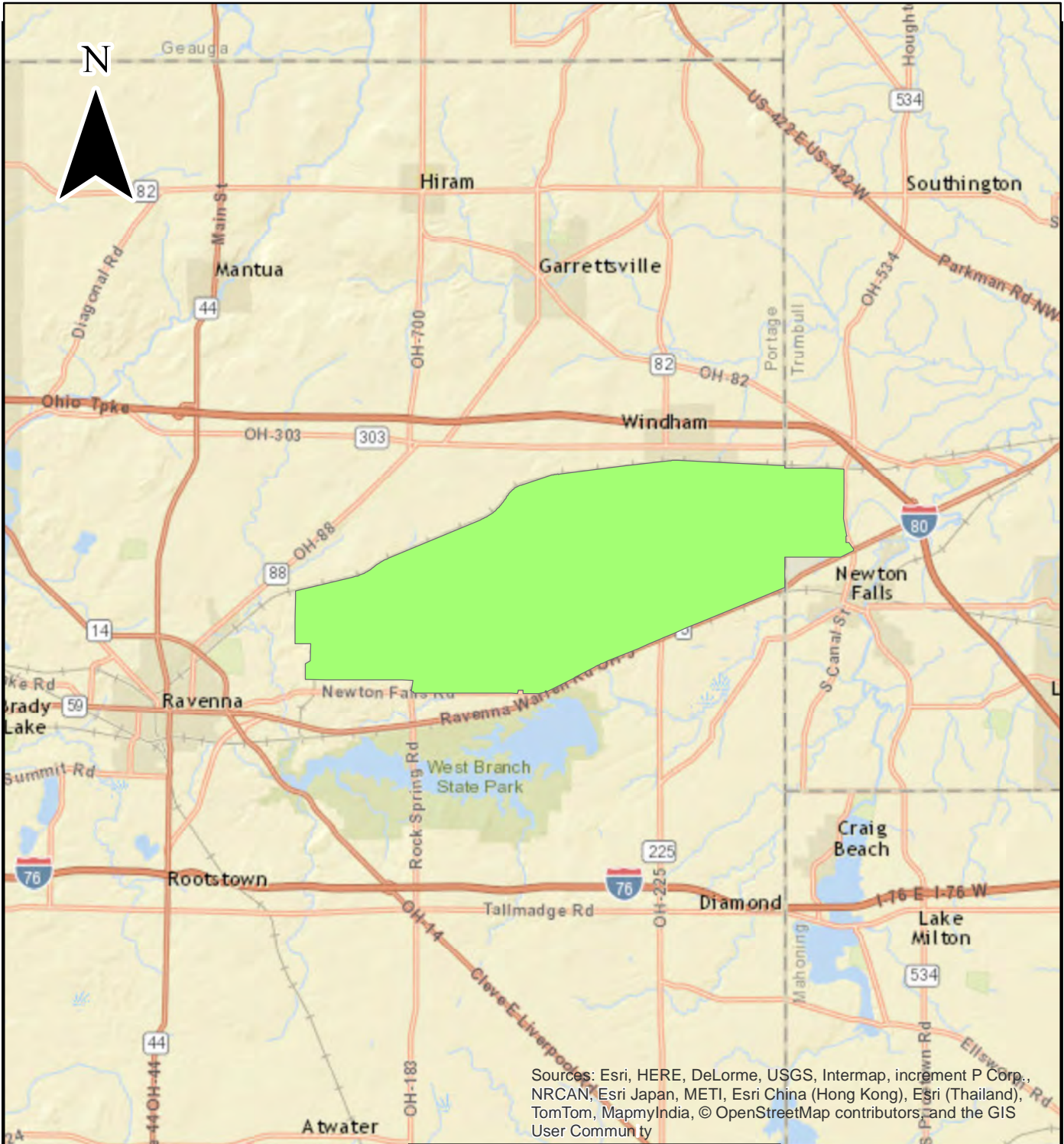
4.0 Recommendation

The presence of MEC/MPPEH has been confirmed at ODA2 and poses a safety hazard to individuals if not addressed through the response action described in this Action Memorandum. It is recommended that this TCRA be approved and implemented per authority and guidelines under CERCLA. All actions included as part of the TCRA will be conducted in a manner that is consistent with all applicable federal, state, local, and installation rules and laws.

Page intentionally left blank

Figure 1

Page intentionally left blank



Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



Camp Ravenna

0 1.25 2.5 5 Miles



Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

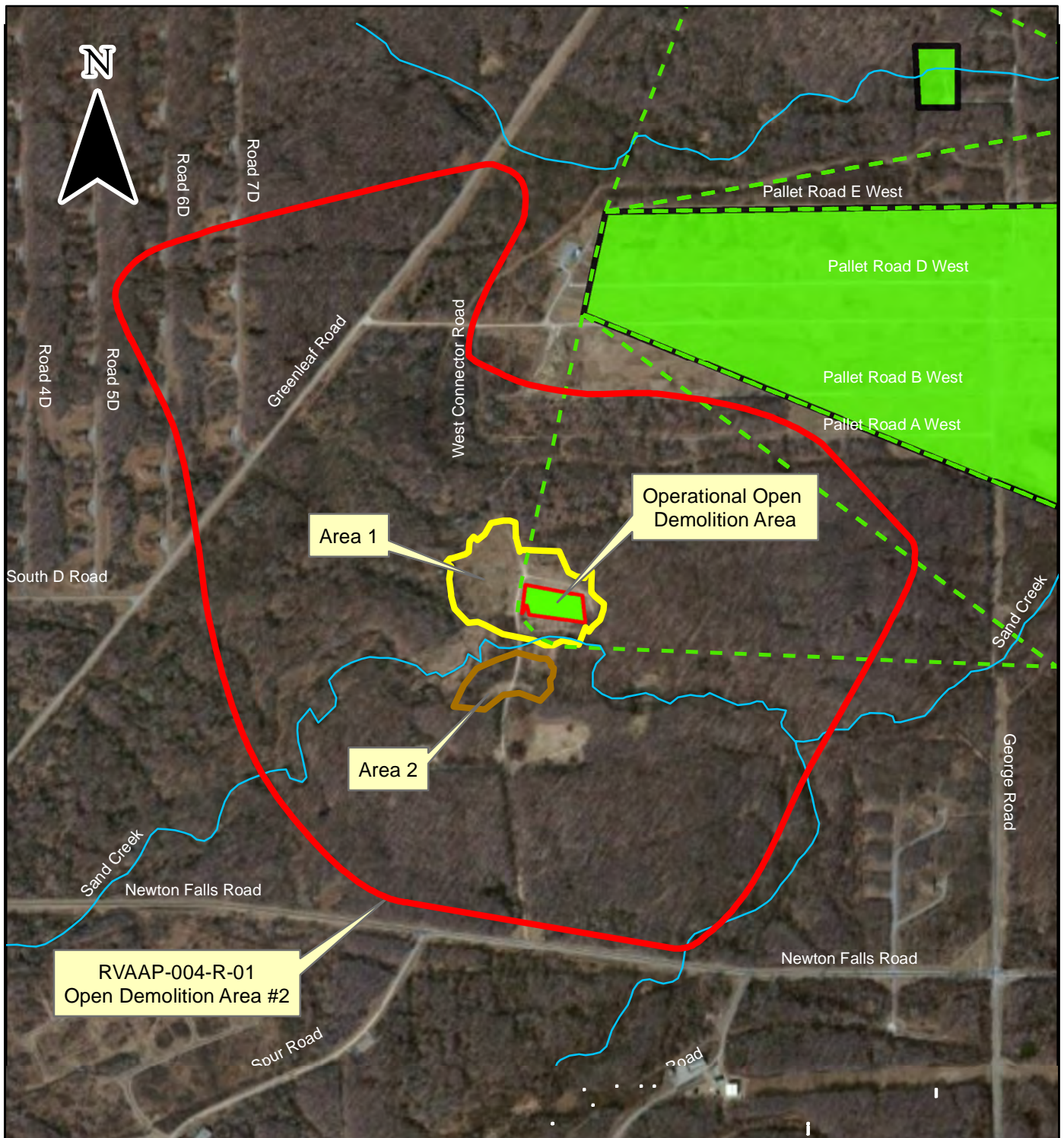


US Army Corps of Engineers
Baltimore District

Figure 1
Installation Location Map

Figure 2

Page intentionally left blank



RVAAP-004-R-01
Open Demolition Area #2

- Operational Open Demolition Area
- Operational Ranges
- Revised MRS Boundary (2015)
- Operational Range Safety Danger Zone
- Creek/Stream
- Area 1 Disposal Area
- Area 2 Disposal Area

0 500 1,000 2,000
Feet



**US Army Corps
of Engineers**
Baltimore District

Figure 2
Revised MRS Boundary - ODA2