

Final

**Record of Decision
for Sediment and Surface Water
at Six Areas of Concern/Munitions Response Sites**

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

Contract No. W912QR-15-C-0046

Prepared for:



**US Army Corps
of Engineers®**

**U.S. Army Corps of Engineers
Louisville District**

Prepared by:



leidos

**Leidos
8866 Commons Boulevard, Suite 201
Twinsburg, Ohio 44087**

June 4, 2020

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at Six Areas of Concern/Munitions Response Sites**

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REPORT DOCUMENTATION PAGE

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13. SUPPLEMENTARY NOTES
None.

14. ABSTRACT
This Record of Decision documents the selection of No Further Action (NFA) with respect to sediment and surface water to attain Unrestricted (Residential) Land Use at RVAAP-01 Ramsdell Quarry Landfill (with co-located RVAAP-001-R-02 RQL MRS Area 1 North), RVAAP-02 Erie Burning Grounds (with co-located RVAAP-002-R-01 EBG MRS), RVAAP-04 Open Demolition Area No. 2 (with co-located RVAAP-004-R-01 ODA2 MRS), RVAAP-16 Fuze and Booster Quarry Landfill/Ponds (with co-located RVAAP-016-R-01 FBQ MRS), RVAAP-001-R-01 RQL MRS Area 2, and RVAAP-060-R-01 Block D Igloo MRS.

In addition, this document presents the physical characteristics of these sites. This document also summarizes the nature and extent of contamination in sediment and surface water; contaminant fate and transport; and human health and ecological risk assessments. These evaluations indicate there are no chemicals of concern (COCs) that pose unacceptable risk for these media.

15. SUBJECT TERMS
record of decision, no further action, land use, chemicals of concern

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT U	18. NUMBER OF PAGES 82	19a. NAME OF RESPONSIBLE PERSON Nathaniel Peters, II
a. REPORT U	b. ABSTRACT U	c. THIS PAGE U			19b. TELEPHONE NUMBER (Include area code) 502.315.2624

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

July 8, 2020

RE: US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Project Records
Remedial Response
Portage County
ID # 267000859254

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

TRANSMITTED ELECTRONICALLY

Subject: Final Record of Decision for Sediment and Surface Water at Six Areas of Concern/Munitions Response Sites at the Former Ravenna Army Ammunition Plant Portage and Trumbull Counties, Ohio

Dear Mr. Sedlak:

The Ohio Environmental Protection Agency (Ohio EPA), Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) has received and reviewed the "Final Record of Decision for Sediment and Surface Water at Six Areas of Concern/Munitions Response Sites" dated June 4, 2020. This document was prepared by Leidos.

Ohio EPA has no comments on the Final Record of Decision (Final ROD). Based on the information contained in the Final ROD document, other investigation documents and reports, and Ohio EPA's oversight participation during the investigation, Ohio EPA concurs with the Final ROD document for the Sediment and Surface Water at Six Areas of Concern/Munitions Response Sites recommending no further action.

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

Sincerely,

Melisa Witherspoon

Melisa Witherspoon
Chief
Division of Environmental Response and Revitalization

MW/sc

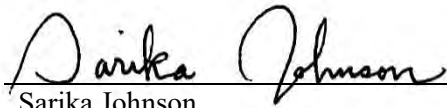
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CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

Leidos has completed the Record of Decision for Sediment and Surface Water at Six Areas of Concern/Munitions Response Sites at the Former Ravenna Army Ammunition Plant, Portage and Trumbull Counties, Ohio. Notice is hereby given that an independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of data quality objectives; technical assumptions; methods, procedures, and materials to be used; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing U.S. Army Corps of Engineers policy.



Sarika Johnson
Study/Design Team Leader

June 4, 2020

Date

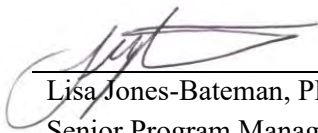


Jed Thomas, P.E., PMP
Independent Technical Review Team Leader

June 4, 2020

Date

Significant concerns and explanation of the resolutions are documented within the project file. As noted above, all concerns resulting from independent technical review of the project have been considered.



Lisa Jones-Bateman, PMP, REM
Senior Program Manager

June 4, 2020

Date

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Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Contract No. W912QR-15-C-0046

Prepared for:
U.S. Army Corps of Engineers
600 Martin Luther King, Jr. Place
Louisville, Kentucky 40202

Prepared by:
Leidos
8866 Commons Boulevard, Suite 201
Twinsburg, Ohio 44087

June 4, 2020

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for Sediment and Surface Water at
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Former Ravenna Army Ammunition Plant
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ARNG = Army National Guard.

NEDO = Northeast District Office.

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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ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-containing Material
AOC	Area of Concern
Army	U.S. Department of the Army
ARNG	Army National Guard
bgs	Below Ground Surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CJAG	Camp James A. Garfield
CMCOPC	Contaminant Migration Chemical of Potential Concern
COC	Chemical of Concern
COEC	Chemical of Ecological Concern
COI	Chemical of Interest
COPEC	Chemical of Potential Ecological Concern
DGM	Digital Geophysical Mapping
EBG	Erie Burning Grounds
EPC	Exposure Point Concentration
ERA	Ecological Risk Assessment
FBQ	Fuze and Booster Quarry
FS	Feasibility Study
FWCUG	Facility-wide Cleanup Goal
HEGP	High Explosive, General Purpose
HHRA	Human Health Risk Assessment
IRP	Installation Restoration Program
ISM	Incremental Sampling Methodology
MC	Munitions Constituent
MD	Munitions Debris
MEC	Munitions and Explosives of Concern
MMRP	Military Munitions Response Program
MRS	Munitions Response Site
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
ODA2	Open Demolition Area #2
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PP	Proposed Plan
RI	Remedial Investigation
ROD	Record of Decision
RQL	Ramsdell Quarry Landfill
RRA	Rocket Ridge Area
RSL	Regional Screening Level

ACRONYMS AND ABBREVIATIONS (continued)

RVAAP	Ravenna Army Ammunition Plant
SEMS	Superfund Enterprise Management System
SERA	Screening Ecological Risk Assessment
SI	Site Inspection
SOR	Sum-of-Ratios
SRC	Site-related Contaminant
SVOC	Semi-volatile Organic Compound
TCRA	Time-Critical Removal Action
USEPA	U.S. Environmental Protection Agency
USP&FO	U.S. Property and Fiscal Officer
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound

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PART I: THE DECLARATION

A SITE NAME AND LOCATION

This Record of Decision (ROD) addresses sediment and surface water within the following six areas of concern (AOCs) and munitions response sites (MRSs) within the former Ravenna Army Ammunition Plant (RVAAP). The sites are presented below. Co-located sites such as the Installation Restoration Program (IRP) site Ramsdell Quarry Landfill (RQL) and MRS RVAAP-001-R-02 RQL MRS Area 1 North are considered one site in this ROD.

Site Name	
1	RVAAP-01 Ramsdell Quarry Landfill (RQL) and RVAAP-001-R-02 RQL MRS Area 1 North
2	RVAAP-02 Erie Burning Grounds (EBG) and RVAAP-002-R-01 EBG MRS
3	RVAAP-04 Open Demolition Area #2 (ODA2) and RVAAP-004-R-01 ODA2 MRS
4	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds (FBQ) and RVAAP-016-R-01 FBQ MRS
5	RVAAP-001-R-01 RQL MRS Area 2
6	RVAAP-060-R-01 Block D Igloo MRS

The former RVAAP, now known as Camp James A. Garfield (CJAG), located in northeastern Ohio within Portage and Trumbull counties, is approximately 3 miles east/northeast of the city of Ravenna and 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; Garrett, McCormick, and Berry Roads to the west; the Norfolk Southern Railroad to the north; and State Route 534 to the east (Figures 1 and 2). In addition, the facility is surrounded by the communities of Windham, Garrettsville, Charlestown, and Wayland. The facility is federal property, which has had multiple accountability transfers amongst multiple Army agencies, making the property ownership and transfer history complex. The most recent administrative accountability transfer occurred in September 2013 when the remaining acreage (not previously transferred) was transferred to the U.S. Property and Fiscal Officer (USP&FO) for Ohio and subsequently licensed to the Ohio Army National Guard (OHARNG) for use as a military training site (Camp James A. Garfield).

RQL and RQL MRS Area 1 North are located immediately south of Ramsdell Road near the intersection of Ramsdell Road and Snow Road in the northeastern part of CJAG. RQL MRS Area 2 is south of RQL MRS Area 1 North. EBG is located south and west of North Perimeter Road in the northeastern portion of CJAG. ODA2 is located along Newton Falls Road, west of the Newton Falls Road and George Road intersection in the central portion of CJAG. FBQ is located along Fuze and Booster Road, northeast of the Fuze and Booster Road and Greenleaf Road intersection in the southwestern portion of CJAG. The Block D Igloo MRS is between the intersection of Smalley Road and Road 7D in the "D" Block earth-covered igloos in the north-central portion of CJAG.

The Superfund Enterprise Management System (SEMS) Identifier for RVAAP is OH5210020736.

B STATEMENT OF BASIS AND PURPOSE

The Army National Guard (ARNG) is the lead agency and has chosen the selected remedy for the sites in this ROD in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on information contained in the Administrative Record file for the AOCs and MRSs.

The Ohio Environmental Protection Agency (Ohio EPA), the supporting state regulatory agency, concurred with the *Remedial Investigation Work Plan for Sediment and Surface Water at RVAAP-01, RVAAP-04, RVAAP-16, RVAAP-001-R-01, and Inventory of Sediment and Surface Water at Multiple Sites* (Leidos 2016) (herein referred to as the Work Plan); the *Supplemental Remedial Investigation Report for Sediment and Surface Water at RVAAP-01, RVAAP-04, RVAAP-16, RVAAP-001-R-01* (Leidos 2017) (herein referred to as the Supplemental Remedial Investigation [RI] Report); and the *Proposed Plan for Sediment and Surface Water at Six Areas of Concern/Munitions Response Sites* (Leidos 2019) (herein referred to as the Proposed Plan [PP]).

The Work Plan (Leidos 2016) recommended no further action to address sediment and surface water at EBG and the Block D Igloo MRS. The Supplemental RI Report (Leidos 2017) evaluated sediment and surface water at RQL Area 1, ODA2, FBQ, and RQL MRS Area 2; no further action was recommended for these media. The decision that no further action is required for sediment and surface water at the sites in this ROD satisfies the requirements of the Ohio EPA *Director's Final Findings and Orders*, dated June 10, 2004 (Ohio EPA 2004).

C DESCRIPTION OF THE SELECTED REMEDY

No further action is necessary for sediment and surface water at the sites in this ROD for Unrestricted (Residential) Land Use. Consequently, no further action is necessary for the future use of the sites (Military Training). Groundwater will be addressed under future CERCLA decisions. Land use controls will not be implemented as part of this decision, as no CERCLA-related chemicals of concern (COCs) were identified in sediment or surface water for the Resident Receptor (Adult and Child) and the ecological risk assessment (ERA) recommended no further action.

D STATUTORY DETERMINATIONS

The recommendation of no further action for sediment and surface water is protective of human health and the environment and meets the statutory requirements for cleanup standards established in Section 121 of CERCLA. Because the human health risk assessment (HHRA) did not identify any COCs that pose unacceptable risk to the Resident Receptor (Adult and Child) and the ERA recommended no further action, five-year reviews will not be required.

E AUTHORIZING SIGNATURE

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Date: 2020.09.15 14:33:41
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15 September 2020

ANTHONY HAMMETT
Colonel, U.S. Army
Chief, G-9
Army National Guard

Date

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PART II: DECISION SUMMARY

A SITE NAME, LOCATION, AND DESCRIPTION

When the RVAAP IRP began in 1989, RVAAP (SEMS Identification Number OH5210020736) was identified as a 21,419-acre installation. In 2002 and 2003, OHARNG surveyed the property, and the total acreage was found to be 21,683 acres. The RVAAP IRP encompasses investigation and cleanup of past activities over the entire 21,683-acre former RVAAP.

As of September 2013, administrative accountability for the entire acreage of the facility has been transferred to the USP&FO for Ohio and subsequently licensed to OHARNG for use as a military training site. ARNG is the lead agency for any remediation, decisions, and applicable cleanup at these six sites. These activities are being funded and conducted under the IRP. Ohio EPA is the supporting state regulatory agency.

CJAG is located in northeastern Ohio within Portage and Trumbull counties, approximately 3 miles east-northeast of the city of Ravenna and approximately 1 mile northwest of the city of Newton Falls. CJAG is a parcel of property approximately 11 miles long and 3.5 miles wide, bounded by State Route 5 and the CSX System Railroad on the south; Garrett, McCormick, and Berry roads on the west; the Norfolk Southern Railroad on the north; and State Route 534 on the east (see Figures 1 and 2). CJAG is surrounded by several communities: Windham 7 miles to the north, Garrettsville 6 miles to the north, Newton Falls 1 mile to the southeast, Charlestown 6 miles to the southwest, and Wayland 3 miles to the south.

B SITE HISTORY AND ENFORCEMENT ACTIVITIES

RVAAP was constructed in 1940 and 1941 for depot storage and ammunition assembly/loading and placed on standby status in 1950. The primary purpose of the former RVAAP was to load medium and major caliber artillery ammunition (i.e., bombs, mines, fuzes and boosters, primers, and percussion elements) and store finished components.

In June 2004, the DFFO was issued to the Army (Ohio EPA 2004). The objective of the DFFO was for the Army and Ohio EPA to “contribute to the protection of public health, safety, and welfare and the environment from the disposal, discharge, or release of contaminants at or from the site, through implementation of a CERCLA-based environmental remediation program. This program will include the development by respondent of an RI/FS for each AOC or appropriate group of AOCs at the site, and upon completion and publication of a Proposed Plan and ROD or other appropriate document for each AOC or appropriate group of AOCs, the design, construction, operation, and maintenance of the selected remedy as set forth in the ROD or other appropriate document for each AOC or appropriate group of AOCs.”

In 2016, the U.S. Department of the Army (Army) developed a sediment and surface water Work Plan (Leidos 2016). The purpose of the Work Plan was to identify and assess sites that 1) required additional activities to attain a CERCLA decision for sediment and surface water, and 2) did not have a contract

or Army-directed activity with a goal of attaining this CERCLA decision. The Work Plan identified six sites that met these criteria; these six sites are presented in this ROD. Figure 2 depicts locations of the sites presented in this ROD. The site histories and descriptions are described below.

B.1 Ramsdell Quarry Landfill Area 1

RQL has been subject to investigation under both the IRP and Military Munitions Response Program (MMRP). RQL (RVAAP-01) consists of a 14-acre AOC and a co-located 7-acre MRS called RQL MRS Area 1 North (RVAAP-001-R-02). For clarity and added distinction from other sites discussed in this ROD, this area will be called “RQL Area 1.”

RQL Area 1 was used as a quarry until 1941. During that time, it was excavated to 30–40 ft below existing grade to provide road and construction ballast materials. Between 1941 and 1989, the western and southern sections of the abandoned quarry were used for landfill operations. No information is available regarding landfill disposal activities from 1941–1976; however, only non-hazardous solid waste was deposited at the landfill from 1976–1989. The permitted sanitary landfill was closed in September 1990 under State of Ohio solid waste regulations. Based on available information, the permitted landfill cap covers approximately 4 of the 14 acres comprising the RQL AOC.

In addition, from 1946 to the 1950s, the bottom of the quarry was used to burn waste explosives from Load Line 1. During this time, approximately 18,000 225-kg (500-lb) incendiary or napalm bombs were reportedly burned in the abandoned quarry. Liquid residues from annealing operations also were dumped in the quarry. No additional historical information is currently available on how the quarry was used, other than for landfill operations, from the 1950s until 1976, when operational records show that non-hazardous solid wastes were placed in RQL.

B.2 Erie Burning Grounds

EBG covers approximately 35 acres. EBG, designated as RVAAP-02, is co-located with the EBG MRS, designated as RVAAP-002-R-01. EBG was in operation from 1941–1951 and was used to conduct open burning of explosives and related materials. Prior to its acquisition by the U.S. Army in 1940, the area may have been used for brick manufacturing (Jacobs 1989). Bulk, obsolete, non-specification explosives, as well as propellants, rags, and U.S. Army railcars used for transporting explosives, were treated at EBG.

Aerial photographs of the site from the 1940s and 1950s depict open boxcars staged at the end of the rail spur, known as Track 49. Presumably, materials were tipped out of the cars on either side of the embankment to be burned. Evidence of activity in the aerial photographs is indicated at the northeastern terminus of the rail spur, where it meets the gravel approach road. Engineering drawings dated 1941 show a waste chute on the north side of Track 49 approximately 200 ft from the terminus; the chute leads to a designated burning area. Three pairs of trenches, now approximately 4 ft below ground surface (bgs), were dug at EBG, perhaps to collect water and to serve as containment barriers for fires set within the “T-Area” between the trenches. These ditches were connected to the original creek channel that flowed through the approximate center of the site, about 300 ft west of the T-Area. A

borrow area between Tracks 10 and 49 may potentially have been used for disposal by open burning. Unspecified large metal items also were treated to remove explosive residues. Metal items were salvaged and processed as scrap (Jacobs 1989). Ash residues from open burning remained on the site.

B.3 Open Demolition Area #2

ODA2, designated as RVAAP-04, is overlapped by the ODA2 MRS designated RVAAP-004-R-01. From 1948–1991, ODA2 was used to detonate large-caliber munitions and off-specification bulk explosives that could not be demilitarized or deactivated through any other means due to their condition. Past operations at ODA2 have also included burying munitions and ordnance components, including disposing of white phosphorus on the southern side of Sand Creek. Known potential contamination source areas include areas used for open detonation, areas used to thermally destroy sludge, areas where projectiles were fired into targets, burial sites, and areas with munitions and explosives of concern (MEC) present on the surface (referred to as the Rocket Ridge Area [RRA]).

B.4 Fuze and Booster Quarry Landfill/Ponds

FBQ, designated as RVAAP-16, is co-located with the FBQ MRS, designated as RVAAP-016-R-01. FBQ operated from 1945 until 1993 and encompasses approximately 45 acres in the south-central part of the former RVAAP. Reportedly, the quarry was used for open burning and as a landfill before 1976. The debris resulting from these activities was reportedly removed during construction of three settling ponds (quarry ponds) in 1976. These quarry ponds, up to 20 to 30 ft deep and separated by earthen berms, were constructed to receive spent brine regenerate, groundwater iron oxide filtrant, and sand filtration backwash water discharge from one of the former RVAAP water treatment plants. The discharge was regulated under a National Pollutant Discharge Elimination System (NPDES) permit and continued until 1993.

B.5 Ramsdell Quarry Landfill MRS Area 2 South

RQL MRS Area 2 is an approximately 7-acre area that contains a small, inactive soil borrow pit and wooded area where installation personnel had previously found munitions debris (MD) (e2M 2008). Information is not available regarding historical activities that occurred at RQL MRS Area 2, and it is unknown how MD arrived at this portion of the MRS. However, based on the debris found during RI fieldwork, it is suspected that this portion of the MRS may have been used as a disposal area for the munitions that were thermally treated at RQL Area 1, along with other debris (e2M 2008).

B.6 Block D Igloo MRS

The Block D Igloo MRS consists of the area contained within the suspected debris field that resulted when Igloo 7-D-15 (“D” Block) accidentally exploded on March 24, 1943. The explosion occurred as a result of 2,516 clusters of M-41 20-lb fragmentation bombs accidentally detonating. The explosion was reported to have been caused by rough handling and the faulty design of the M-110 fuze. At the time of the incident, Igloo 7-D-15 was 95 percent full.

The 60-foot-long igloo was constructed of reinforced concrete with a steel door. The igloo was primarily earthen covered with the exception of the front of it where the door was located. The igloo-shaped configuration of the magazine was designed to protect the personnel at the former RVAAP and the nearby residential communities from external force in the event of an internal explosion. The directional configuration of former Igloo 7-D-15 and the door location was toward the east.

C COMMUNITY PARTICIPATION

Using the RVAAP community relations program, ARNG and Ohio EPA have interacted with the public through public notices, public meetings, reading materials, direct mailings, an internet website, and receiving and responding to public comments. Specific items in the community relations program include the following:

- **Restoration Advisory Board** – The Army established a Restoration Advisory Board in 1996 to promote community involvement in U.S. Department of Defense environmental cleanup activities and allow the public to review and discuss the progress with decision makers. Board meetings are generally held two to three times per year and are open to the public.
- **Community Relations Plan** – The *Community Relations Plan* (Chenega 2019) is maintained to establish processes to keep the public informed of activities at the former RVAAP. The plan is available in the Administrative Record at CJAG.
- **Internet Website** – The Army established an internet website in 2004 for RVAAP. It is accessible to the public at www.rvaap.org.

In accordance with CERCLA Section 117(a) and NCP Section 300.430(f)(2), ARNG released the PP (Leidos 2019) to the public on August 12, 2019. The PP and other project-related documents were made available to the public in the Administrative Record maintained at CJAG and in the Information Repositories at Reed Memorial Library in Ravenna, Ohio, and Newton Falls Public Library in Newton Falls, Ohio. A notice of availability for the PP was sent to radio stations, television stations, and newspapers (e.g., *Warren Tribune-Chronicle* and *Ravenna Record Courier*), as specified in the Community Relations Plan. The notice of availability initiated the 30-day public comment period beginning August 12, 2019 and ending September 10, 2019.

ARNG held a public meeting on August 29, 2019, at the Charlestown Town Hall, 9355 Newton Falls Road, Ravenna, Ohio 44266 to present the PP. At this meeting, representatives of ARNG provided information and were available to answer any questions. A transcript of the public meeting is available to the public and has been included in the Administrative Record. Responses to any verbal comments received at this meeting and written comments received during the public notification period are included in the Responsiveness Summary, which is Part III of this ROD.

ARNG considered public input from the public meeting on the PP when selecting the remedy.

D SCOPE AND ROLE OF RESPONSE ACTIONS

The overall program goal of the IRP at the former RVAAP is to clean up previously contaminated lands to reduce contamination to concentrations that are not anticipated to cause risks to human health or the environment. This ROD addresses sediment and surface water. The concentrations of CERCLA-related contamination at the sites in this ROD are considered protective of human health and do not represent a risk to the environment. Therefore, these media are already protective for Unrestricted (Residential) Land Use, and the program goal of the IRP at RVAAP has been met for the sites in this ROD.

E SITE CHARACTERISTICS

This section presents physical characteristics, site investigations, nature and extent of contamination, and the conceptual site model pertinent to the sediment and surface water media for the sites in this ROD. These characteristics and findings are based on investigations conducted from 1978–2017 and are further summarized in the Work Plan (Leidos 2016) and Supplemental RI Report (Leidos 2017).

E.1 Physical Characteristics

This section describes the physical characteristics associated with the sediment and surface water media at these six sites addressed in this ROD that were key factors in identifying the potential contaminant transport pathways, receptor populations, and exposure scenarios to evaluate human health and ecological risks.

E.1.1 Ramsdell Quarry Landfill Area 1

Figure 3 depicts the site features of RQL Area 1. Ground surface elevations across RQL range from approximately 955 to 990 ft above mean sea level. The quarry bottom is approximately 40 ft below the surrounding area, and the land surface in a large portion of the AOC slopes into the former quarry, which is underlain by thin deposits of sediment over bedrock.

Surface water runoff collects in a wetland area in the bottom of the quarry. Open water within the wetland is intermittent and has been observed to be dry for extended periods. When water is present, the depth is usually less than 4 ft. During periods of inundation, a high degree of interaction exists between groundwater and surface water.

No perennial streams exist in the immediate vicinity of the site, and no surface water drainage from the quarry pond occurs. The drainage ways and ditch lines, located along access roads and the rail line, only contain water during rain events.

The water levels and horizontal extent of water in the quarry bottom of RQL fluctuate seasonally and yearly. In 2008, the IRP stakeholders agreed to use the September 2007 survey results to delineate wet sediment and soil or dry sediment. The areas of the quarry bottom that were under water during the September 2007 survey are considered wet sediment and are addressed in this ROD. The remaining

areas were considered soil and dry sediment and were addressed in the *Record of Decision for Soil and Dry Sediment for Ramsdell Quarry Landfill (RVAAP-01)* (SAIC 2009).

E.1.2 Erie Burning Grounds

Figure 4 depicts the site features of EBG. EBG has been largely inundated since the early 1990s as a result of the subdued topography and beaver activity that blocked the former surface water drainage channel just downstream from a culvert under the railroad track, near the south end of EBG where the water exits the AOC. This railroad track is designated as Track 10 in Figure 4.

The surface water basins are shallow and subject to seasonal fluctuations in water level. The water level in the ponds occasionally drops low enough so that no outflow occurs at the exit point. Seasonal high water may occasionally inundate the access road around the site. Sediment accumulations within the basins are greatest along the axis of the former drainage channel. Elsewhere in the ponds, a thin veneer of sediment overlies sandstone fill, construction debris, or other hard substrate. The nature and time of placement of these materials are not precisely known (SAIC 2005a).

Surface water drainage flows from the north to the southwest across EBG. Surface water enters EBG from the north along a drainage ditch and culvert pipe beneath East Patrol Road. Surface water drainage is also thought to enter EBG from the east through at least one culvert beneath East Patrol Road. Surface water exits the pond at the southwestern corner through a 48-inch-diameter reinforced concrete culvert beneath Track 10 at the southwestern corner of EBG. All surface water that exits EBG forms the headwaters of a perennial stream, which flows south then east and exits the facility immediately west of Route 534 (SAIC 2005a).

The *Proposed Plan for Soil and Dry Sediment at Erie Burning Grounds (RVAAP-02)* (SAIC 2007a) and *Record of Decision for Soil and Dry Sediment at Erie Burning Grounds (RVAAP-02)* (SAIC 2007b) addressed dry sediment in terms of soil, but all sediment samples collected at EBG are considered wet sediment. As a matter of record keeping and media inventory, the EBG PP and EBG ROD documenting no further action for soil continued to include dry sediment in the document title, although no dry sediment was at EBG.

E.1.3 Open Demolition Area #2

Figure 5 depicts the site features of ODA2. The topographic high elevations at ODA2 are at the northern and southern portions of the site. Sand Creek is the primary water body at the AOC, which flows across the center of the site from west to east. Surface water at the northern portion of the AOC drains south toward Sand Creek, and surface water at the southern portion of the AOC drains north toward Sand Creek. The primary north-south drainage feature within the AOC is a drainage pathway that originates near the southeastern border of the Winklepeck Burning Grounds and flows south to intersect with Sand Creek. Samples from this drainage pathway were considered dry sediment or soil. Stream flow in this drainage way is intermittent and is driven primarily by storm events. Flow in Sand Creek is perennial; consequently, samples from Sand Creek were considered wet sediment.

E.1.4 Fuze and Booster Quarry Landfill/Ponds

Figure 6 depicts the site features of FBQ. Three distinct sediment and surface water features are identified in the *Phase I/Phase II Remedial Investigation of the Fuze and Booster Quarry Landfill/Ponds (RVAAP-16)* (SAIC 2005b). These features are presented below.

Quarry Ponds. The Quarry Ponds consist of three elongated ponds situated end to end and separated by earthen berms. The surface water in the ponds is approximately 15 to 20 ft below the surrounding grade, and the depths of the water in the ponds fluctuate depending on the seasons and amount of precipitation. The southern two quarry ponds are filled with water year round. Water is typically present in the northern pond; however, water levels can vary widely, and sometimes no water is present during extended dry periods. Surface water flows from the direction of the northern pond to the southern pond through a series of gated culverts between the three ponds. Surface water overflow exits the southern pond through a culvert to the drainage ditch at the southwestern corner of the pond.

The Quarry Ponds are considered to have wet sediment and surface water media and are addressed in this ROD. In addition, the Quarry Ponds are within an MRS that is being addressed under the MMRP.

Ditch. The Ditch (drainage ditch) is downstream from the Quarry Ponds. The Ditch is in the central portion of the AOC and receives surface water discharge from the southern Quarry Pond via a culvert under the main access road in FBQ. The sediment within this drainage ditch was eventually considered to be dry sediment, as the presence of surface water received from the Quarry Ponds was considered intermittent. This drainage ditch attained CERCLA remedy via implementation of the remedial action specified in the *Record of Decision for Soil and Dry Sediment at the Fuze and Booster Quarry Landfill/Ponds (RVAAP-16)* (SAIC 2007c).

Settling Basins. The Settling Basins are composed of 11 small, shallow settling basins in the western portion of the AOC, downstream from the drainage ditch. The sediment associated with the Settling Basins was eventually considered to be dry sediment, as surface water was only intermittent in the basins, and attained CERCLA remedy under *Record of Decision for Soil and Dry Sediment at the Fuze and Booster Quarry Landfill/Ponds (RVAAP-16)* (SAIC 2007c).

E.1.5 Ramsdell Quarry Landfill MRS Area 2 South

Figure 7 depicts the site features of RQL MRS Area 2 South. This area is heavily wooded with mature forest but with little to no ground cover. During the MMRP Site Inspection (SI) (e2M 2008), the former soil borrow pit was observed to be situated on top of exposed bedrock. No water was noted at the time of the SI. In 2008, a planning-level survey for wetlands was conducted at the facility and included this site (EnviroScience 2008). Approximately 0.5 acres of wetland were identified in the former soil borrow pit and along the eastern boundary (CB&I 2015a).

E.1.6 Block D Igloo MRS

Figure 8 depicts the site features of the Block D Igloo MRS. Surface water drainage for the MRS and surrounding area follows the topography toward the southeast. An unnamed tributary to Sand Creek begins approximately 1,000 ft southeast of the former igloo 7-D-15 footprint and flows east to northeast within the MRS, then flows southeast toward Sand Creek beyond the MRS boundary. Sand Creek ultimately enters the downstream perennial headwater stream to the Michael J. Kirwan reservoir.

E.2 Site Investigations

In 1978, the U.S. Army Toxic and Hazardous Materials Agency conducted an Installation Assessment of RVAAP to review the potential for contaminant releases at multiple former operations areas, as documented in *Installation Assessment of Ravenna Army Ammunition Plant* (USATHAMA 1978). Since 1978, the sites in this ROD have been the subject of multiple IRP/MMRP investigations and/or assessments leading to CERCLA decisions and remedial actions at the AOCs and MRSs.

E.2.1 Ramsdell Quarry Landfill Area 1

RQL Area 1 has been part of multiple RIs. The following subsections summarize investigations performed at RQL Area 1 to assess sediment and surface water.

E.2.1.1 1998 Phase I Remedial Investigation

In 1998, five sediment samples and nine surface water samples were collected to assess potential contamination within the RQL quarry bottom during the RQL Phase I RI. The sample results were assessed in the *Phase I Remedial Investigation Report for Ramsdell Quarry Landfill* (SAIC 2005c).

Using risk screening methodology available at that time, four COCs (arsenic, chromium, manganese, and benzo[a]pyrene) were identified in sediment, and three COCs (arsenic, manganese, and aldrin) were identified in surface water. Based on the results of the HHRA and ERA, the site was recommended for further evaluation in a Feasibility Study (FS).

E.2.1.2 2006 Soil and Dry Sediment Feasibility Study

The *Feasibility Study for Ramsdell Quarry Landfill (RVAAP-01)* (SAIC 2006a) primarily focused on soil and dry sediment within the RQL quarry bottom. The FS provided an initial evaluation of sediment and surface water COCs and chemicals of potential ecological concern (COPECs) at the site; however, the scope of the FS did not include evaluation of remedial alternatives, if needed, for aqueous media (i.e., sediment, surface water, and groundwater).

For soil and dry sediment, the *Record of Decision Amendment for Soils and Dry Sediment at the RVAAP-01 Ramsdell Quarry Landfill* (SAIC 2013) was finalized to select an alternative to install a fence around the site to mitigate human exposure to soil and asbestos-containing material (ACM) contamination in the quarry bottom. As part of this remedy for soil and dry sediment, 1,100 tons of

contaminated soil in the northeastern portion of the quarry bottom were removed. In addition, administrative land use controls are in place to restrict access and digging at the site.

E.2.1.3 2007 MMRP Site Inspection

The 2007 MMRP SI (e2M 2008) consisted of a meandering path magnetometer- and metal detector-assisted unexploded ordnance (UXO) survey, totaling approximately 3 acres. Based on the findings of the UXO survey, buried MEC/MD were suspected to be present around the pond at the quarry bottom. Further characterization of MEC and munitions constituents (MC) in the pond in the northern quarry area was recommended.

E.2.1.4 2011 MMRP Remedial Investigation

The 2011 MMRP RI (CB&I 2015a) included a digital geophysical mapping (DGM) investigation, an intrusive investigation of anomalies, an underwater investigation to identify if MEC/MD were present in the pond sediment, and a determination of whether unacceptable risks to human or ecological receptors associated with MEC/MD would require further actions.

No MEC/MD were found at RQL Area 1; therefore, no samples were required to be collected for MC characterization in this portion of the MRS. No further action was recommended under the MMRP for Area 1 because no evidence of MEC/MD was found.

E.2.2 Erie Burning Grounds

EBG has been included in various site evaluations and RIs. A Relative Risk Site Evaluation (USACHPPM 1996) classified EBG as a high-priority AOC, the surface water/human endpoint was assessed as a “high” relative risk, and the sediment/human endpoint was assessed as a “moderate” relative risk. In 2007, the EBG ROD (SAIC 2007b) finalized the no further action decision for soil or dry sediment, but did not finalize decisions regarding wet sediment and surface water.

The following subsections summarize investigations performed at the site to assess sediment and surface water.

E.2.2.1 1999 Phase I Remedial Investigation

During the 1999 EBG Phase I RI (SAIC 2001), 86 sediment samples were collected from 59 sample locations. Four additional sediment samples were collected outside of the AOC. Co-located surface water samples were collected within 7 sub-areas at 18 of the sediment sample locations.

The results indicated levels of explosive, organic, and inorganic constituents were above human health and ecological risk evaluation screening levels in sediment and surface water. Chemicals of potential concern were identified, and an additional characterization and a baseline risk assessment were recommended.

E.2.2.2 2003/2004 Phase II Remedial Investigation

During the 2003/2004 EBG Phase II RI field activities, seven discrete sediment samples and eight surface water samples were collected. The EBG Phase II RI Report (SAIC 2005a) evaluated all available data and determined the nature and extent of contamination in soil, sediment, and surface water.

The HHRA assessed risks and hazards for two representative receptors evaluated within the RVAAP Restoration Program (Hunter/Trapper and Fire/Dust Suppression Worker). COCs were identified for the Resident Farmer in sediment and surface water; however, the focus of the Phase II RI was on the Hunter/Trapper and Fire/Dust Suppression Worker, as they were receptors applicable to the intended future land use at the time.

The EBG Phase II RI Report (SAIC 2005a) made the following recommendations: identify the need for any additional human health risk evaluation or preliminary cleanup goal development, and determine if further evaluation of ecological risks may be required or if ecological preliminary cleanup goals are required.

E.2.2.3 2006 Phase II RI Addendum

The *Addendum to the Phase II Remedial Investigation Report for Erie Burning Grounds (RVAAP-02)* (SAIC 2006b) was performed to 1) evaluate the fate and transport analysis conducted in the Phase II RI; 2) evaluate an Adult and Juvenile Trespasser scenario to supplement the baseline HHRA to provide information to support determination of the need for continued security at the facility; 3) develop preliminary cleanup goals and, based on land use considerations, apply risk management considerations to the HHRA completed during the Phase II RI; 4) incorporate further weight-of-evidence into the ERA completed during the Phase II RI; and 5) determine if EBG will require no further action or will be the subject of an FS to evaluate potential remedies and future actions using the results of the updated risk assessments.

The HHRA indicated no COCs required remediation for the Resident Receptor in surface water. Only one COC (antimony) was identified in wet sediment that required further evaluation for the Resident Receptor.

The ERA indicated that the terrestrial and aquatic ecosystems, including a Category 3 wetland, are relatively healthy and functioning, and no preliminary cleanup values for ecological resources were recommended. The ERA concluded that remediation or removal of soil or sediment to reduce COPEC concentrations was not warranted and would cause more ecological damage than the contaminant reduction was worth.

E.2.2.4 2007 MMRP Site Investigation

The 2007 MMRP SI (e2M 2008) consisted of a meandering path magnetometer- and metal detector-assisted UXO survey conducted at all accessible dry areas of the MRS. Several subsurface anomalies

were detected in the central and northwestern portions of the MRS, but no MEC was observed. Anomalies also were detected in the southwestern portion of the MRS, and a partially buried potential MEC item was found in the northwestern portion.

Based on the results of the MMRP SI, further investigation was recommended in the flooded areas of the MRS for MEC and MC in wet sediment.

E.2.2.5 2012 MMRP Remedial Investigation

The 2012 MMRP RI (CB&I 2014) included a DGM investigation, an intrusive investigation of anomalies identified during the DGM investigation, wet sediment and surface water sampling to characterize nature and extent of contamination, an evaluation to determine the presence of MC, and a determination of whether unacceptable risks to human or ecological receptors associated with MEC/MD would require further actions. No MEC was identified during the intrusive investigation activities; however, 33 MD items were identified at 5 of the exploratory trenches, and 29 MD items were identified at the point-source anomaly locations.

Three surface water samples and six incremental sampling methodology (ISM) wet sediment samples were collected. Surface water samples were collected at each of the main surface water areas: the North Surface Water Basin, the South Surface Water Basin, and the East Surface Water Basin.

E.2.3 Open Demolition Area #2

The Preliminary Assessment conducted in 1996 indicated that ODA2 is considered a high-priority AOC (USACE 1996). ODA2 has been part of multiple RIs. The following subsections summarize investigations performed at the site to assess sediment and surface water.

E.2.3.1 1998 Phase I Remedial Investigation

During a Phase I RI to assess high-priority AOCs (including ODA2), sediment samples were collected from three locations at areas north of Sand Creek. No explosives, pesticides, polychlorinated biphenyls (PCBs), or semi-volatile organic compounds (SVOCs) were detected in the samples.

The Phase I RI Report (SAIC 1998) indicated that soil-related organic chemicals were not detected in stream sediment samples downstream from the AOC; therefore, it was assumed that contaminants are not migrating away from ODA2 via surface runoff.

E.2.3.2 2002/2003 Phase II Remedial Investigation

The ODA2 Phase II RI determined the nature and extent of sediment and surface water contamination. The HHRA and baseline ERA were summarized in the *Phase II Remedial Investigation Report for the Open Demolition Area #2 (RVAAP 04)* (SAIC 2005d). One explosive, metals, SVOCs, and VOCs were identified as site-related contaminants (SRCs) in sediment samples collected from the drainage ditches

and Sand Creek. One explosive, metals, one SVOC, and volatile organic compounds (VOCs) were identified as SRCs in surface water samples collected from Sand Creek.

The HHRA evaluated risks and hazards for one receptor (Security Guard/Maintenance Worker). The Security Guard/Maintenance Worker receptor scenario included exposure to soil, but this receptor's scenario did not include exposure to sediment, surface water, or groundwater. One soil COC (arsenic) was identified for this receptor.

A Level II Screening Ecological Risk Assessment (SERA) was performed at ODA2 for soil, sediment, and surface water using Ohio EPA guidance. The Level II SERA systematically removed chemicals from further consideration. Thirteen downstream COPECs and 12 upstream COPECs were retained for sediment. Nine downstream COPECs and seven upstream COPECs were retained for surface water. Based on the presence of multiple COPECs, the ODA2 Phase II RI Report recommended further evaluation.

E.2.3.3 2006 Phase II Remedial Investigation Addendum

The *Addendum to the Phase II Remedial Investigation Report for Open Demolition Area #2 (RVAAP-04)* (SAIC 2006c) was performed to evaluate necessary CERCLA requirements with respect to chemical contamination in soil and dry sediment at ODA2. The Phase II RI Addendum did not address wet sediment, surface water, or groundwater.

The addendum recommended no further action with respect to soil chemical contamination to be protective of the Security Guard/Maintenance Worker and the environment, which was further documented in the *Record of Decision for Soil and Dry Sediment at Open Demolition Area #2 (RVAAP-04)* (SAIC 2007d).

E.2.3.4 2007 MMRP Site Investigation

During MMRP SI fieldwork, a meandering path magnetometer- and metal detector-assisted UXO survey was conducted at all accessible dry areas of the MRS (e2M 2008). MEC items were found on and protruding through the ground surface at the RRA, Bomb Disposal Area, Burial Site 2, and on the hill across Sand Creek from the RRA.

E.2.3.5 2009/2011 Rocket Ridge Area Removal Actions

The RRA is located adjacent to Sand Creek within ODA2. The RRA was likely used for disposing of demilitarized munitions, although not all munitions had been completely demilitarized. The RRA was remediated under two time-critical removal actions (TCRAs) that occurred in 2009 and 2011. Between July and August 2009, the first TCRA was conducted within the RRA in order to mitigate immediate explosive hazards (PIKA 2009). Additional activities in 2009 included the following:

- Investigating three 500-lb high explosive, general purpose (HEGP) bombs and blow-in-place destruction of one 105-mm projectile;

- Removing acceptable-to-move AN-M Series 500-lb HEGP bombs or providing the best recommendation to address unacceptable-to-move (if required) AN-M Series 500-lb HEGP bombs;
- Performing a radiation screening survey of the RRA; and
- Conducting an instrument-assisted MEC/MD density survey of the RRA MRS to determine and mark linear site boundaries and to determine the extent of contamination to assess the potential explosive hazards known to be present.

The second TCRA, conducted between April and November 2011, was completed as a follow up to remove all of the material potentially presenting an explosives hazard from the RRA, including all soil found to contain explosives with concentrations greater than 10% explosives by weight for secondary explosives.

After the MEC operations, confirmation sampling was performed to verify that secondary explosives concentrations in surface soil were less than 10% by weight and to verify the removal of white phosphorus contamination. Two ISM surface soil samples and one ISM dry sediment sample were collected for confirmatory analyses following the TCRA at the RRA to assess the adequacy of the removal action and to ensure that no residual contamination remained after remediation activities were complete (CB&I 2015b).

E.2.3.6 2011 MMRP Remedial Investigation

In 2011, an RI under the MMRP was conducted (CB&I 2015b). This RI included a subsurface investigation led by a magnetometer (mag and dig), an intrusive investigation of anomalies identified during a DGM investigation, soil sampling to characterize nature and extent of contamination and evaluate for MC, and a determination of whether unacceptable risks to human or ecological receptors associated with MEC/MD would require further actions.

No MEC was found during the evaluation of accessible areas of the stream and wetlands. However, the MMRP RI (CB&I 2015b) indicated that due to the presence of MEC within the MRS, MEC could potentially be present in uninvestigated areas of Sand Creek and associated wetland areas in the MRS.

The HHRA indicated that detected MC in surface and subsurface soil are not present at concentrations great enough to pose risks to the Security Guard/Maintenance Worker and the National Guard Trainee, the representative receptors for the future land use. The ERA indicated that detected MC may pose potential threats to likely ecological receptors in the terrestrial environment, particularly to the short-tailed shrew and American robin in surface soil. The RI recommended an FS be conducted for ODA2 to address remaining MEC/MD.

E.2.3.7 Time Critical Removal Action

A TCRA was conducted at ODA2 MRS from April 17, 2016 to May 10, 2019, as summarized in the *Time Critical Removal Action Report for RVAAP-004-R-01 Open Demolition Area #2* (USACE 2019). During removal activities, 791 MPPEH items were recovered from ODA2, of which 487 of those items

were determined to be MEC and destroyed in the buried explosion module. A total of 90,080 pounds of MDAS were recovered, of which approximately 2,500 pounds were cultural debris.

Numerous disposal pits were encountered in the moderate-to-high-probability area. Specifically, five areas were identified as having evidence of significant disposal activities. These areas are centrally located within the MRS. No disposal pits were encountered in the low-probability area.

Four magnetometer-assisted visual surface sweeps of Sand Creek were conducted between October 2017 and April 2019 to evaluate the potential for MEC/MPPEH migration within the ODA2 MRS and to evaluate the potential for migration of MEC/MPPEH off the installation at creek exit points. A significant amount of MPPEH was removed from the creek in the moderate-to-high-probability areas; however, clearance activities were not conducted on the creek banks due to erosion and stability concerns. During post-clearance surveys of Sand Creek, MPPEH was observed eroding from the creek banks into the water, but MPPEH does not appear to be migrating downgradient. Rather, this material is accumulating near the recently installed three-sided culvert located near the center of the ODA2 MRS.

Ordnance and Explosive Safety Specialists observed no significant migration of MEC/MPPEH within Sand Creek and no evidence of MEC/MPPEH exiting the MRS or installation.

E.2.4 Fuze and Booster Quarry Landfill/Ponds

FBQ has been included in various site evaluations and RIs. A Relative Risk Site Evaluation (USACHPPM 1996) classified FBQ as a high-priority AOC. The following subsections summarize investigations performed at the site to assess sediment and surface water.

E.2.4.1 2003/2004 Phase I/Phase II Remedial Investigation

The FBQ Phase I/Phase II RI was performed to assess soil, sediment, surface water, and groundwater at FBQ. During the RI activities, 17 sediment samples and 4 surface water samples were collected from the quarry ponds.

The FBQ Phase I/Phase II RI Report (SAIC 2005b) recommended that decision makers carefully consider the need for further investigation or remedial action based on the calculated risks using these data.

E.2.4.2 2003 Facility-wide Biological Water Quality Study

Two surface water samples and one ISM sediment sample were collected from a quarry pond at FBQ during the *2003 Facility-wide Biological Water Quality Study* (USACE 2005). The samples were analyzed for target analyte list metals, SVOCs, PCBs, pesticides, explosive compounds, percent solids, cyanide, ammonia, nitrate, and phosphorus. The report determined that surface water and sediment quality was sufficient to not adversely impact the biological community.

E.2.4.3 2006 Soil and Dry Sediment Feasibility Study

The *Feasibility Study for Fuze and Booster Quarry Landfill/Ponds (RVAAP-16)* (SAIC 2006d) primarily focused on soil and dry sediment at FBQ. The FS recommended remediation within the drainage ditch (west of and downstream from the quarry ponds), as documented in the FBQ ROD (SAIC 2007c). The ROD addressed soil and dry sediment (which included the 11 settling basins and drainage ditch), resulting in the removal of 184 tons of contaminated dry sediment from the drainage ditch. Subsequent to this remedial action, no further action was required for soil or dry sediment to be protective of human health and the environment.

The wet sediment and surface water media within the quarry ponds were not included in the final decisions associated with the ROD. The quarry ponds are rarely without surface water; therefore, the quarry ponds were considered to contain wet sediment. For the wet sediment within the quarry ponds, initial COCs were identified for the Resident Receptor, and no COCs were identified in surface water.

E.2.4.4 2007 MMRP Site Investigation

The MMRP SI (e2M 2008) included a meandering path with a magnetometer- and metal detector-assisted UXO survey, which was conducted on the banks and surrounding areas at all three ponds. No MEC was observed; however, MD was found at the southeastern side of the southern pond. In addition, many subsurface anomalies, presumed to represent buried MD and potentially MEC, were detected along the eastern and northern sides of the northern pond, the east side of the central pond, and the southern and eastern sides of the southern pond.

Based on the results of the MMRP SI, further characterization of the ponds was recommended to assess the buried anomalies, and the MRS footprint was reduced to the 4.92-acre area, including the three ponds and their associated banks.

E.2.4.5 MMRP Remedial Investigation

In 2011, an MMRP RI (CB&I 2015c) was conducted. This RI included a DGM investigation, an intrusive investigation of anomalies identified during the DGM investigation, an underwater investigation to identify if MEC/MD were present in the quarry pond sediment, sampling of wet sediment to characterize nature and extent of contamination and evaluate for MC, and a determination of whether unacceptable risks to human or ecological receptors associated with MEC/MD would require further actions.

No MEC/MD were found in the ponds during the underwater investigation. Four wet sediment samples were collected from the quarry ponds during the RI field activities. No explosives or propellants were detected in the wet sediment samples. An HHRA was conducted to determine if the SRCs may pose a risk to the National Guard Trainee or Resident Receptor. The Resident Receptor COCs in wet sediment consisted of antimony, iron, lead, mercury, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and Aroclor-1254. No COCs were identified in the wet sediment samples for

the National Guard Trainee. The potential for impact to ecological receptors in the aquatic environment from SRCs in wet sediment was identified in the ERA.

E.2.5 Ramsdell Quarry Landfill MRS Area 2 South

Since 2007, RQL MRS Area 2 has undergone an SI and RI under the MMRP. The following subsections summarize investigations performed at the site to assess sediment and surface water.

E.2.5.1 2007 MMRP Site Investigation

The MMRP SI (e2M 2008) consisted of a line abreast and a meandering path magnetometer- and metal detector-assisted UXO survey totaling approximately 2 acres. Debris items, including one empty 105-mm ceremonial shot cartridge and one empty 155-mm shot round, were found at two locations within the MRS, with one location at the soil borrow pit. Four additional ISM surface soil samples were collected and analyzed for explosives, propellants, and target analyte list metals. Lead and manganese identified as MC were detected in one sample at concentrations greater than background values.

The SI Report (e2M 2008) stated additional characterization of MEC was necessary in the southern soil borrow pit based on the presence of MC.

E.2.5.2 2011 MMRP Remedial Investigation

Areas of concentrated MD were encountered during the intrusive investigation activities at RQL Area 2, and two ISM surface soil samples were collected at locations that were biased to where MC would be expected to be found (CB&I 2015a).

The risk assessments for MC indicated the detected SRCs in soil at RQL Area 2 did not pose risks to human or ecological receptors (CB&I 2015a), although sediment and surface water present at the former soil borrow pit and nearby wetlands were not sampled.

E.2.6 Block D Igloo MRS

Since 2007, the Block D Igloo MRS has undergone an SI and RI under the MMRP. The following subsections summarize investigations performed at the site to assess sediment and surface water.

E.2.6.1 2007 MMRP Site Investigation

The MMRP SI (e2M 2008) consisted of a meandering path magnetometer-assisted UXO survey around the former igloo and at four documented locations where debris was found, totaling approximately 6 acres. No MEC/MD were found lying on the ground within the interior of the former igloo and within a circumference of approximately 100 ft surrounding this area. Several subsurface anomalies were recorded within the former igloo and may be attributed to the remnants of the reinforced concrete floor, but no subsurface anomalies were detected in the 100-ft circumference surrounding the igloo.

At the four documented debris locations, no visual evidence of MEC/MD was found and few subsurface anomalies were detected.

E.2.6.2 2011 MMRP Remedial Investigation

Sampling for MC conducted at the Block D Igloo MRS determined that none of the detected soil SRCs posed any risk to human or ecological receptors (CB&I 2015d). Sediment and surface water samples were not collected from several small wetlands and a floodplain along the unnamed tributary to Sand Creek; however, MEC/MD were not observed in surface water or sediment during the visual survey. The SRCs detected in the surrounding terrestrial environments were low and were determined not to pose risks to likely human or ecological receptors. Therefore, the aquatic environments, including sediment and surface water, are considered incomplete MC exposure pathways for the receptors.

E.3 Nature and Extent of Contamination

The Work Plan (Leidos 2016) presented available information and historical documents associated with these six sites. This review concluded that EBG and the Block D Igloo MRS require no further action to address sediment and surface water. The remaining four sites were recommended for further evaluation. The Work Plan also concluded that RQL Area 1 and RQL MRS Area 2 required additional sampling, and no additional sampling was necessary for ODA2 or FBQ to complete risk assessment decisions.

Analytical results from all of the RIs, including samples collected in accordance with the Work Plan (Leidos 2016), effectively characterized the nature and extent of contamination at the AOCs and MRSs. Chemicals of interest (COIs) that exceeded May 2016 U.S. Environmental Protection Agency (USEPA) Tapwater regional screening levels (RSLs) in surface water and May 2016 USEPA Resident Soil RSLs in sediment were the focus of the nature and extent discussion.

The characterization of nature and extent is presented in the Supplemental RI Report (Leidos 2017) and is summarized in the following subsections. Based on previous information and the summary below, it can be concluded that the vertical and horizontal extent of contamination is defined, and no further sampling is needed to evaluate the sites in this ROD.

E.3.1 Ramsdell Quarry Landfill Area 1

The Work Plan (Leidos 2016) identified the need to collect additional samples due to the lack of sediment data for the southern ponded area and eastern side of the quarry. No surface water samples were collected during field activities because no water was present during the October 2016 sampling event.

Using all available information, including sediment and surface water data from historical investigations, an assessment of nature and extent of contamination was performed in the Supplement RI Report (Leidos 2017). Inorganics, including aluminum, arsenic, cobalt, lead, manganese, and thallium, were detected in the surface water at concentrations above facility-wide background

concentrations and RSLs. Aluminum, arsenic, cobalt, lead, and manganese are MCs that can be attributed to the thermal treatment of waste explosives from Load Line 1 in the quarry bottom. Arsenic, manganese, and thallium were also detected in wet sediment samples above background and screening criteria. The maximum concentrations in sediment were all at RQLsd-022, which is in the northern ponded area. Similar concentrations of arsenic, manganese, and thallium were detected in adjacent sample RQLsd-081 during the 1998 sampling. The only COI detected above its respective RSL in the southern ponded area was arsenic at sample location RQLsd-082. These inorganic constituents also were widely detected in the soil and dry sediment surrounding the surface water and wet sediment areas prior to the excavation and off-site disposal of soil and dry sediment completed in 2010.

Limited organics exceeded the RSLs at RQL Area 1. A single detection of a pesticide (aldrin) in surface water and benzo(a)pyrene concentrations in wet sediment were the only organic constituents to exceed the RSLs. The quarry bottom is approximately 40 ft below the surrounding area, and the land surface in a large portion of the AOC slopes into the former quarry. Surface water runoff collects in the bottom of the quarry and may account for the detection of aldrin in surface water. Benzo(a)pyrene exceeded the RSL (0.16 mg/kg) in four samples from three sample locations. The exceedances are sporadic. At RQLsd-018, benzo(a)pyrene was detected in the 0- to 5- and 0.5- to 2-foot intervals; however, a deeper sediment sample (2 to 4 ft bgs) was collected at this location and benzo(a)pyrene was not detected.

E.3.2 Erie Burning Grounds

No MEC was identified during the intrusive investigation activities; however, a total of 33 MD items were identified at 5 of the exploratory trenches, and a total of 29 MD items were identified at the point source anomaly locations. Three surface water samples and six ISM wet sediment samples were collected at the MRS during the RI field activities. Surface water samples were collected at each of the main surface water areas at the MRS: the North Surface Water Basin, the South Surface Water Basin, and the East Surface Water Basin. The surface water SRCs consisted only of metals. The wet sediment samples were collected from the main water basins: three ISM sediment samples from the North Surface Water Basin (2.8 acres each), two ISM sediment samples from the South Surface Water Basin (3.2 acres each), and one ISM sediment sample from the East Surface Water Basin (1.5 acres). SRCs in wet sediment consisted of metals, explosives, SVOCs, and PCBs.

Sampling for MC conducted at the EBG MRS determined that none of the detected sediment and surface water SRCs are present at concentrations great enough to pose any risk to human or ecological receptors. For this reason, no further action is recommended to address sediment and surface water under the IRP. Sampling for MC in wet sediment and surface water at EBG was comprehensive and representative of potential SRCs for all IRP and MMRP site activities.

E.3.3 Open Demolition Area #2

Arsenic, manganese, and thallium were detected in the surface water at concentrations above facility-wide background concentrations and RSLs. Arsenic and manganese are MCs, and their presence at the site is consistent with the open demolition activities that occurred at ODA2. They were not detected at concentrations greater than background at the upstream sample location (DA2sw-096). Thallium did

exceed the RSL at upstream sample location DA2sw-096 in samples collected during three sampling events between May 2007 and October 2011. Arsenic, manganese, and thallium have not been detected at any of the surface water sample locations during the last three sampling events (collected from August to September 2013). Arsenic, manganese, and thallium were not detected in wet sediment samples above facility-wide background concentrations.

Hexavalent chromium was analyzed for in six sediment samples but only detected at a single sample location (DA2sd-099). Total chromium at DA2sd-099 was below background concentrations. There are no known sources of hexavalent chromium at ODA2. Hexavalent chromium was not detected in upgradient or downgradient sediment samples.

E.3.4 Fuze and Booster Quarry Landfill/Ponds

Antimony, lead, and mercury concentrations in wet sediment were detected above their respective RSLs in only the southern ISM sample from the Southern Pond (FBQsd-210M). Antimony also slightly exceeded the RSL (0.0078 mg/L) in a single surface water sample from the Northern Pond. Surface water flows from the direction of the Northern Pond to the Southern Pond through a series of gated culverts between the three ponds. The Ditch receives surface water discharge from the southern Quarry Pond via a culvert under the main access road in FBQ. This area was evaluated in an FS and achieved a ROD for soil and dry sediment by addressing manganese. The Ditch was not impacted by antimony, lead, or mercury from the FBQ Ponds. Lead was detected in surface water at concentrations below the maximum contaminant level, and mercury was not detected in surface water.

Benzo(a)pyrene was the sole organic compound with an exceedance of the RSL. Benzo(a)pyrene exceeded the RSL (0.16 mg/kg) in the ISM sample collected from the Central Pond (FBQsd-212M). Benzo(a)pyrene was detected in the ISM sample from the Northern Pond (FBQsd-213M) at the RSL. Benzo(a)pyrene was not detected in the northern portion of the Southern Pond (FBQsd-211M) and was below the RSL in the southern portion of the Southern Pond (FBQsd-210M). Benzo(a)pyrene was not detected in any of the surface water samples from any of the ponds.

E.3.5 Ramsdell Quarry Landfill MRS Area 2 South

The Work Plan (Leidos 2016) determined that further investigation was warranted to determine the nature and extent of any contamination resulting from previous activities concerning MD. Four discrete sediment samples were collected in October 2016 and analyzed for metals, SVOCs, nitrocellulose, explosives/propellants, PCBs, total organic carbon, and pH. No surface water samples could be collected because water was not present during the October 2016 sampling event. Using all available information, including data from historical investigations, an assessment of nature and extent of contamination was detailed in the Supplement RI Report (Leidos 2017).

No surface water samples could be collected because water was not present during the October 2016 sampling event. Ten metals, PCB-1260, and 16 SVOCs (primarily polycyclic aromatic hydrocarbons [PAHs]) and two explosives/propellants (nitrocellulose and nitroguanidine) are considered COIs for

wet sediment at RQL MRS Area 2. None of the COIs exceeded the RSL in sediment at RQL MRS Area 2.

E.3.6 Block D Igloo MRS

A total of 3,135 MD items and 5 MEC items were encountered during the intrusive investigation activities. Samples for sediment and surface water were not collected because MEC/MD was not observed in the unnamed tributary to Sand Creek. SRCs detected in the surrounding terrestrial environments were low and were determined not to pose risks to likely human or ecological receptors. Therefore, the aquatic environments, including sediment and surface water, are considered incomplete MC exposure pathways for the receptors.

E.4 Conceptual Site Model

Conceptual site model elements are discussed in this section, including primary and secondary contaminant sources and release mechanisms, contaminant migration pathways and discharge or exit points, and potential human receptors and ecological resources.

E.4.1 Primary and Secondary Contaminant Sources and Release Mechanisms

No primary contaminant sources (e.g., operational facilities) are currently located at the sites in this ROD. Remnant contamination in sediment is considered a secondary source of contamination.

The potential mechanisms for contaminant releases from secondary sources at the sites in this ROD include:

- Contaminated sediment at the bottom of surface water bodies, assuming equilibrium with groundwater, and mixing with surface water based on a calculated dilution attenuation factor (DAF);
- Contaminated sediment transported to potential downstream receptors; and
- Contaminated surface water migrating to potential downstream receptors.

E.4.2 Contaminant Migration Pathways and Exit Points

All sediment SRCs were evaluated to determine if residual concentrations in sediment may potentially impact groundwater quality and warrant evaluation in an FS. The sediment screening evaluation identified the following contaminant migration chemicals of potential concern (CMCOPCs):

- Among the sediment CMCOPCs, arsenic, cobalt, and methylene chloride at RQL Area 1 and antimony and methylene chloride at FBQ Ponds were predicted to exceed screening criteria in groundwater beneath their respective source.

A qualitative assessment of the sample results and considerations of the limitations and assumptions of the results were performed to identify if any CMCOs are present in sediment at these AOCs and MRSs

that may impact the groundwater beneath their respective source. This qualitative assessment concluded that no CMCOs were present in sediment that may impact the groundwater beneath their respective sources. Therefore, no further action is required of sediment to protect groundwater.

E.4.3 Potential Human Receptors and Ecological Resources

In February 2014, the Army and Ohio EPA amended the risk assessment process to address changes in the RVAAP restoration program. The *Final Technical Memorandum: Land Uses and Revised Risk Assessment Process for the RVAAP Installation Restoration Program* (ARNG 2014) identified the following three Categorical Land Uses and Representative Receptors to be considered during the RI phase of the CERCLA process.

1. Unrestricted (Residential) Land Use – Resident Receptor (Adult and Child) (formerly called Resident Farmer).
2. Military Training Land Use – National Guard Trainee.
3. Commercial/Industrial Land Use – Industrial Receptor (USEPA Composite Worker).

An evaluation using Resident Receptor (Adult and Child) facility-wide cleanup goals (FWCUGs) was used to provide an Unrestricted (Residential) Land Use evaluation. Unrestricted (Residential) Land Use is considered protective for all categories of land use at CJAG. Additional human health receptors associated with CJAG are the National Guard Trainee and Industrial Receptor. No COCs were identified as requiring remediation to be protective for the Resident Receptor or Unrestricted (Residential) Land Use.

F CURRENT AND POTENTIAL FUTURE LAND USES

The sites in this ROD are currently managed by ARNG/OHARNG. The future use of the sites is Military Training. The Resident Receptor (Adult and Child) was evaluated in the HHRA to assess an Unrestricted (Residential) Land Use scenario. This ROD discusses future land use, as it pertains to sediment and surface water and how it impacts human health, the environment, and groundwater.

G SUMMARY OF SITE RISKS

The HHRA and ERA estimated risks to human receptors and ecological resources; identified exposure pathways; identified COCs and COPECs, if any; and provided a basis for remedial decisions.

G.1 Human Health Risk Assessment

Using information available prior to 2016, the Work Plan (Leidos 2016) concluded that EBG and Block D Igloo did not require additional sampling or evaluation and can be recommended for no further action for sediment and surface water. For RQL Area 1, ODA2, FBQ, and RQL MRS Area 2, the Supplemental RI (Leidos 2017) evaluated COIs identified in the Work Plan (Leidos 2016) to determine if sediment or surface water COCs require remediation at the four sites. The methodology of comparing exposure concentrations to RSLs and determining COCs generally follows guidance presented in the

Position Paper for Human Health Cleanup Goals (USACE 2012) and Technical Memorandum (ARNG 2014) and includes calculating a sum-of-ratios (SOR) for all non-carcinogenic and carcinogenic chemicals.

RSLs are not available for sediment; therefore, the May 2016 USEPA Resident Soil RSLs were used to identify COCs in sediment in the Supplemental RI Report (Leidos 2016). This was a conservative approach, as the RSLs assume there is daily exposure to soil in a residential yard (i.e., exposure occurs daily from age 0 to 30 years old and children ingest significant amounts of material while playing in the yard) whereas exposure to sediment in a water body in Northern Ohio and under more than 1 ft of water will be less frequent and for a shorter duration (i.e., more reflective of a recreational exposure).

USEPA RSLs are also not available for surface water that is not a potable water source. Use of the May 2016 USEPA Tapwater RSLs based on potable water use to evaluate the small surface water bodies at the AOCs (i.e., drainage ditches and shallow ponds) is conservative compared to the potential incidental exposure that may occur at these conveyances.

The reported concentration in each sample was compared to RSLs (i.e., the exposure point concentration [EPC] is the concentration in each individual sample). COIs were identified as COCs for a given receptor if:

- The EPC exceeds the most stringent RSL for either the 1E-05 target cancer risk or the target hazard quotient of 1; or
- The SOR for all carcinogens or non-carcinogens that may affect the same organ is greater than 1. Chemicals contributing more than 5–10% to an SOR greater than 1 are also considered COCs.

The HHRA identified COCs and conducted risk management analysis to determine if COCs pose unacceptable risk to the Resident Receptor. The potential impact of using these conservative RSLs for soil and tapwater to evaluate sediment and surface water was evaluated in the Supplemental RI Report (Leidos 2017) using the online USEPA RSL calculator to calculate screening levels based on slightly more realistic but still conservative exposure assumptions (e.g., exposure is limited to the warmer months of the year: June through September). If no unacceptable risk to the Resident Receptor exists, it can be concluded that no further action is required from a human health perspective. The results of the HHRA for the sites are provided below.

G.1.1 Ramsdell Quarry Landfill Area 1

Aluminum, arsenic, cobalt, lead, manganese, thallium, and aldrin exceeded the RSLs and were identified as COCs in surface water. The EPCs of all COCs were well below calculated RSLs for seasonal use of surface water for recreation (e.g., wading) by a resident with the corresponding SORs less than 1. Thus, these COCs were not recommended for potential remediation.

Arsenic, manganese, thallium, and benzo(a)pyrene exceeded the RSLs and were identified as COCs in sediment. Cobalt and four additional PAHs contributed to SORs above 1 and were also identified as

COCs. The EPCs of all COCs were well below calculated RSLs for seasonal use of surface water for recreation (e.g., wading) by a resident with the corresponding SORs less than 1. Thus, these COCs are not recommended for potential remediation.

G.1.2 Erie Burning Grounds

Sampling for MC in wet sediment and surface water at EBG was comprehensive and representative of potential site-related constituents for all IRP and MMRP site activities. Sampling for MC conducted at the EBG MRS determined that none of the detected sediment and surface water SRCs are present at concentrations great enough to pose any risk to human or ecological receptors. For this reason, no further action is recommended to address sediment and surface water under the IRP.

G.1.3 Open Demolition Area #2

Arsenic, manganese, and thallium exceeded the RSLs and were identified as COCs in surface water. The maximum detected concentrations of all COCs are well below calculated RSLs for recreational use by a resident with the corresponding SORs less than 1. Thus, these COCs are not recommended for potential remediation.

The detected concentration of hexavalent chromium in one of six samples exceeded the RSL and contributed to an SOR above 1. Hexavalent chromium was identified as a COC in sediment. The single hexavalent chromium detection is not recommended for potential remediation because the estimated risk is close to the target risk even using the conservative RSL.

G.1.4 Fuze and Booster Quarry Landfill/Ponds

The concentration of antimony slightly exceeded the RSL in one location; thus, antimony was identified as a COC in surface water. The detected concentration of antimony was well below the calculated RSL for recreational use by a resident with the corresponding SORs less than 1. Thus, this COC was not recommended for potential remediation.

Concentrations of antimony, lead, mercury, and benzo(a)pyrene exceed the RSL and were identified as COCs in sediment in one or more of the pond exposure units. While the detected concentrations slightly exceed the RSLs, they are well below the calculated sediment RSLs, and these metals and PAHs are not recommended for potential remediation. Hexavalent chromium and the PAHs benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene contribute to one or more SORs above 1. No COCs were identified for potential remediation within the Northern Pond, Central Pond, or Southern Pond at FBQ because the estimated risks are close to the target risk even using the conservative RSLs.

G.1.5 Ramsdell Quarry Landfill MRS Area 2 South

Because surface water was not present and no COCs were identified in sediment, no COCs were identified for further evaluation in an FS for surface water or sediment at RQL MRS Area 2.

G.1.6 Block D Igloo MRS

Sampling for MC conducted at the Block D Igloo MRS determined that none of the detected soil SRCs posed any risk to human or ecological receptors. Sediment and surface water samples were not collected from several small wetlands and a floodplain along the unnamed tributary to Sand Creek; however, MEC and MD were not observed in surface water or sediment during the visual survey. Therefore, the Block D Igloo MRS required no further action to address sediment and surface water.

G.2 Ecological Risk Assessment

Evaluation of the selected COPECs at EBG within the Level III Baseline (CB&I 2014) suggested that impacts to upper trophic-level receptors are minimal, and adverse effects to populations of these receptors are not expected. These findings are supported by the FWBWQS (USACE 2005). This study included the evaluation of several reaches of the West Branch of the Mahoning River downstream from the EBG MRS and found no biological impacts associated with chemical contamination, thereby supporting the recommendation for no further action for EBG from an ecological perspective.

The Block D Igloo SRCs detected in the surrounding terrestrial environments were low and were determined not to pose risks to likely human or ecological receptors. Therefore, the aquatic environments, including sediment and surface water, are considered incomplete MC exposure pathways for the receptors, and no further action is required for sediment and surface water at Block D Igloo from an ecological perspective.

To assess the potential ecological risk at RQL Area 1, ODA2, FBQ, and RQL MRS Area 2, the Supplemental RI included ERAs for sediment and surface water in accordance with the Level I Scoping ERA and Level II Screening ERA outlined in the *Guidance for Conducting Ecological Risk Assessments* (Ohio EPA 2008) with specific application of components from other ecological risk guidance, such as *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (USEPA 1997).

A Level I ERA was conducted for RQL Area 1, ODA2, FBQ, and RQL MRS Area 2 to determine the presence/absence of important ecological places and resources and the presence of contamination. Perennial surface water in creeks and/or ponds and wetlands are important ecological resources at these four sites. Because contamination and important/significant ecological resources exist at RQL Area 1, ODA2, and FBQ, the ERAs continued to a Level II Screening ERA.

The Level II Screening ERA identified procedures to determine integrated COIs for each site and defined habitats/environmental setting, suspected contaminants, and possible exposure pathways. Technical and refinement factors were then used to refine the integrated COIs from the Level II Screening ERA. The factors included use of mean exposure concentrations and discussion of approved ecological screening values and other topics. This type of assessment is Step 3A in the ERA process (USEPA 1997). Step 3A refined the list of integrated COIs to determine if there are chemicals of ecological concern (COECs) requiring further evaluation in Level III or remediation to protect ecological receptors, or integrated COIs can be eliminated from further consideration. This evaluation

is an important part of Level II and is adapted from USEPA Step 3A, outlined in the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (USEPA 1997) and *Risk Assessment Handbook Volume II: Environmental Evaluation* (USACE 2010).

For RQL Area 1, ODA2, and FBQ, the evaluation in Step 3A showed that no ecological concern exists. Consequently, the ERAs for RQL Area 1, ODA2, and FBQ concluded with Level II that no further action is necessary to be protective of important ecological resources. The ERA for the RQL MRS Area 2 AOC concluded with a Level I Scoping ERA and a recommendation that no further action is required to be protective of ecological resources.

H DOCUMENTATION OF NO SIGNIFICANT CHANGE

The *Proposed Plan for Sediment and Surface Water at Six Areas of Concern/Munitions Response Sites* (Leidos 2019) was released for public comment on August 12, 2019. The PP recommended no further action for sediment and surface water at the sites in this ROD. No significant changes were necessary or appropriate following the conclusion of the public comment period.

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PART III: RESPONSIVENESS SUMMARY FOR PUBLIC COMMENTS ON THE PROPOSED PLAN FOR SEDIMENT AND SURFACE WATER AT SIX AREAS OF CONCERN/MUNITIONS RESPONSE SITES

A OVERVIEW

On August 12, 2019, ARNG released the *Proposed Plan for Sediment and Surface Water at Six Areas of Concern/Munitions Response Sites* (Leidos 2019) for public comment. A 30-day public comment period was held from August 12, 2019 to September 10, 2019. ARNG hosted a public meeting on August 29, 2019 to present the PP and take questions and comments from the public for the record.

For surface water and sediment at the sites in this ROD, ARNG recommended no further action. During the public meeting, Ohio EPA concurred with the recommendation of no further action. Comments provided during the public comment period and public meeting are summarized in the following section.

The community voiced no objections to the no further action recommendation. All public input was considered during the selection of the final remedy for surface water and sediment at the sites in this ROD.

B SUMMARY OF PUBLIC COMMENTS AND LEAD AGENCY RESPONSES

The following subsections summarize the oral and written comments provided during the public comment period and public meeting. The Army's responses provided below are considered final upon approval of the Final ROD.

B.1 Oral Comments from Public Meeting

No oral comments were received during the public meeting or during the public comment period.

B.2 Written Comments

No written comments were received during the public comment period.

C TECHNICAL AND LEGAL ISSUES

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

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- SAIC 2007c. *Record of Decision for Soil and Dry Sediment at the Fuze and Booster Quarry Landfill/Ponds (RVAAP-16)*. September 2007.
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FIGURES

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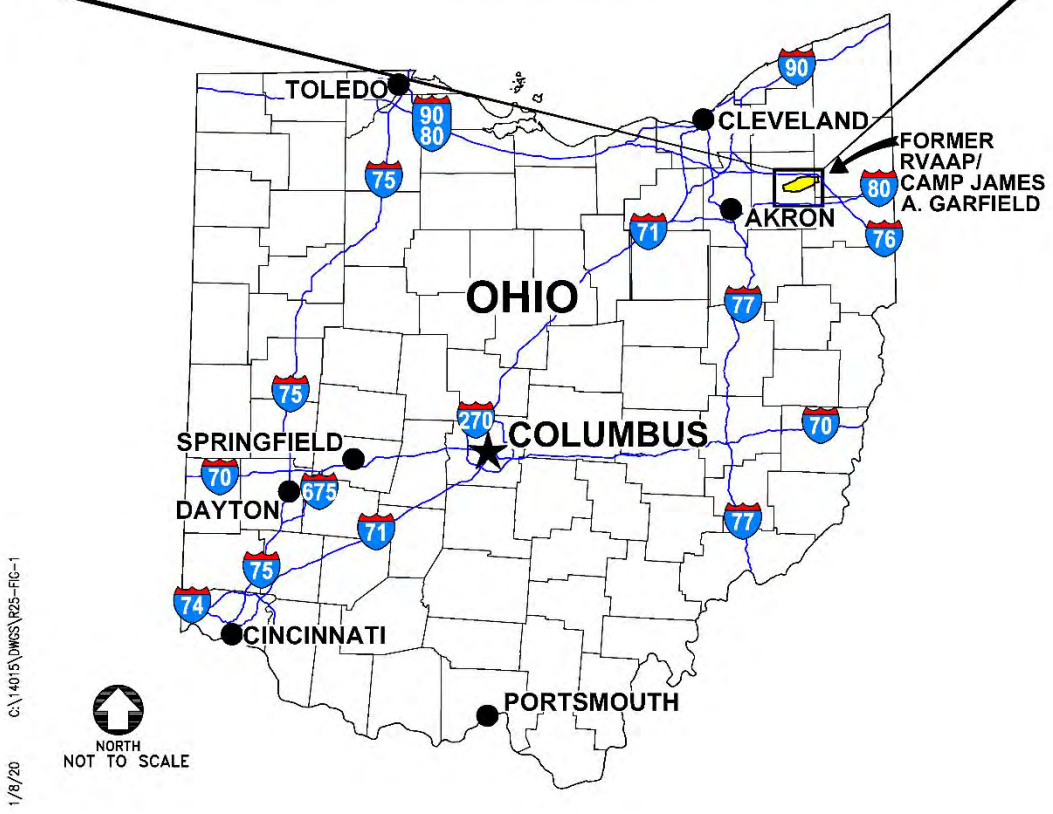
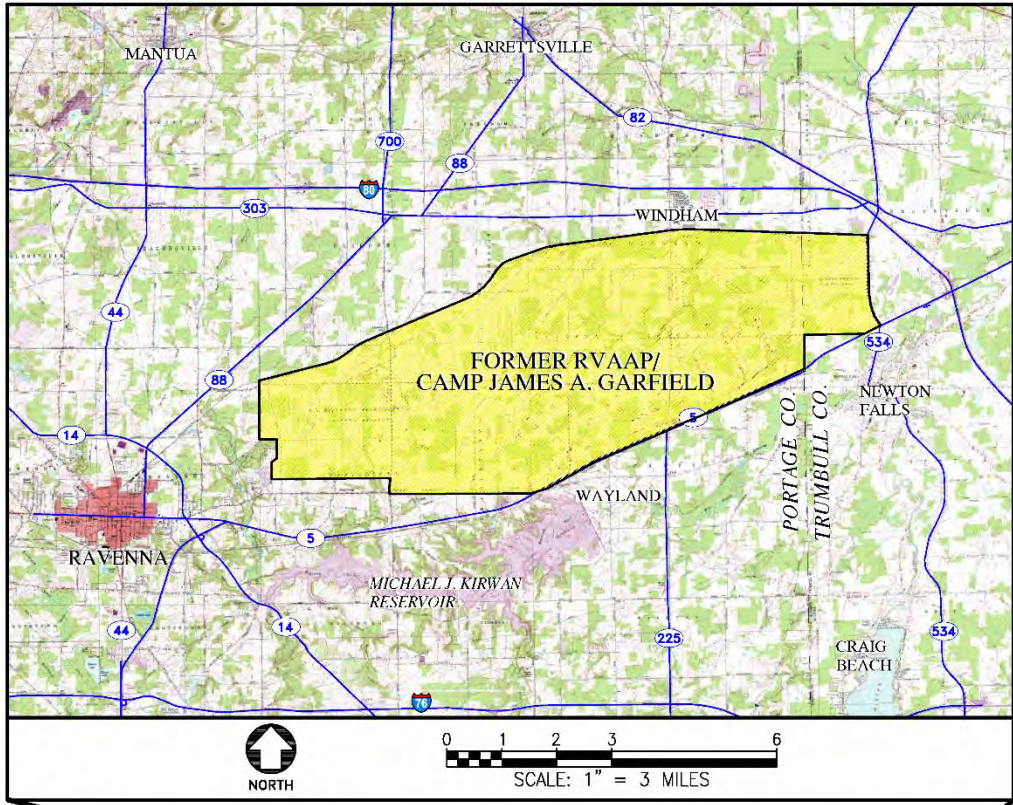
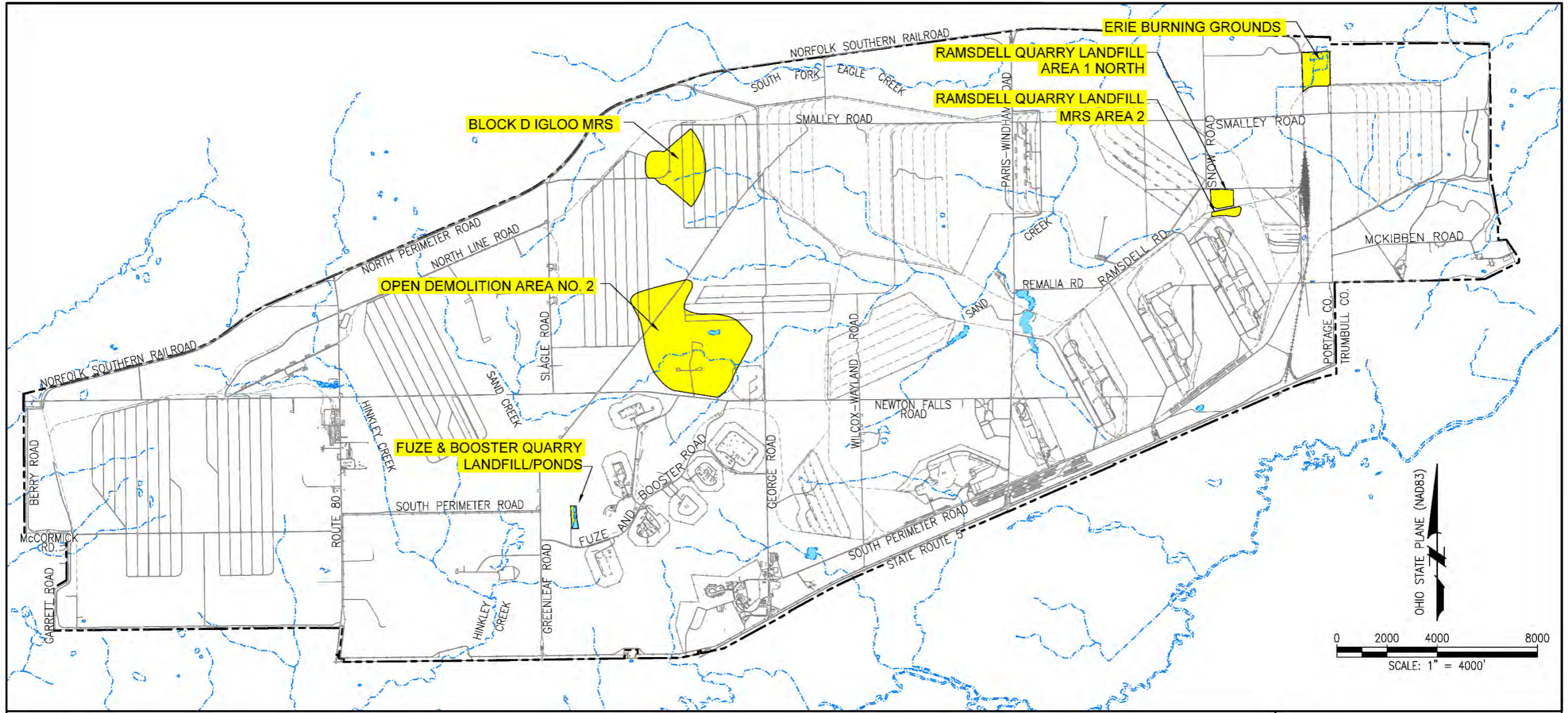



Figure 1. Location and Orientation of Former RVAAP/Camp James A. Garfield

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LEGEND:

RVAAP-01.....	RAMSDELL QUARRY LANDFILL AREA 1 NORTH (RQL)
RVAAP-02.....	ERIE BURNING GROUNDS (EBG)
RVAAP-04.....	OPEN DEMOLITION AREA #2 (ODA2)
RVAAP-16 ..	FUZE & BOOSTER QUARRY PONDS (FBQ)
RVAAP-001-R-01	RQL MRS AREA 2
RVAAP-060-R-01	BLOCK D IGLOO MRS



US Army Corps of Engineers
Louisville District

**FORMER RVAAP/CAMP JAMES A. GARFIELD
PORTAGE & TRUMBULL COUNTIES, OHIO**

DRAWN BY: P. HOLM	REV. NO./DATE: REV.0/ 1/8/20	CAD FILE: C:\14015\DWGS R25-FIG-2
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Figure 2. Location of the AOCs and MRSs within Camp James A. Garfield

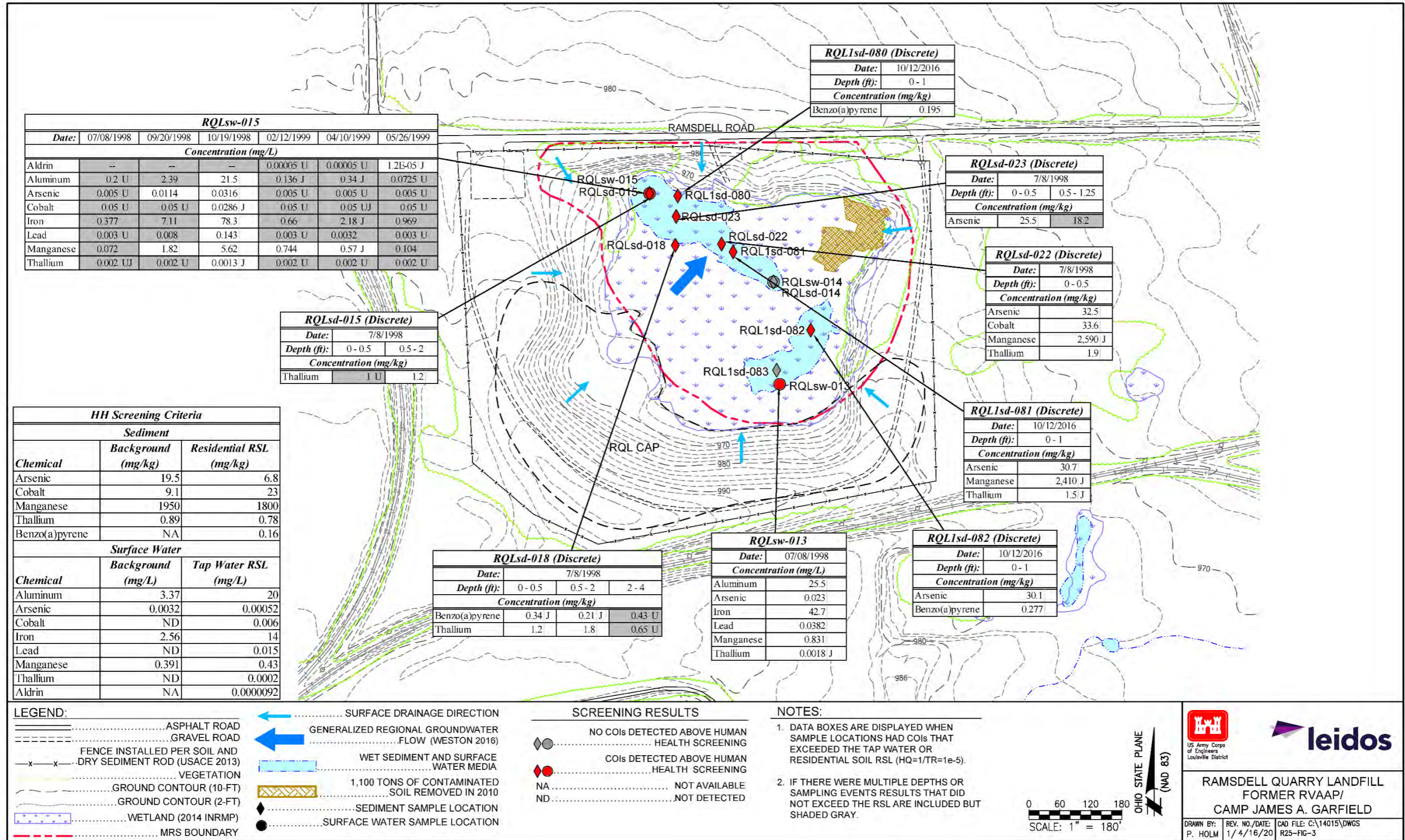


Figure 3. Ramsdell Quarry Landfill Area 1 Site Features

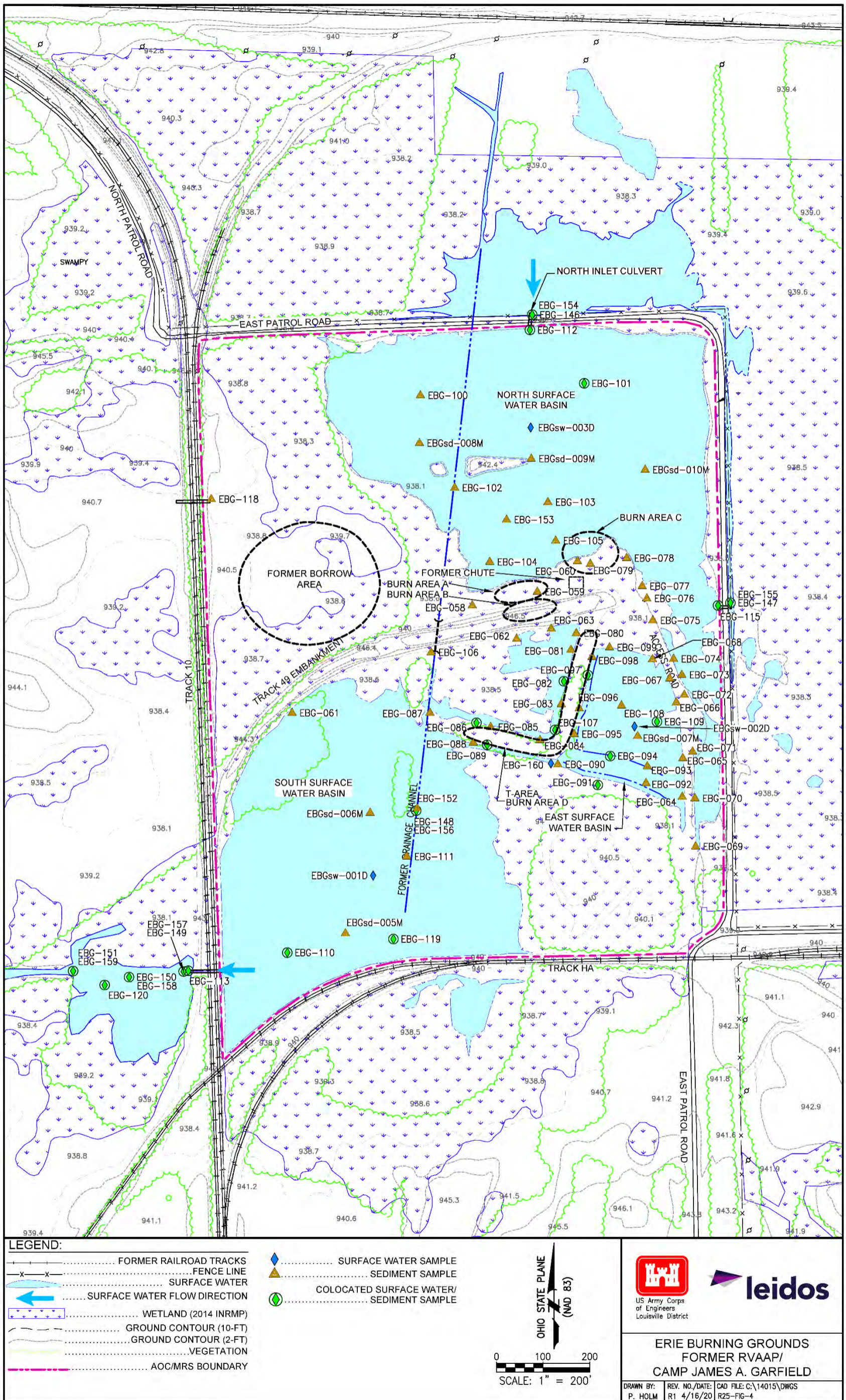


Figure 4. Erie Burning Grounds Site Features

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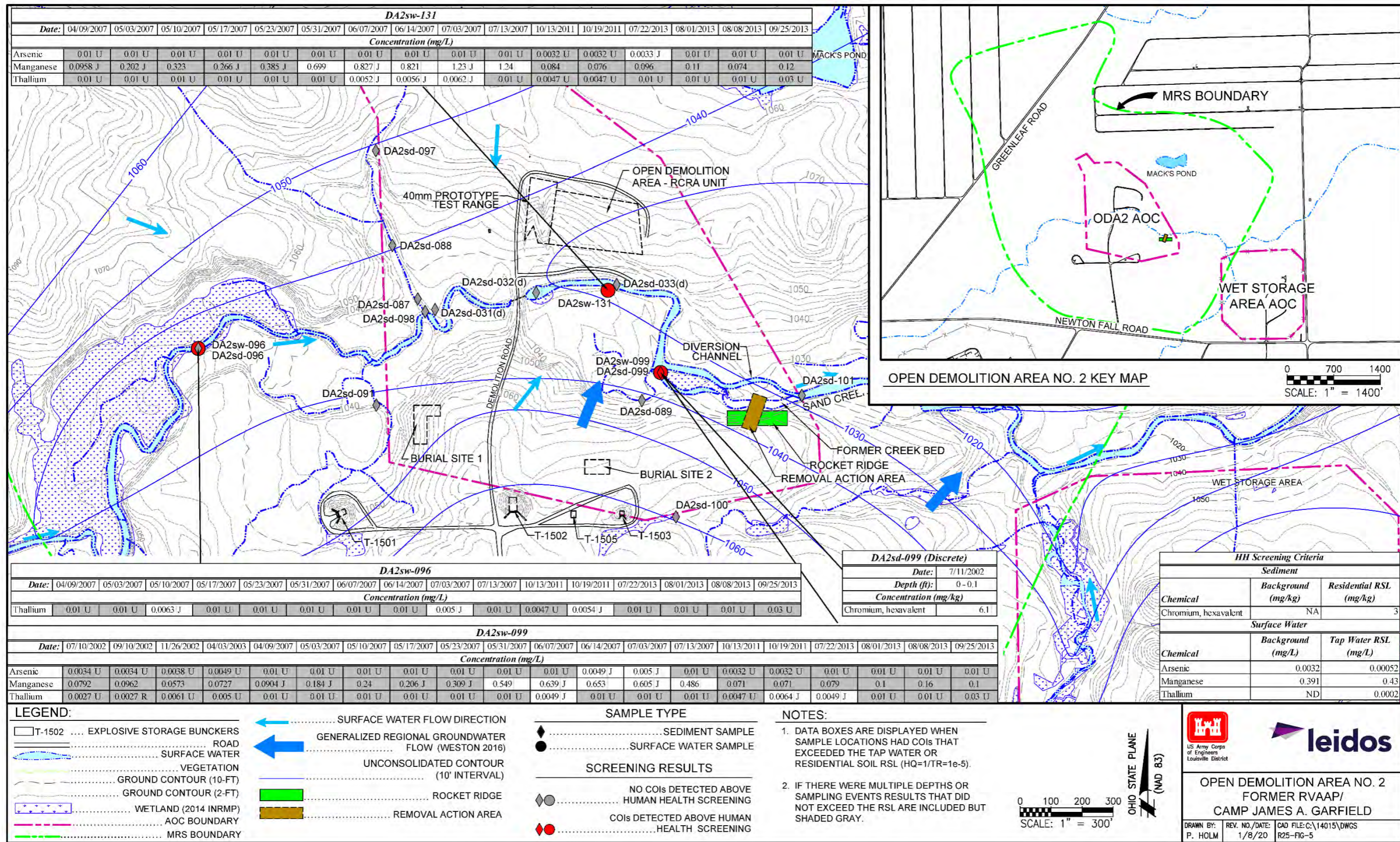


Figure 5. Open Demolition Area #2 Site Features

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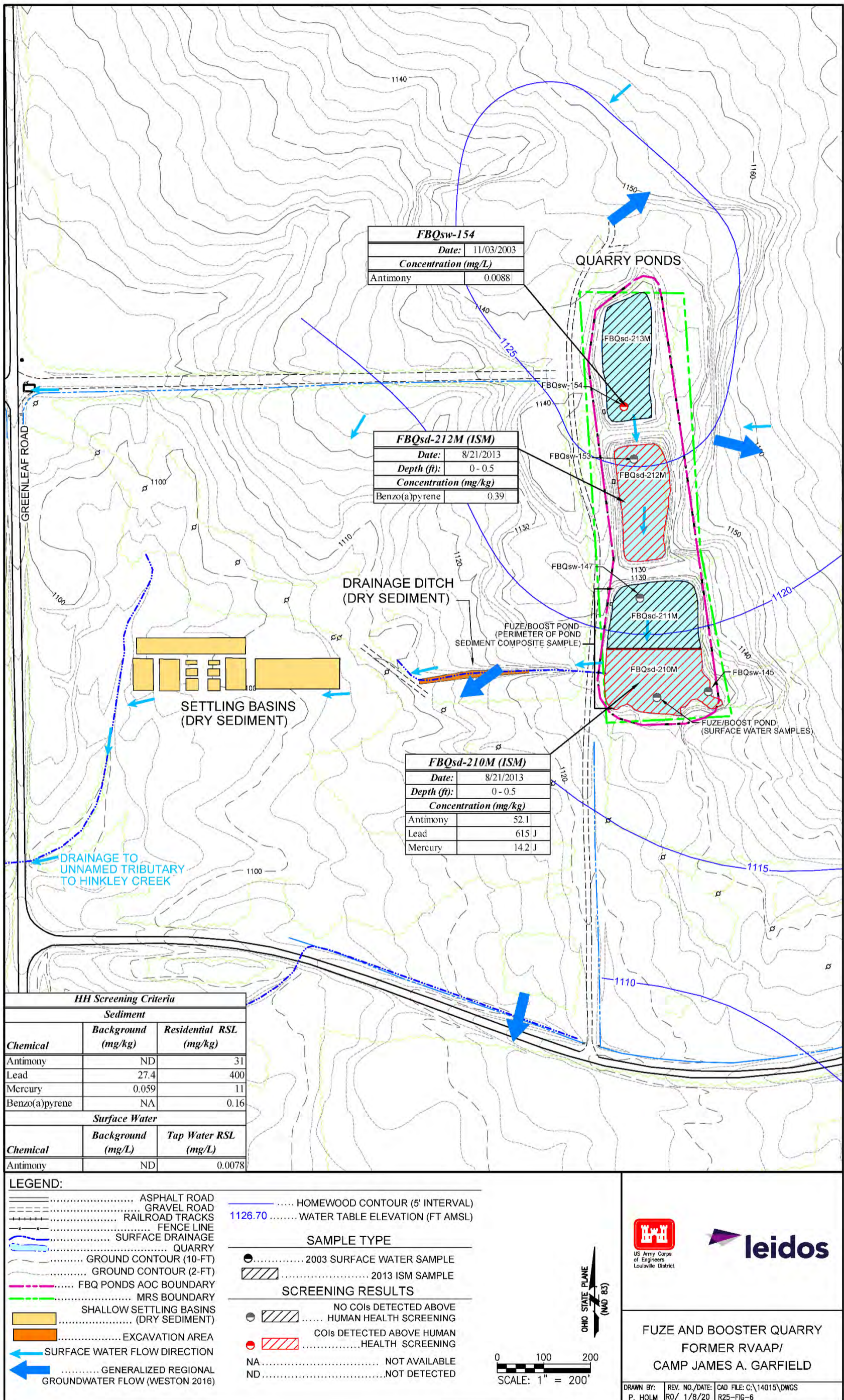


Figure 6. Fuze and Booster Quarry Landfill/Ponds Site Features

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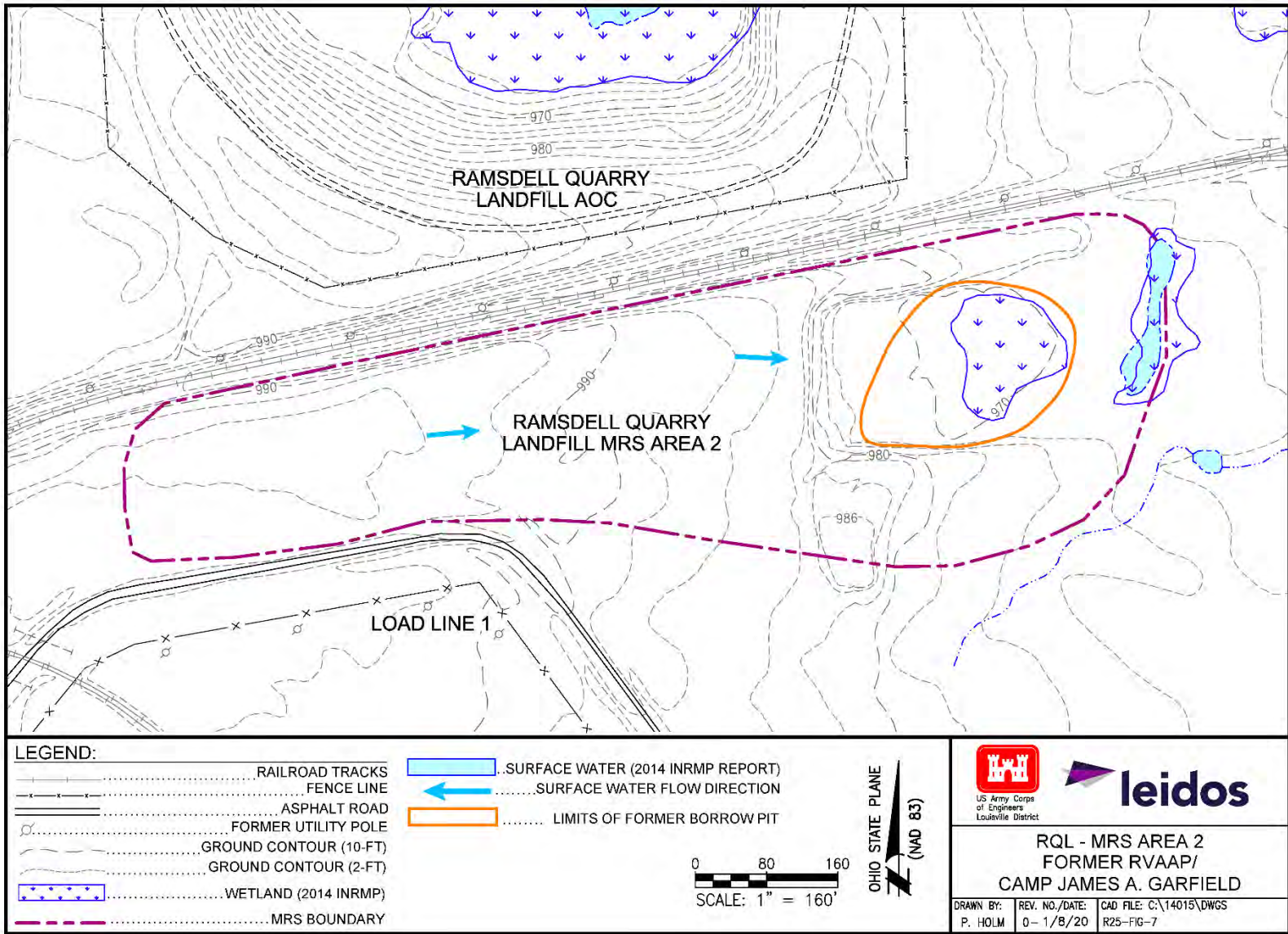


Figure 7. Ramsdell Quarry Landfill MRS Area 2 Site Features

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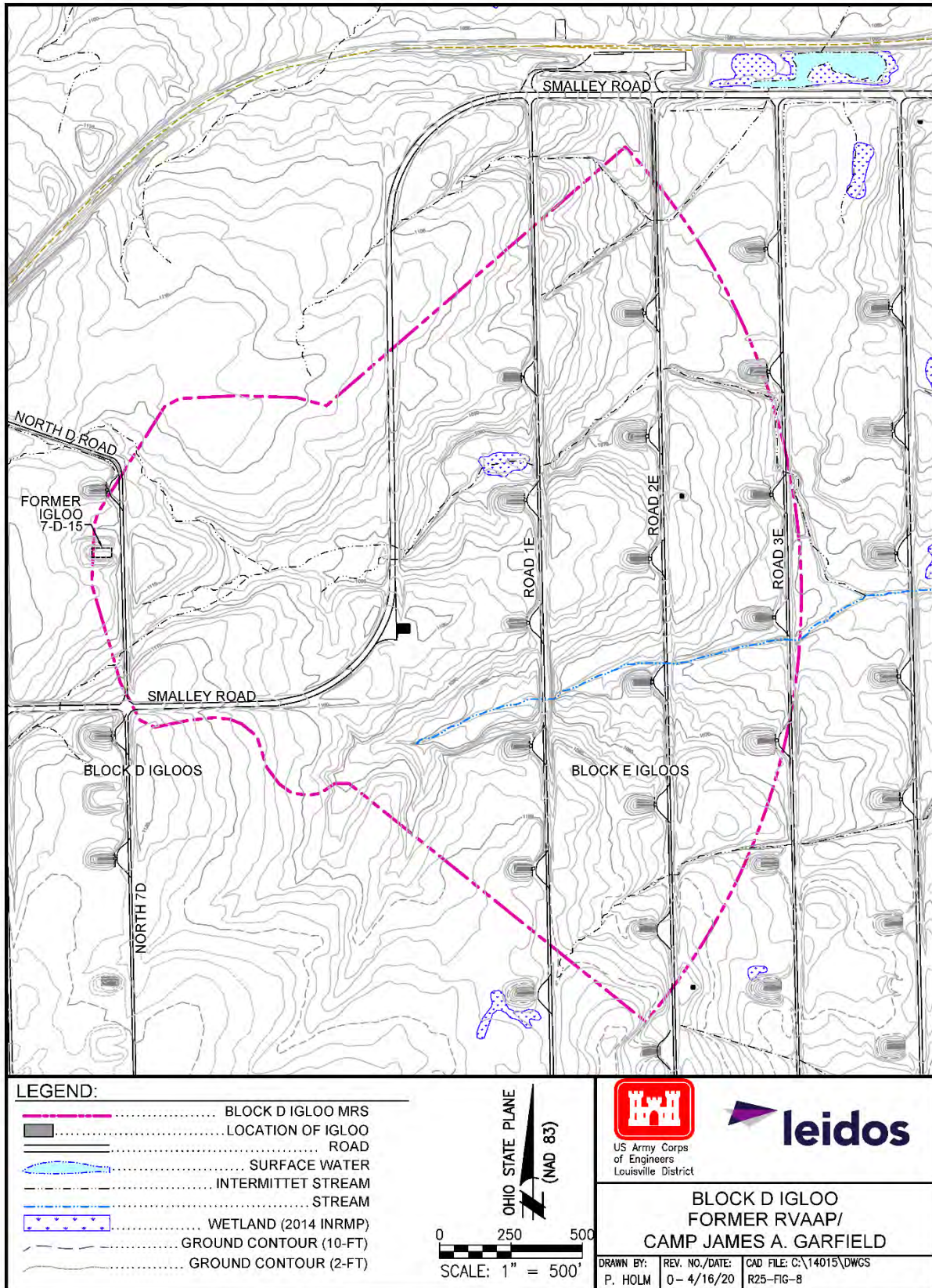


Figure 8. Block D Igloo MRS Site Features

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APPENDIX A

Affidavits

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Affidavit of Publication, Tribune Chronicle, August 12, 2019

NOTICE OF DOCUMENT AVAILABILITY
 Proposed Plan for Sediment and Surface Water at Six Areas of Concern/Munitions Response Sites at the Former Ravenna Army Ammunition Plant (RVAAP)
 The Proposed Plan for Sediment and Surface Water at Six Areas of Concern/Munitions Response Sites presents a recommendation of No Further Action and provides the rationale for these recommendations. The Proposed Plan is available for public review from August 12, 2019 to September 10, 2019.

The Proposed Plan is available at:
 Newton Falls Public Library Reed Memorial Library
 204 South Canal Street 167 East Main Street
 Newton Falls, Ohio 44444 Ravenna, Ohio 44266

The Proposed Plan is also available at: www.rvaap.org
 Please join us for an OPEN HOUSE and PUBLIC MEETING.
 The Army National Guard will host an informational open house and a public meeting to explain the recommendation in the Proposed Plan. Oral and written comments will be accepted at the meeting. Written comments may also be mailed to the Camp James A. Garfield Environmental Office, 1436 State Route 534 SW, Newton Falls, OH 44444. Comments will be accepted during the public comment period from August 12, 2019 to September 10, 2019.

The public meeting is scheduled for:
 Thursday August 29, 2019 at: Charlestown Town Hall
 8:00 pm Open House 8735 Rock Spring Road
 8:30 pm Public Meeting Ravenna, OH 44266

For more information or if you need special accommodations to attend, please contact Katie Tait at 614-338-6186.
 #224-1T-August 12, 2019 #4220

PROOF OF PUBLICATION

STATE OF OHIO
TRUMBULL COUNTY

SS CONNIE PACEK

BEING DULY SWORN, UPON OATH STATES THAT SHE IS AN AUTHORIZED REPRESENTATIVE OF THE TRIBUNE CHRONICLE, (A DIVISION OF EASTERN OHIO NEWSPAPERS INC). A DAILY NEWSPAPER PRINTED IN THE CITY OF WARREN, COUNTY OF TRUMBULL, STATE OF OHIO AND OF GENERAL CIRCULATION IN THE CITY OF WARREN, TRUMBULL COUNTY, OHIO AND IS INDEPENDENT IN POLITICS

THAT THE ATTACHED ADVERTISEMENT WAS PUBLISHED IN THE TRIBUNE CHRONICLE EVERY Monday

FOR One CONSECUTIVE WEEKS AND

THAT THE FIRST INSERTION WAS ON Monday

THE 12th DAY OF August 2019

Connie Pacek

SWORN TO BEFORE ME AND SUBSCRIBED IN MY PRESENCE ON THIS

14th DAY OF August 2019

Lawrence J. Kovach
NOTARY PUBLIC

LAWRENCE J. KOVACH, Notary Public
STATE OF OHIO
MY COMMISSION EXPIRES SEPTEMBER 23, 2022

SEAL

ADVERTISING COST \$ 274.18

Affidavit of Publication, Record-Courier, August 14, 2019

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Proof of Publication

Record Publishing Company
1050 W. Main Street,
Kent, OH 44240
Phone (330) 541-9400
Fax (330) 673-6363

I, Thompson being first duly sworn depose and say that I am Advertising Clerk of
Record Publishing Company

30 Record-Courier a newspaper printed and published in the city of Kent, and of General circulation in the County of Portage, State of Ohio, and personal knowledge of the facts herein stated and that the notice hereto annexed was Published in said newspapers for 1 insertions on the same day of the week from and after the 14th day of August, 2019 and that the fees charged are legal.



Name of Account: Leidos
Ad Number: 12584514
No. of Lines: 28

Day(s) Published: 08/14,
Printers Fee: \$115.20

Sworn to and subscribed before this 14th day of August, 2019.



Elizabeth McDaniel
Notary Public
Commission Expires June 19, 2021

Notice of Document Availability



Proposed Plan for Sediment and Surface Water at Six Areas of Concern/Munitions Response Sites at the Former Ravenna Army Ammunition Plant (RVAAP)

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6735 Rock Spring Road
Ravenna, OH 44266

For more information or if you need special accommodations to attend,
please contact Katie Tait at 614-336-6136.

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APPENDIX B

Ohio EPA Comments

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

May 11, 2020

RE: US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Project Records
Remedial Response
Portage County
ID # 267000859254

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

TRANSMITTED ELECTRONICALLY

Subject: Receipt and Review of the "Draft Record of Decision for Sediment and Surface Water at Six Areas of Concern/Munitions Response Sites" at the Former Ravenna Army Ammunition Plant Portage and Trumbull Counties, Ohio - Dated April 16, 2020

Dear Mr. Connolly:

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, "Draft Record of Decision for Sediment and Surface Water at Six Areas of Concern/Munitions Response Sites" dated April 16, 2020. This document was received by Ohio EPA, NEDO on April 17, 2020.

Ohio EPA has no comments and concurs with the findings of the draft record of decision. Please submit the final version of the record of decision for review and concurrence.

If you have any questions or concerns, please do not hesitate to contact me at (330) 963-1235.

Sincerely,

Nicholas Roope
Site Coordinator
Division of Environmental Response and Revitalization

NCR/sc

ec: David Connolly, ARNG
Katie Tait, OHARNG RTLS
Kevin Sedlak, OHARNG RTLS
Nat Peters, USACE
Craig Coombs, USACE
Rebecca Shreffler, Chenega
Natalie Oryshkewych, Ohio EPA, NEDO, DERR
Bob Princic, Ohio EPA, NEDO, DERR
Tom Schneider, Ohio EPA, SWDO, DERR

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