

1 **Draft Action Memorandum**
2 **Time-Critical Removal Action**
3 **RVAAP-004-R-01 Open Demolition Area #2**
4 **Former Ravenna Army Ammunition Plant**
5 **Ravenna, Ohio**

6
7 **Project No. PN453698**
8
9
10
11
12



13
14
15 *Prepared by:* U.S. Army Corps of Engineers
16 Baltimore District
17 10 South Howard Street
18 Baltimore, MD 21201
19
20
21
22
23
24
25



26
27
28 *Prepared for:* Army National Guard Directorate
29 111 South George Mason Drive
30 Arlington, VA 22204
31
32
33
34
35
36

14 August 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) | | 2. REPORT TYPE | | 3. DATES COVERED (From - To) | |
| 4. TITLE AND SUBTITLE | | | | 5a. CONTRACT NUMBER | |
| | | | | 5b. GRANT NUMBER | |
| | | | | 5c. PROGRAM ELEMENT NUMBER | |
| 6. AUTHOR(S) | | | | 5d. PROJECT NUMBER | |
| | | | | 5e. TASK NUMBER | |
| | | | | 5f. WORK UNIT NUMBER | |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) | | | | 8. PERFORMING ORGANIZATION REPORT NUMBER | |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) | | | | 10. SPONSOR/MONITOR'S ACRONYM(S) | |
| | | | | 11. SPONSOR/MONITOR'S REPORT NUMBER(S) | |
| 12. DISTRIBUTION/AVAILABILITY STATEMENT | | | | | |
| 13. SUPPLEMENTARY NOTES | | | | | |
| 14. ABSTRACT | | | | | |
| 15. SUBJECT TERMS | | | | | |
| 16. SECURITY CLASSIFICATION OF: | | | 17. LIMITATION OF ABSTRACT | 18. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON |
| a. REPORT | b. ABSTRACT | c. THIS PAGE | | | 19b. TELEPHONE NUMBER (Include area code) |

37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52

DISCLAIMER STATEMENT

This document is a work prepared for the United States Government by U.S. Army Corps of Engineers, Baltimore District. In no event shall either the United States Government or U.S. Army Corps of Engineers, Baltimore District have any responsibility or liability for any consequences of any use, misuse, inability to use, or reliance on the information contained herein, nor does either warrant or otherwise represent in any way the accuracy, adequacy, efficacy, or applicability of the contents hereof.

53 **Draft Action Memorandum**
54 **Time-Critical Removal Action**

55
56 **RVAAP-004-R-01 Open Demolition Area #2**
57 **Former Ravenna Army Ammunition Plant**
58 **Ravenna, Ohio**
59

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

66
67 The Army approves of the time-critical removal action activities described in this Action
68 Memorandum as the most appropriate means to mitigate the imminent threat. Additional activities
69 will be conducted under future response actions as necessary at this site.

70
71 APPROVED:
72
73
74
75
76

77
78 _____
79 MARK LEEPER, P.G. Date
80 Restoration/Cleanup Program Manager
81 ARNG Directorate
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98

99
100
101
102
103
104
105
106
107
108
109

PLACEHOLDER FOR:
Documentation of Ohio EPA Approval of Final Document
(Documentation to be provided once approval is issued)

110 **Draft Action Memorandum**
111 **Time-Critical Removal Action**
112 **RVAAP-004-R-01 Open Demolition Area #2**
113 **Former Ravenna Army Ammunition Plant**
114 **Ravenna, Ohio**

115
116 **Project No. PN453698**
117
118
119
120
121
122



123
124
125 *Prepared by:* U.S. Army Corps of Engineers
126 Baltimore District
127 10 South Howard Street
128 Baltimore, MD 21201
129
130
131
132
133
134
135



136
137
138 *Prepared for:* Army National Guard Directorate
139 111 South George Mason Drive
140 Arlington, VA 22204
141
142
143
144
145

14 August 2015

146
147
148
149
150
151
152
153

DOCUMENT DISTRIBUTION
For the
Draft 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 | 1 |
| Katie Tait, OHARNG – Camp Ravenna | 1 | 0 |
| 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 |

154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171

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

| | | |
|-----|--------------|---|
| 172 | | |
| 173 | | |
| 174 | | |
| 175 | AAR | After Action Report |
| 176 | AM | Action Memorandum |
| 177 | APP | Accident Prevention Plan |
| 178 | ARNG | Army National Guard |
| 179 | BEM | Buried Explosion Module |
| 180 | bgs | below ground surface |
| 181 | Camp Ravenna | Camp Ravenna Joint Military Training Center |
| 182 | CRP | Community Relations Plan |
| 183 | ESS | Explosives Safety Submission |
| 184 | MEC | munitions and explosives of concern |
| 185 | MPPEH | material potentially presenting an explosive hazard |
| 186 | MRS | Munitions Response Site |
| 187 | OB/OD | Open Burn/Open Detonation |
| 188 | ODA2 | RVAAP-004-R-01 Open Demolition Area #2 |
| 189 | OHARNG | Ohio Army National Guard |
| 190 | Ohio EPA | Ohio Environmental Protection Agency |
| 191 | PA | Probability Assessment |
| 192 | PMP | Project Management Plan |
| 193 | QAPP | Quality Assurance Project Plan |
| 194 | RI | Remedial Investigation |
| 195 | RVAAP | former Ravenna Army Ammunition Plant |
| 196 | SSHP | Site Specific Safety and Health Plan |
| 197 | TCRA | Time-Critical Removal Action |
| 198 | USACE | U.S. Army Corps of Engineers |
| 199 | USAEC | U.S. Army Environmental Command |
| 200 | WP | Work Plan |
| 201 | | |
| 202 | | |
| 203 | | |
| 204 | | |
| 205 | | |
| 206 | | |
| 207 | | |
| 208 | | |
| 209 | | |
| 210 | | |
| 211 | | |
| 212 | | |
| 213 | | |
| 214 | | |
| 215 | | |

| | | |
|-----|--|----|
| 216 | Table of Contents | |
| 217 | DOCUMENT DISTRIBUTION..... | i |
| 218 | Acronyms and Abbreviations | ii |
| 219 | 1.0 Declaration..... | 1 |
| 220 | 1.1 Site Description..... | 1 |
| 221 | 1.2 Site Location | 2 |
| 222 | 1.3 Purpose..... | 2 |
| 223 | 1.4 Previous Activities | 2 |
| 224 | 1.5 Description of Current Land-Use and Risk of Exposure | 3 |
| 225 | 1.6 Scope of the TCRA..... | 3 |
| 226 | 2.0 Threats to Public Health, Safety, and Environment..... | 4 |
| 227 | 3.0 Proposed Action and Estimated Cost..... | 5 |
| 228 | 3.1 Proposed Action Description | 5 |
| 229 | 3.2 Contribution to Remedial Performance | 5 |
| 230 | 3.3 Estimated Costs..... | 5 |
| 231 | 3.4 Schedule..... | 6 |
| 232 | 3.5 Community Relations | 6 |
| 233 | 4.0 Recommendation | 6 |
| 234 | Figure 1 | 7 |
| 235 | Figure 2 | 8 |
| 236 | | |
| 237 | | |
| 238 | | |

239 **1.0 Declaration**

240

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

249

250 **1.1 Site Description**

251

252 The former Ravenna Army Ammunition Plant (RVAAP), now known as the Camp
253 Ravenna Joint Military Training Center (Camp Ravenna), located in northeastern Ohio
254 within Portage and Trumbull counties, is approximately three (3) miles east/northeast of
255 the City of Ravenna and one (1) mile north/northwest of the City of Newton Falls. The
256 facility is approximately 11 miles long and 3.5 miles wide. The facility is bounded by State
257 Route 5, the Michael J. Kirwan Reservoir, and the CSX System Railroad to the south;
258 Garret, McCormick, and Berry Roads to the west; the Norfolk Southern Railroad to the
259 north; and State Route 534 to the east. In addition, the facility is surrounded by the
260 communities of Windham, Garrettsville, Charlestown, and Wayland. The property
261 location is depicted in **Figure 1**.

262

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

268

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

274

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

279

280

281

282

283 **1.2 Site Location**

284
285 The Open Demolition Area #2 MRS is an approximately 317.4-acre MRS located in the central
286 portion of the facility within Portage County. The 2.5-acre Operational Open Demolition Area
287 is located at the north-central portion of the MRS and is an operational range. The operational
288 range is not part of the MRS. The MRS location is illustrated on **Figure 2**.

289
290 **1.3 Purpose**

291
292 The purpose of this Action Memorandum is to document the rationale for conducting a
293 TCRA at ODA2. This action is being taken to mitigate significant explosive safety hazards
294 posed to National Guard Soldiers trainees due to exposure to MEC/MPPEH at the ODA2
295 MRS. Contributing factors supporting this action include:

- 296
- 297 1. Unrestricted access to the MRS by facility personnel and military trainees
298 (i.e., there is no perimeter fence around the MRS);
 - 299 2. Expanded OHARNG training mission has increased military troop traffic in
300 the areas surrounding the MRS;
 - 301 3. Close proximity to facility maintenance and military training facilities;
 - 302 4. Known presence of surface MEC/MPPEH;
 - 303 5. Potential for interaction with MEC/MPPEH by facility personnel, military
304 trainees, and potential trespassers.
- 305

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

309
310 **1.4 Previous Activities**

311
312 The ODA2 MRS is a former OB/OD area, dumping ground, and burial site that was used
313 from 1948 until 1991. During this period, ODA2 was used to detonate large caliber
314 munitions and off-specification bulk explosives that could not be deactivated or
315 demilitarized by any other means due to their condition. ODA2 was also used to
316 destroy white phosphorus and bombs.

317
318 A Remedial Investigation was conducted at the ODA2 MRS and the findings were reported
319 in the Final Remedial Investigation Report dated February 2015. The report concluded
320 that a release of MEC/MPPEH had occurred at the site, and the MRS boundary was
321 modified based on the results of the investigation. The revised MRS acreage is 317.4 acres.

322
323 In May 2015, the USACE conducted a Probability Assessment (PA) to assess the
324 probability for MEC/MPPEH at the ODA2 MRS. The purpose of the assessment was to
325 visually assess the difficulties posed by site access/egress and to verify specific areas within
326 ODA2 with the highest concentrations of MEC/MPPEH. Specific objectives of the
327 investigation included identifying areas that are inaccessible to potential receptors due to

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

330
331 The results of the field investigation confirmed that specific areas of low probability could
332 be delineated within the MRS. In addition, some areas of the MRS were observed to be
333 inaccessible to potential receptors due to heavy/thick vegetation. Further, field
334 observations confirmed that conducting a removal action in accessible, moderate to high
335 probability areas would be able to effectively reduce the probability to low probability for
336 encountering MEC.

337
338 The results of the probability assessment were as follows (**Figure 2**):

- 339 - 170.4 acres were categorized as Moderate to High Probability
- 340 - 147 acres were categorized as Low Probability;
- 341 - 40 acres were identified as inaccessible.

342
343 The Army National Guard (ARNG) and other stakeholders including the U.S. Army Corps
344 of Engineers (USACE), Ohio Environmental Protection Agency (Ohio EPA), Army
345 National Guard (ARNG), Ohio Army National Guard (OHARNG), and the Army
346 Environmental Command (AEC) have become concerned about the safety at ODA2
347 because of the known MEC/MPPEH hazard and the central location of the MRS on the
348 facility which is in close proximity to military training assets. The increased demand and
349 use of the facility for military training has also raised a concern about trespassing or
350 accidental access into this area due to the fact that access is not restricted by a physical
351 barrier (i.e. fence) and training occurs in the surrounding and adjacent areas. In addition,
352 there is a potential for MEC/MPPEH to potentially migrate from the MRS downstream to
353 surrounding areas on the facility during storm events impacting Sand Creek.

354
355 **1.5 Description of Current Land-Use and Risk of Exposure**

356
357 The former RVAAP is being used as a military training site, Camp Ravenna, by the
358 OHARNG. Training, including range operations and mounted and dismounted training,
359 occurs in the area surround the MRS and along the roads adjacent to the MRS.” With the
360 exception of gates across vehicle access point and Siebert stakes and range impact signs
361 along the perimeter of the MRS, there is no physical barrier (i.e., fence) to prevent
362 unintentional trespassing. Further, the MRS is centrally located within the vicinity to
363 multiple military training assets and operational ranges which are used on a regular basis.
364 Over the past ten years or so, the use of the facility and the military presence at the facility
365 has increased significantly. Consequently, the potential risk of exposure to the
366 MEC/MPPEH from former operations at the MRS has also increased.

367
368 **1.6 Scope of the TCRA**

369
370 The objective of the TCRA will be to reduce the overall potential for exposure to explosive
371 hazards at the MRS in areas having a moderate to high probability for encountering
372 MEC/MPPEH and to monitor and/or reduce the potential for MEC/MPPEH migration

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

- 375
- 376 1) Prepare required documents including: Action Memorandum (AM), Explosives
377 Safety Submission (ESS), TCRA Work Plan (WP), and TCRA After Action
378 Report (AAR).
- 379 2) Coordinate public involvement and conduct public meeting.
- 380 3) Conduct MEC surface clearance in areas identified as having low probability
381 for MEC.
- 382 4) Investigate subsurface anomalies in low probability areas at a rate of 10% by
383 surface area to verify low probability conditions.
- 384 5) Conduct MEC clearance to 4 feet below ground surface (bgs) in areas having
385 moderate to high probability for MEC, excluding known disposal areas.
- 386 6) Conduct MEC clearance to 2 feet bgs in known disposal areas including: Area
387 1, Area 2, Burial Site 1, Burial Site 2, and Bomb Disposal Area.
- 388 7) Identify and delineate areal extent of unknown disposal areas discovered in
389 moderate to high probability areas.
- 390 8) Investigate and replace the culvert along the ODA2 access road to address
391 MEC/MPPEH within culvert fill and to eliminate the potential for
392 MEC/MPPEH to impact surface water.
- 393 9) Conduct magnetometer-assisted surface clearance of Sand Creek two (2) times
394 per year to assess potential MEC/MPPEH migration from the ODA2 site, and
395 potential for migration off the installation at creek exit points during the TCRA.
- 396 10) Stabilize the slope of Rocket Ridge with additional plantings and boulders in
397 the area previously remediated.
- 398 11) Place boulders in stream diversion areas to slow flood waters along slope.
- 399 12) Develop and implement area-specific interim land-use controls for ODA2 to
400 reduce the potential for exposure at these sites.
- 401 13) Prepare a Removal Action Report.
- 402

403 **2.0 Threats to Public Health, Safety, and Environment**

404
405 The Ohio Army National Guard has recently increased the training mission at Camp
406 Ravenna significantly. Increased troop/training levels and operations in close proximity to
407 ODA2 significantly increases the potential for interaction with MEC. Exposure to MEC
408 at ODA2 could result in catastrophic results including the loss of life, significant injury
409 and/or property damage.

410
411 The MRS is centrally located within the vicinity to multiple military training assets and
412 operational ranges which are used on a regular basis. Over the past ten years or so, the use
413 of the facility and the military presence at the facility has increased significantly.
414 Consequently, the potential risk of exposure to the MEC/MPPEH from former operations
415 at the MRS has also increased. Accidental exposure or contact to MEC at the MRS could
416 potentially result in a catastrophic event including the loss of life, significant injury and/or
417 property damage.

418 **3.0 Proposed Action and Estimated Cost**

419

420 **3.1 Proposed Action Description**

421

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

439

440 **3.2 Contribution to Remedial Performance**

441

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

444

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

456

457

458 **3.3 Estimated Costs**

459

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

462

463 **3.4 Schedule**

464

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

470

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

474

475 **3.5 Community Relations**

476

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

481

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

489

490 **4.0 Recommendation**

491

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

498

499

500

501

502

503

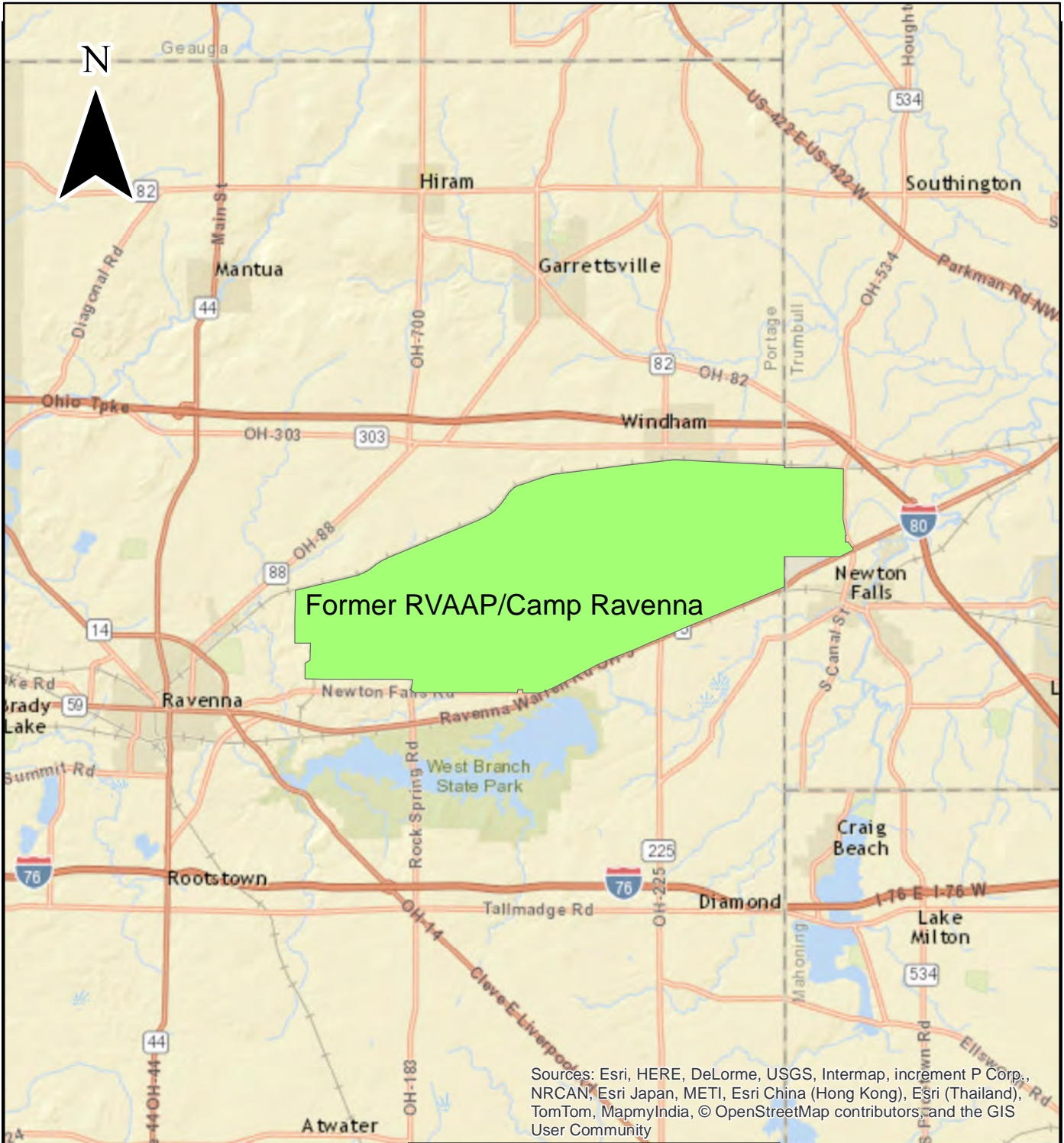
504

505

506

507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545

Figure 1



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,

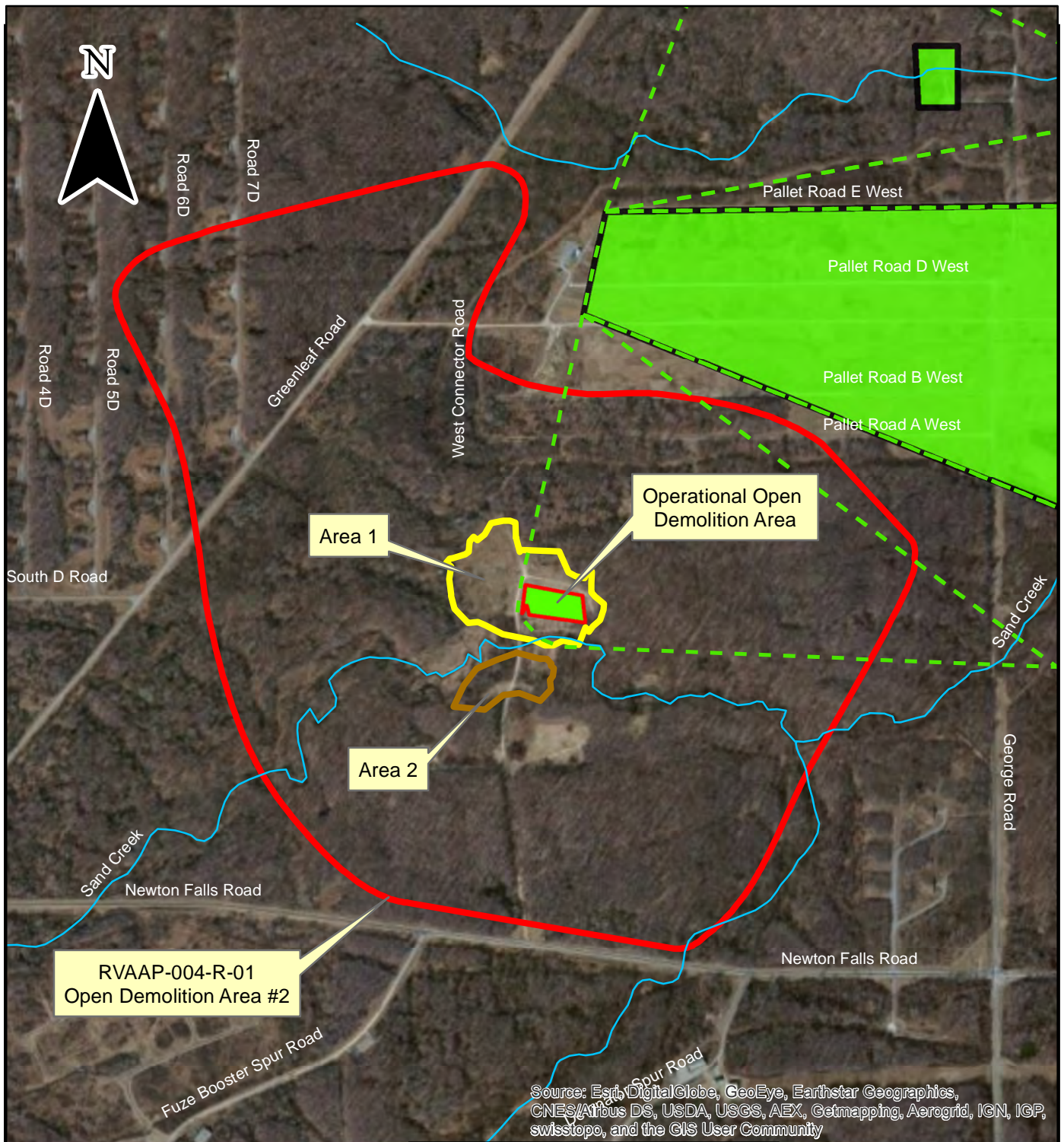


US Army Corps of Engineers
Baltimore District

Figure 1
Installation Location Map

546
547
548
549
550
551
552
553
554
555
556

Figure 2



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

- 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