

**Final**

**Record of Decision  
for Soil, Sediment, and Surface Water  
at RVAAP-43 Load Line 10**

**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**

**March 10, 2017**

**REPORT DOCUMENTATION PAGE**

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None.

**14. ABSTRACT**  
This Record of Decision documents the selection of No Further Action (NFA) with respect to soil, sediment, and surface water to attain Unrestricted (Residential) Land Use at Load Line 10. In addition, this document presents the physical characteristics, geology, and hydrogeology of Load Line 10. This document also summarizes nature and extent of contamination in soil, 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.

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

<b>16. SECURITY CLASSIFICATION OF:</b>			<b>17. LIMITATION OF ABSTRACT</b> U	<b>18. NUMBER OF PAGES</b> 50	<b>19a. NAME OF RESPONSIBLE PERSON</b> Nathaniel Peters, II
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**CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW**

Leidos has completed the Record of Decision for Soil, Sediment, and Surface Water at RVAAP-43 Load Line 10 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.



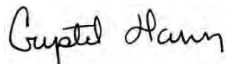
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Barry Blanton, Jr.  
Study/Design Team Leader

3/10/2017

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Date



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Crystal Hann  
Independent Technical Review Team Leader

3/10/2017

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Date

Significant concerns and the explanation of the resolution are as follows:

Internal Leidos Independent Technical Review comments are recorded on a Document Review Record per Leidos standard operating procedure ESE A3.1 Document Review. This Document Review Record is maintained in the project file. Changes to the report addressing the comments have been verified by the Study/Design Team Leader. As noted above, all concerns resulting from independent technical review of the project have been considered.



---

Lisa Jones-Bateman  
Senior Program Manager

3/10/2017

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Date



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

May 11, 2017

**Re: US Army Ravenna Ammunition PLT RVAAP  
Remediation Response  
Project Records  
Remedial Response  
Trumbull County  
267000859121**

Mr. Mark Leeper  
Restoration Program Manager  
Army National Guard Directorate  
ARNGD-ILE Clean Up  
111 South George Mason Drive  
Arlington, VA 22203

**SUBJECT: "RAVENNA ARMY AMMUNITION PLANT PORTAGE/TRUMBULL  
COUNTIES, FINAL, RECORD OF DECISION FOR SOIL, SEDIMENT,  
AND SURFACE WATER AT RVAAP-43 LOAD LINE 10," DATED  
MARCH 10, 2017**

Dear Mr. Leeper:

The Ohio Environmental Protection Agency (Ohio EPA) has received and reviewed the "Final, Record of Decision (ROD) for Soil, Sediment, and Surface Water at RVAAP-43 Load Line 10," document for the Ravenna Army Ammunition Plant (RVAAP), Portage/Trumbull Counties. The document is dated March 10, 2017 and was received at the Northeast District Office (NEDO) on March 24, 2017. This letter serves to document Ohio EPA's approval regarding the proposal of No Further Action (NFA) for the RVAAP Load Line 10 site contained in the Final ROD.

Based on investigative findings, conclusions, human health risk assessment and ecological risk assessment in the Final RI report, the U.S. Army Corps of Engineers (USACE) submitted a Final Proposed Plan (PP) dated August 18, 2016, to Ohio EPA for review recommending NFA. Ohio EPA concurred with the recommendation in a letter dated October 7, 2016.

A public meeting was held on November 29, 2016, that was public noticed through radio stations, television stations, and newspapers. A 30-day public comment period was held between November 14, 2016 and December 14, 2016. No comments were received and therefore, the ROD contains no significant changes from the Final PP.

MR. MARK LEEPER  
ARMY NATIONAL GUARD DIRECTORATE  
PAGE 2

Based on the information contained in the Final PP document, other investigation documents/reports, and Ohio EPA's oversight participation during the investigation, Ohio EPA approves the Final ROD document for the RVAAP Load Line 10 for NFA.

If you have any questions concerning the above, please feel free to contact Vicki Deppisch, NEDO, at (330) 963-1207.

Sincerely,



Michael Proffitt  
Chief  
Division of Environmental Response and Revitalization

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March 10, 2017

**DOCUMENT DISTRIBUTION**  
**for the**  
**Final Record of Decision**  
**for Soil, Sediment, and Surface Water at RVAAP-43 Load Line 10**  
**Former Ravenna Army Ammunition Plant**  
**Portage and Trumbull Counties, Ohio**

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ARNG = Army National Guard.

CO = Central Office.

DERR = Division of Environmental Response and Revitalization.

IED = Installation and Environment Division.

NEDO = Northeast District Office.

OHARNG = Ohio Army National Guard.

Ohio EPA = Ohio Environmental Protection Agency.

REIMS = Ravenna Environmental Information Management System.

SWDO = Southwest District Office.

USACE = U.S. Army Corps of Engineers.

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## LIST OF ACRONYMS

amsl	above mean sea level
AOC	Area of Concern
Army	U.S. Department of the Army
AT123D	Analytical Transient 1-, 2-, and 3-Dimensional Model
bgs	below ground surface
Camp Ravenna	Camp Ravenna Joint Military Training Center
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Act Information System
CMCOPC	Contaminant Migration Chemical of Potential Concern
COC	Chemical of Concern
COPEC	Chemical of Potential Ecological Concern
DNT	Dinitrotoluene
ERA	Ecological Risk Assessment
FA	Frankfurt Arsenal
FPA	Former Production Area
FWCUG	Facility-wide Cleanup Goal
HHRA	Human Health Risk Assessment
IRP	Installation Restoration Program
ISM	Incremental Sampling Methodology
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
PAH	Polycyclic Aromatic Hydrocarbon
PBA08 RI	2008 Performance-based Acquisition Remedial Investigation
PCB	Polychlorinated Biphenyl
PP	Proposed Plan
RI	Remedial Investigation
ROD	Record of Decision
RVAAP	Ravenna Army Ammunition Plant
SRC	Site-related Contaminant
USEPA	U.S. Environmental Protection Agency
USP&FO	United States Property & Fiscal Officer
VOC	Volatile Organic Compound

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## **PART I: THE DECLARATION**

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### **A SITE NAME AND LOCATION**

This Record of Decision (ROD) addresses soil, sediment, and surface water contaminants at Load Line 10. Load Line 10 is designated as area of concern (AOC) RVAAP-43 within the former Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio (Figures 1 and 2).

The former RVAAP is now known as Camp Ravenna Joint Military Training Center (Camp Ravenna). Camp Ravenna, consisting of 21,683 acres, is federally owned and is located in northeastern Ohio within Portage and Trumbull counties, approximately 4.8 kilometers (3 miles) east/northeast of the city of Ravenna and approximately 1.6 kilometers (1 mile) northwest of the city of Newton Falls. As of September 2013, administrative accountability for the entire acreage of the facility has been 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 Ravenna).

Load Line 10 is located in the south-central portion of Camp Ravenna. The Comprehensive Environmental Response, Compensation, and Liability Act Information System (CERCLIS) Identifier for RVAAP is OH5210020736.

### **B STATEMENT OF BASIS AND PURPOSE**

The U.S. Department of the Army (Army) is the lead agency and has chosen the selected remedy for Load Line 10 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. This decision is based on information contained in the Administrative Record file for the AOC.

The Ohio Environmental Protection Agency (Ohio EPA), the support agency, concurred with the *Remedial Investigation Report for Soil, Sediment, and Surface Water at RVAAP-43 Load Line 10* (USACE 2015) and *Proposed Plan for Soil, Sediment, and Surface Water at RVAAP-43 Load Line 10* (USACE 2016). The Remedial Investigation (RI) Report evaluated contaminated soil, sediment, and surface water at Load Line 10 and recommended no further action for these media. The decision that no further action is required for soil, sediment, and surface water at Load Line 10 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 soil, sediment, and surface water at Load Line 10 for Unrestricted (Residential) Land Use. Consequently, no further action is necessary for the future use of the site (Military Training). Groundwater at Load Line 10 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 soil, sediment, or surface water for the Resident Receptor.

**D STATUTORY DETERMINATIONS**

The recommendation of no further action for soil, 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 CERCLA-related contamination present in soil, sediment, and surface water at Load Line 10 does not pose a potential risk to human health or the environment, five-year reviews will not be required.

**E AUTHORIZING SIGNATURE**



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Erik T. Gordon  
COL, GS  
Chief, Installation and Environment (I&E)

16 Mar 2017

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Date

## **PART II: DECISION SUMMARY**

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### **A SITE NAME, LOCATION, AND DESCRIPTION**

When the RVAAP Installation Restoration Program (IRP) began in 1989, RVAAP (CERCLIS Identification Number OH5210020736) was identified as a 21,419-acre installation. In 2002 and 2003, OHARNG surveyed the property and the total acreage of the property 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 (Camp Ravenna). The Army is the lead agency for any remediation, decisions, and applicable cleanup at Load Line 10. These activities are being funded and conducted under the IRP. Ohio EPA is the support agency.

Camp Ravenna is located in northeastern Ohio within Portage and Trumbull counties, approximately 4.8 km (3 miles) east-northeast of the city of Ravenna and approximately 1.6 km (1 mile) northwest of the city of Newton Falls. The RVAAP portions of the property are solely located within Portage County. References in this document to RVAAP relate to previous activities at the facility as related to former munitions production activities or to activities being conducted under the restoration/cleanup program.

Camp Ravenna is a parcel of property approximately 17.7 km (11 miles) long and 5.6 km (3.5 miles) wide, bounded by State Route 5 and the CSX System Railroad on the south; Garret, 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). Camp Ravenna is surrounded by several communities: Windham 11.2 km (7 miles) to the north, Garrettsville 9.6 km (6 miles) to the north, Newton Falls 1.6 km (1 mile) to the southeast, Charlestown 3.6 km (6 miles) to the southwest, and Wayland 4.8 km (3 miles) to the south.

Load Line 10 is approximately 36 acres and is located south of Fuze and Booster Road, southwest of Load Line 9, and in the south-central portion of Camp Ravenna (Figure 2). The distinct surface features of the AOC, shown on Figure 3, include a perimeter fence and a one-lane asphalt access road that enters the AOC from the west and encircles the former production area (FPA) and the gravel access roads around the former buildings. Small constructed drainage ditches border the access road and are also located within the FPA. The AOC has an herbaceous field and is currently overgrown by trees and successional scrub vegetation.

All buildings, including slabs and foundations, were removed in 2007. Remaining features at Load Line 10 include a one-lane asphalt perimeter road that enters the AOC from the west and encircles the FPA and access roads within the AOC. The FPA consists of approximately 12 acres, is located within the asphalt perimeter road in the central portion of the AOC, and was historically used to manufacture percussion elements and primers and contained the former production and storage buildings and multiple access roads.

The Load Line 10 perimeter fence is still in place, although it is not currently maintained. Small construction drainage ditches border the access road and are also located within the FPA.

## **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, fuze and boosters, primers, and percussion elements) and store finished components. Load Lines 5 through 11 produced fuzes, boosters, primers, detonators, and percussion elements.

Load Line 10, formerly known as the Percussion Element Manufacturing Line, is a 36-acre, fenced AOC located south of Fuze and Booster Road, southwest of Load Line 9, and northeast of Load Line 5 in the south-central portion of Camp Ravenna (Figure 2). Below is a summary of historical operations at Load Line 10:

- From 1941–1945, Load Line 10 produced 226,387,306 M36 percussion elements used during World War II. Percussion elements consist of primer cups and a percussion element charge (i.e., explosive) that ignites a less sensitive propellant.
- From 1951–1957, Load Line 10 produced 49,286,628 percussion elements and 135,262,465 primers; these devices contain a percussion element and a less sensitive propellant.
- From 1969–1971, unknown quantities of primers were produced at Load Line 10. In 1971, Load Line 10 was deactivated permanently, and the production equipment was removed.

No historical data or information exists to indicate Load Line 10 was used for any process other than percussion element/primer manufacturing (MKM 2007). No fuel storage tanks were present at the AOC during operations. Additionally, no fuel materials were used operationally at Load Line 10, and no burning was conducted.

There have been no CERCLA enforcement actions related to Load Line 10.

## **C COMMUNITY PARTICIPATION**

Using the RVAAP community relations program, the Army and Ohio EPA have interacted with the public through news releases, 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 every two or three months and are open to the public.

**Community Relations Plan** – The *Community Relations Plan* (Vista 2016) was prepared to establish processes to keep the public informed of activities at RVAAP. The plan is available in the Administrative Record at Camp Ravenna.

**Internet Website** – The Army established an internet website in 2004 for RVAAP. It is accessible to the public at [www.rvaap.org](http://www.rvaap.org).

In accordance with CERCLA Section 117(a) and National Oil and Hazardous Substances Pollution Contingency Plan Section 300.430(f)(2), the Army released the *Proposed Plan for Soil, Sediment, and Surface Water at RVAAP-43 Load Line 10* (USACE 2016) to the public on November 14, 2016. The proposed plan (PP) and other project-related documents were made available to the public in the Administrative Record maintained at Camp Ravenna 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., *Youngstown Vindicator*, *Warren Tribune-Chronicle*, *Akron Beacon Journal*, and *Ravenna Record Courier*), as specified in the Community Relations Plan. The notice of availability initiated the 30-day public comment period beginning November 14, 2016, and ending December 14, 2016.

The Army held a public meeting on November 29, 2016, at the Shearer Community Center, 9355 Newton Falls Road, Ravenna, Ohio 44266 to present the PP. At this meeting, representatives of the Army 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.

The Army 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. No IRP cleanup activities have been performed at Load Line 10 to date.

This ROD addresses soil, sediment, and surface water. The CERCLA-related contamination at Load Line 10 is at concentrations considered protective of human health and does 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 Load Line 10.

## **E SITE CHARACTERISTICS**

This section presents site characteristics, nature and extent of contamination, and the conceptual site model for Load Line 10. These characteristics and findings are based on investigations conducted from 1978–2010 and are further summarized in the *Remedial Investigation Report for Soil, Sediment, and Surface Water at RVAAP-43 Load Line 10* (USACE 2015).



## **E.1 Physical Characteristics**

This section describes the topography/physiology, geology, hydrogeology, and ecological characteristics of Camp Ravenna and Load Line 10 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 Topography/Physiography**

The topography of Camp Ravenna is gently undulating with an overall decrease in ground elevation from a topographic high of approximately 1,220 ft above mean sea level (amsl) in the far western portion of the facility to low areas at approximately 930 ft amsl in the far eastern portion. Ground elevations within Load Line 10 range from 1,114–1,133 ft amsl, with the central portion being a topographic high.

Load Line 10 is located south of Fuze and Booster Road, southwest of Load Line 9, northeast of Load Line 5 in the south-central portion of Camp Ravenna (Figure 2). All buildings and structures have been demolished and building slabs and footers have been removed. No fill material or soil was brought onto Load Line 10 during building demolition (PIKA 2007). Remaining features at Load Line 10 include a one-lane asphalt access road that enters the AOC from the west and encircles the FPA, buildings, and access roads within the AOC (Figure 2). The Load Line 10 perimeter fence is still in place, although it is not currently maintained. Small construction drainage ditches border the access road and are also located in the FPA. The central portion of Load Line 10 is a topographic high (or divide) with gentle slopes to the northwest and southeast outside of the FPA.

No permanent surface water features are present at the AOC. Surface water intermittently occurs as overland storm water runoff associated with heavy rainfall events and generally drains into small ditches bordering roads and within the FPA. As shown on Figure 3, surface water drainage from the southern two-thirds of Load Line 10 exits to the south through a drainage channel that flows south-southeast. The channel drains to an unnamed stream, which enters the west branch of the Mahoning River. In the northern portion of Load Line 10, several small drainage ditches direct surface runoff to the northwest, ultimately into larger drainage ditches that border Fuze and Booster Road.

### **E.1.2 Geology**

The soil type covering more than 98% of Load Line 10 is the Mahoning silt loam (2-6% slopes). The Mahoning silt loam is a gently sloping, poorly drained soil formed in silty clay loam or clay loam glacial till, generally where bedrock is greater than 6 ft bgs. Mahoning silt loam has low permeability with rapid runoff and seasonal wetness (USDA 2010).

As shown on Figure 4, Load Line 10 is located within Hiram Till glacial deposits. At Load Line 10, unconsolidated zone characteristics may vary due to site disturbances, including building construction, demolition, and re-grading.

As show on Figure 5, the bedrock formation at Load Line 10, as inferred from existing geologic data, is the Pennsylvanian age Pottsville Formation, Homewood Sandstone Member, Mercer Member, and Sharon Sandstone. The northern third of Load Line 10, closest to Load Line 9, is Homewood Sandstone. The central portion is composed of the Mercer Member, and Sharon Sandstone is observed in the southern third of Load Line 10. Bedrock was encountered at Load Line 10 at 12.5–23 ft below ground surface (bgs) during monitoring well installation activities as part of the Characterization of 14 AOCs (MKM 2007). During the 2008 Performance-based Acquisition Remedial Investigation (PBA08 RI), top of bedrock was encountered in three soil borings (L10sb-066, L10sb-068, and L10sb-075) at 7–12 ft bgs (USACE 2015).

### **E.1.3 Hydrogeology**

Six monitoring wells are present at Load Line 10, which were installed in 2004 during the Characterization of 14 AOCs (MKM 2007). All groundwater monitoring wells were installed to monitor groundwater in the shallow bedrock aquifer. Initial depths to groundwater encountered during groundwater monitoring well installation varied from 14 ft bgs in L10mw-002 to 24 ft bgs in L10mw-004. Groundwater depths in monitoring wells at the AOC ranged from 23.5–31 ft bgs. Potentiometric data indicate the groundwater table occurs within bedrock throughout most of the AOC (wells L10mw-001 through L10mw-005), with the exception of well L10mw-006 which was installed in the unconsolidated zone.

### **E.1.4 Ecology**

The ecological risk assessment (ERA) in the RI Report concluded that there are no important and significant ecological resources at the AOC. A field survey conducted by Leidos field biologists at Load Line 10 in May 2010 identified four main habitat types, presented in Figure 6: dry, early-successional, herbaceous field in the center of the area; dry, mid-successional, cold-deciduous, shrubland between the boundary fence and the perimeter road; *Acer rubrum* successional forest along the eastern and western sides of the area; and *Malus spp. Fraxinus pennsylvanica* woodland present in a small area at the southwestern corner of the AOC. The extent of herbaceous field and shrubland communities was approximately equal; forest and associated woodland habitat was extremely limited in extent. The herbaceous field and shrubland habitats have declined over the last decade, while the area of forest and woodland communities has increased.

The northern long-eared bat (*Myotis septentrionalis*; endangered species) exists at Camp Ravenna. There are no other federally listed species and no critical habitat occurs on Camp Ravenna. Load Line 10 has not been previously surveyed for federal- or state-listed species; however, there have been no documented sightings of state-listed, federally listed, threatened, or endangered species at the AOC (OHARNG 2014).

## **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). This assessment indicated historical operations may have utilized lead azide or lead styphnate, which are primary explosives. The *Relative Risk Site Evaluation for Newly Added Sites* (USACHPPM 1998) indicated lead thiocyanate was used in production operations at this AOC. The two primer mixes were utilized. Each mixture contained the primary chemicals potassium chlorate, antimony sulfide, and lead thiocyanate in similar quantities. The secondary explosives used within the primers were 2,4,6-trinitrotoluene in Frankfurt Arsenal (FA) 70 primers and pentaerythritol tetranitrate in FA 90A primers (USACHPPM 1998). Load Line 10 was the only AOC to use lead thiocyanate in primer production; lead azide and lead styphnate were not used at the AOC.

Since 1998, Load Line 10 has been included in various historical assessments and investigations conducted at the former RVAAP. The following environmental investigations have been completed for Load Line 10:

- Installation Assessment of Ravenna Army Ammunition Plant (USATHAMA 1978);
- Resource Conservation and Recovery Act Facility Assessment (Jacobs 1989);
- Preliminary Assessment for the Characterization of Areas of Contamination (USACE 1996);
- Relative Risk Site Evaluation for Newly Added Sites (USACHPPM 1998);
- Lead Azide Screening (MKM 2003);
- Characterization of 14 AOCs (MKM 2007);
- Investigation of the Under Slab Surface Soils (USACE 2009b); and
- PBA08 RI, as summarized in the *Remedial Investigation Report for Soil, Sediment, and Surface Water at the RVAAP 43 Load Line 10* (USACE 2009a; USACE 2015).

In 2010, the PBA08 RI was implemented to supplement historical data available for the AOC and support the development of the RI Report for Load Line 10. The results of the PBA08 RI sampling were combined with applicable results of previous sampling events to evaluate the nature and extent of contamination, examine contaminant fate and transport, conduct risk assessments, and evaluate potential remedial alternatives.

### **E.3 Nature and Extent of Contamination**

Data from the 2015 PBA08 RI effectively characterized the nature and extent of contamination at the AOC. Figure 7 presents the RI sample locations. Based on previous information and the summary below, it can be concluded that no further sampling is needed to evaluate Load Line 10.

The predominant site-related contaminants (SRCs) in surface and subsurface soil at Load Line 10 were polycyclic aromatic hydrocarbons (PAHs), which were observed in all surface soil samples analyzed across the entire AOC. Some inorganic chemicals were also observed in soil at concentrations above their respective background concentrations throughout the AOC. The PAHs and inorganic chemicals varied in concentration, but no focused area of contamination was identified. The human health risk assessment (HHRA) and ERA further evaluated if these chemicals posed an unacceptable risk to potential receptors.

Explosives were a main potential contaminant from previous use of the site. The surface soil and subsurface soil samples predominantly had non-detectable concentrations of explosives. Those samples that had concentrations for explosives were all below laboratory reporting limits. Three explosives [dinitrotoluene (DNT), 3-nitrotoluene, and tetryl] and two propellants (nitrocellulose and nitroglycerin) were identified as SRCs, as there are no associated background concentrations for these chemicals.

Lead is a chemical associated with previous use of the site. Only 1 incremental sampling methodology (ISM) sample (L10ss-003M at 430 mg/kg) of 93 soil samples exceeded lead's risk-based screening level of 400 mg/kg. This sample area is approximately 0.1 acres and is well below the industrial regional screening levels of 800 mg/kg. The co-located discrete surface soil sample collected in 2010 had a concentration of 79.4 mg/kg.

The former PE-2 and PE-20 Solvent Storage building locations were identified as having potential volatile organic compound (VOC) contamination. These samples had non-detectable VOC concentrations in surface soil. In addition, former Building PE-16 only had detections of carbon disulfide and methylene chloride (common laboratory contaminants) at concentrations below laboratory reporting limits. All other VOCs had non-detectable concentrations at this location.

Historical records indicate that three transformers serviced all buildings at the AOC and were located between former Buildings PE-1 and PE-3. Large grid ISM sample L10ss-088M encompassed this area and sample location L10ss-080M and is associated with former Building PE-1. Sample L10ss-088M had a non-detectable concentration of polychlorinated biphenyls (PCBs), and sample L10ss-080M had a concentration below laboratory reporting limits (0.024J mg/kg).

A limited number of SRCs were observed in sediment and surface water. Detections of explosives, propellants, VOCs, pesticides, and PCBs were limited in frequency.

#### **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 Load Line 10. All buildings were demolished in 2006. Remnant contamination in soil and sediment is considered a secondary source of contamination.

The potential mechanisms for contaminant releases from secondary sources at Load Line 10 include:

- Eroding soil with sorbed contaminants and mobilization in turbulent surface water flow under storm conditions,
- Dissolving soluble contaminants and transport in surface water,
- Re-suspending contaminated sediment during periods of high flow with downstream transport within the surface water system, and
- Contaminant leaching to groundwater.

#### **E.4.2 Contaminant Migration Pathways and Exit Points**

The potential for soil and sediment contaminants to impact groundwater was evaluated in the fate and transport evaluation presented in the RI Report (USACE 2015). Contaminants in surface soil may migrate to surface water via drainage ditches in the dissolved phase following a storm event or as particulates in storm water runoff.

Maximum SRC concentrations identified in surface and subsurface soil were evaluated using a series of generic screening steps to identify initial contaminant migration chemicals of potential concern (CMCOPCs). These CMCOPCs for soil were further evaluated using the Seasonal Soil Compartment model to predict leaching concentrations and identify final CMCOPCs based on RVAAP facility-wide background criteria and the lowest risk-based screening criteria among U.S. Environmental Protection Agency (USEPA) maximum contaminant levels, USEPA tap water regional screening levels, or RVAAP groundwater facility-wide cleanup goals (FWCUGs) for the Resident Receptor Adult. Final CMCOPCs were evaluated using the Analytical Transient 1-, 2-, and 3-Dimensional (AT123D) model to predict groundwater mixing concentrations beneath source areas and concentrations at the nearest downgradient groundwater receptor to the AOC (e.g., stream). Maximum SRC concentrations in sediment were evaluated using an analytical solution to identify final CMCOPCs for evaluation using AT123D. The AT123D modeling results were evaluated with respect to AOC groundwater monitoring data, as well as model limitations and assumptions, to identify chemicals to be retained as CMCOs.

Conclusions of the soil and sediment screening, leachate modeling, and groundwater modeling are as follows:

- The AT123D model predicted maximum future groundwater concentrations for the final soil CMCOPCs alpha-chlordane; gamma-chlordane; pentaerythritol tetranitrate; 3-nitrotoluene; 4-amino-2,6-DNT; 2,6-DNT; phenanthrene; naphthalene; dibenzofuran; 2-methylnaphthalene; and selenium exceed groundwater screening criteria beneath soil source areas, but do not exceed groundwater screening criteria at the downgradient receptor location (unnamed tributary to Sand Creek 1,875 ft north of the AOC). Predicted groundwater concentrations of the final sediment CMCOPCs cadmium, benz(a)anthracene, benzo(b)fluoranthene, and nitroguanidine also do not exceed groundwater screening criteria at the downgradient receptor location (unnamed tributary 1,000 ft south of the AOC).

- Evaluation of modeling results with respect to current AOC groundwater data and model limitations indicate that identified CMCOPCs are not currently impacting groundwater beneath the source areas and that modeling assumptions are conservative. Evaluation of predicted breakthrough curves show peak concentrations for PAHs would have occurred in the past. Potential future impacts predicted by the model for remaining CMCOPCs would likely be mitigated by factors such as chemical and biological degradation, lateral dispersivity, and AOC-specific variations soil geochemistry.

All SRCs identified in surface soil, subsurface soil, and sediment at Load Line 10 were evaluated through the stepwise fate and transport evaluation. All SRCs were eliminated as posing future impacts to groundwater, and no further action is necessary for surface soil, subsurface soil, and 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) 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 Camp Ravenna. Additional human health receptors associated with Camp Ravenna 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. The receptor is assumed to be exposed to surface soil from 0–1 ft bgs and sub-surface soil from 1–13 ft bgs.

Load Line 10 does not have any important and significant ecological resources such as wetlands, terrestrial areas used for breeding by large or dense populations of animals, habitats used by threatened and endangered species, state land designated for wildlife or game management, or locally important ecological places. Groundwater is not considered an exposure medium for ecological receptors on the AOC given its depth and occurrence within bedrock, and there are no discharge points (e.g., springs, seeps) that would represent potential exposure points.

## F CURRENT AND POTENTIAL FUTURE LAND USES

Load Line 10 is currently managed by Army National Guard/OHARNG. The AOC is not currently being utilized for training purposes. The future use of Load Line 10 is Military Training. The Resident Receptor was evaluated in the HHRA to assess an Unrestricted (Residential) Land Use scenario. This ROD discusses future Land Use, as it pertains to soil 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; COCs and chemicals of potential ecological concern (COPECs), if any; and provided a basis for remedial decisions. This section of the ROD summarizes the results of the HHRA and ERA, which are presented in detail in the *Remedial Investigation Report for Soil, Sediment, and Surface Water at RVAAP-43 Load Line 10* (USACE 2015) and *Proposed Plan for Soil, Sediment, and Surface Water at RVAAP-43 Load Line 10* (USACE 2016) located in the Administrative Record and Information Repositories.

### G.1 Human Health Risk Assessment

A HHRA was performed to identify COCs and provide a risk management evaluation to determine if remediation is required under CERCLA based on potential risks to human receptors. The media evaluated in the HHRA for the Resident (Adult and Child) were surface soil (0–1 ft bgs), subsurface soil (1–13 ft bgs), sediment, and surface water. No sediment or surface water chemicals of potential concern were identified for Load Line 10 and, therefore, no COCs were identified for sediment or surface water.

The only soil (surface and subsurface) COCs identified were four PAHs [benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene], as concentrations of these chemicals in soil either exceeded FWCUGs or contributed to a sum-of-ratios greater than one. The evaluation of elevated PAH concentrations indicated that the samples having the highest sum-of-ratios either contained building debris or fill material (L10sb-071) or were on a gravel access roadway (L10ss-080). Neither of these samples were collected near potential sources of site-related PAH contamination, such as the Heater Houses. Other samples with slightly elevated PAH concentrations above FWCUGs were also located in areas impacted by sources such as asphalt parking lots and roads, vehicle traffic, etc.

Lead is a chemical associated with previous use of the site. Only 1 ISM sample (L10ss-003M at 430 mg/kg) of 93 soil samples exceeded lead's risk-based screening level of 400 mg/kg. This sample area is approximately 0.1 acres and is well below the industrial regional screening level of 800 mg/kg. The co-located discrete surface soil sample collected in 2010 had a concentration of 79.4 mg/kg.

The HHRA did not identify COCs from previous Army activities requiring remediation under CERCLA to be protective of the Resident Receptor.

## **G.2 Ecological Risk Assessment**

The ecological habitat in Load Line 10 is approximately 36 acres and consists of grasses, forest, and shrubs. The vegetation provides a habitat for birds, mammals, insects, and other organisms. Although there are no streams, ponds, or wetlands on the AOC, small drainage ditches exist bordering the roads and within the FPA. During most of the year, there is no water in the drainage ditches; in turn, no signs of an aquatic habitat have been observed.

Ecological resources at Load Line 10 were compared to the list of important ecological places and resources. Based on the 39 criteria defining important places as identified by the Army and Ohio EPA, no important/significant ecological resources were identified at the AOC. The vegetation types present at Load Line 10 are also found elsewhere near the AOC, at Camp Ravenna, and in the ecoregion.

The northern long-eared bat (*Myotis septentrionalis*; federally threatened) exists at Camp Ravenna. There are no other federally listed species or critical habitats on Camp Ravenna. Load Line 10 has not been previously surveyed for federal- or state-listed species; however, there have been no documented sightings of state-listed, federally listed, threatened, or endangered species at the AOC (OHARNG 2014).

The ERA for Load Line 10 (USACE 2015) evaluated chemical contamination to determine if it posed a risk to the environment. The ERA incorporated available data to identify integrated COPECs. A total of 23 integrated soil COPECs were identified in the Level I ERA. In addition, three integrated sediment COPECs and one integrated surface water COPEC were identified in the Level I ERA.

However, Load Line 10 does not have any important and significant ecological resources such as wetlands, terrestrial areas used for breeding by large or dense populations of animals, habitats used by threatened and endangered species, state land designated for wildlife or game management, or locally important ecological places. Consequently, the ERA for Load Line 10 concludes with a Level I Scoping Level Risk Assessment, with a recommendation of no further action from the ecological risk perspective.

## **H DOCUMENTATION OF NO SIGNIFICANT CHANGE**

The *Proposed Plan for Soil, Sediment, and Surface Water at RVAAP-43 Load Line 10* (USACE 2016) was released for public comment on November 14, 2016. The PP recommends no further action for soil, sediment, and surface water at Load Line 10. After the public comment period, 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 ARMY PROPOSED PLAN FOR RVAAP-43 LOAD LINE 10**

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## **A OVERVIEW**

On November 14, 2016, the Army released the *Proposed Plan for Soil, Sediment, and Surface Water at RVAAP-43 Load Line 10* (USACE 2016) for public comment. A 30-day public comment period was held from November 14, 2016, to December 14, 2016. The Army hosted a public meeting on November 29, 2016 to present the PP and take questions and comments from the public for the record.

For soil, surface water, and sediment at Load Line 10, the Army recommended no further action. During the public meeting, Ohio EPA concurred with the recommendation of no further action. No oral comments were received at the public meeting, and no written comments were provided by the public during the public comment period.

The community voiced no objections to the no further action recommendation. All public input was considered during the selection of the final remedy for soil, surface water, and sediment at Load Line 10 in this ROD.

## **B SUMMARY OF PUBLIC COMMENTS AND LEAD AGENCY RESPONSES**

### **B.1 Oral Comments from Public Meeting**

No oral comments were provided by the public during the public comment period.

### **B.2 Written Comments**

No written comments were received during the public comment period.

## **C TECHNICAL AND LEGAL ISSUES**

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

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## **PART IV: REFERENCES**

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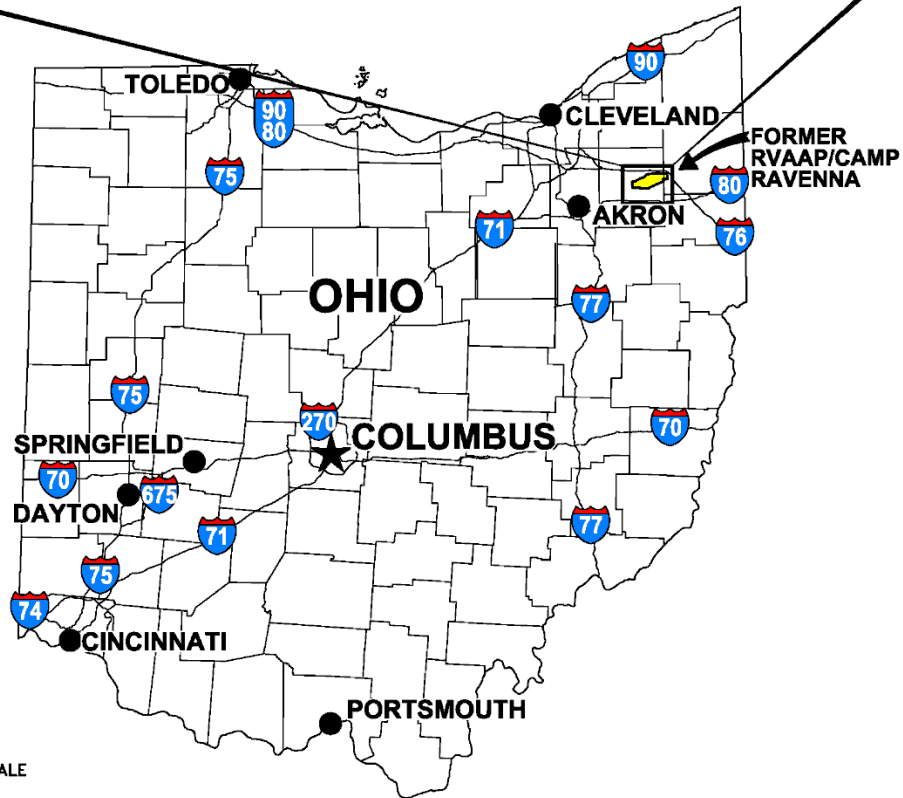
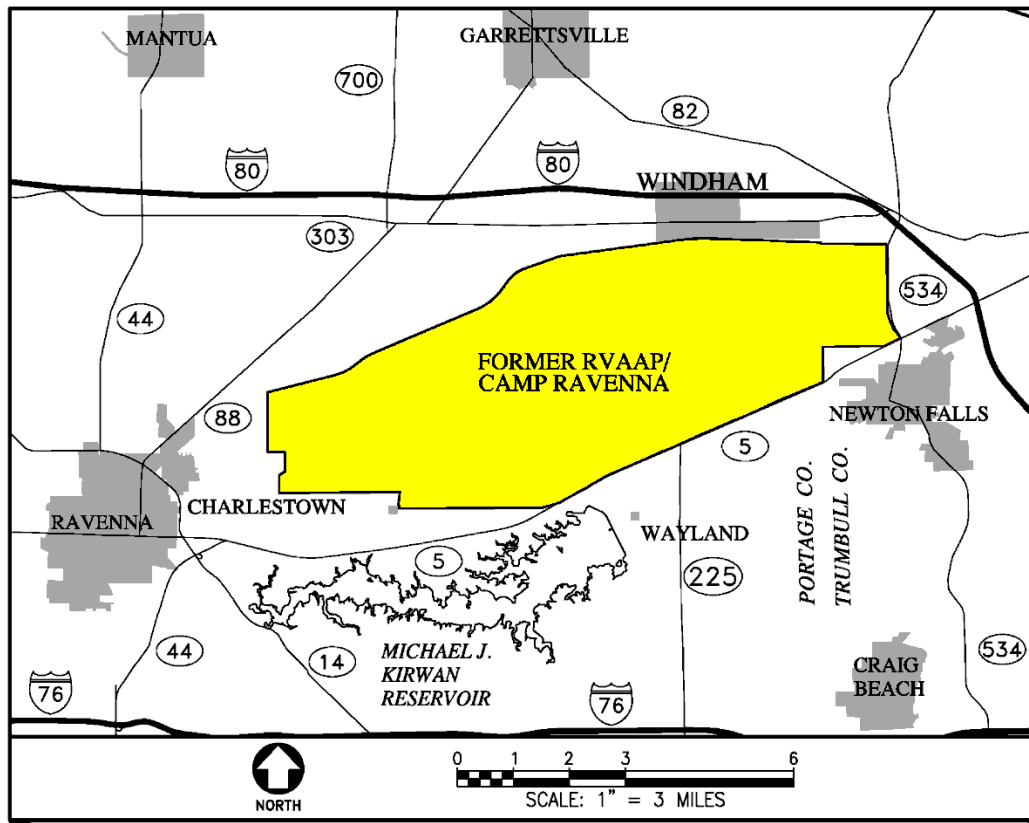
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## FIGURES

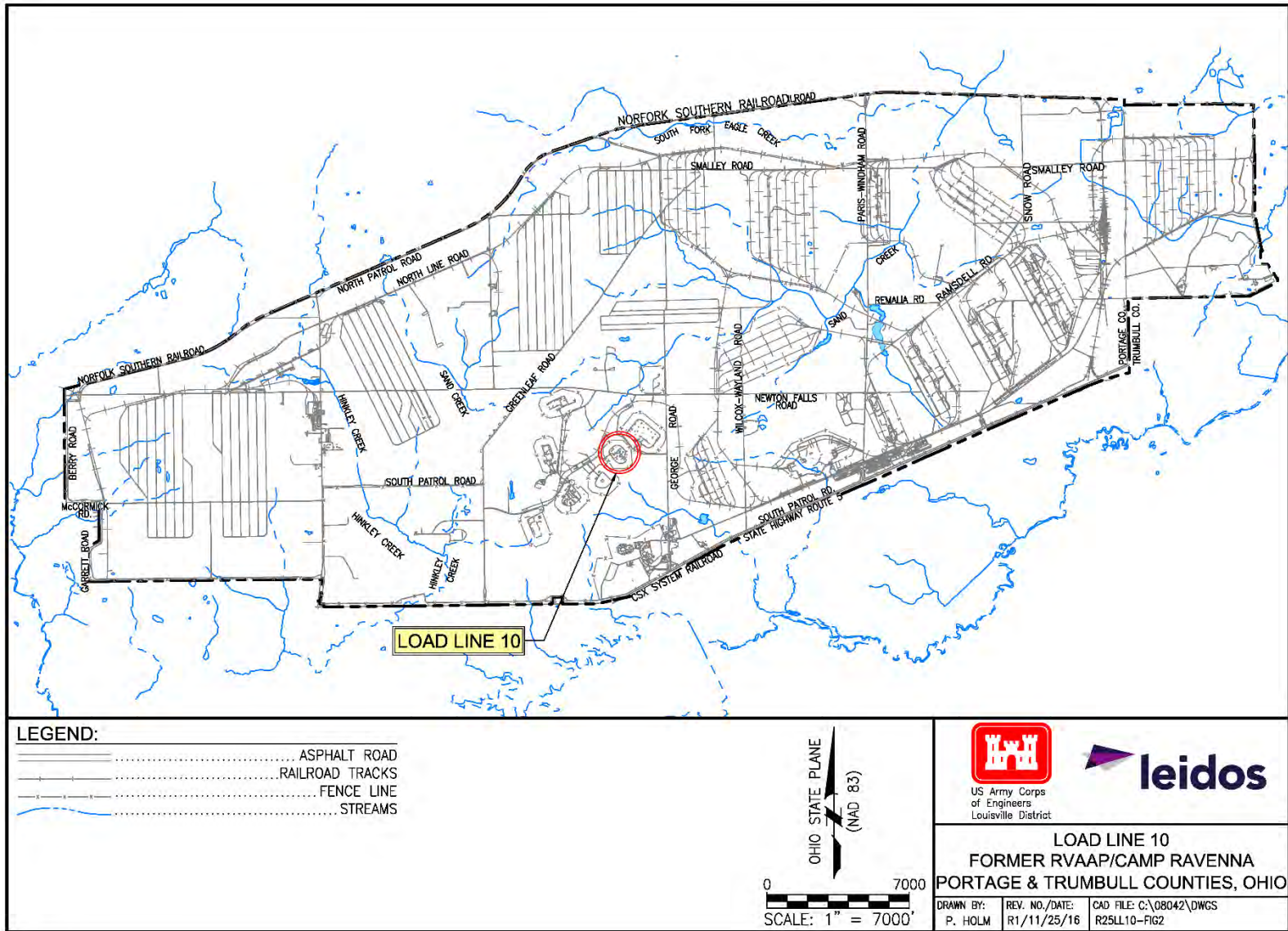
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Figure 1. General Location and Orientation of RVAAP/Camp Ravenna





**Figure 2. RVAAP/Camp Ravenna Installation Map**



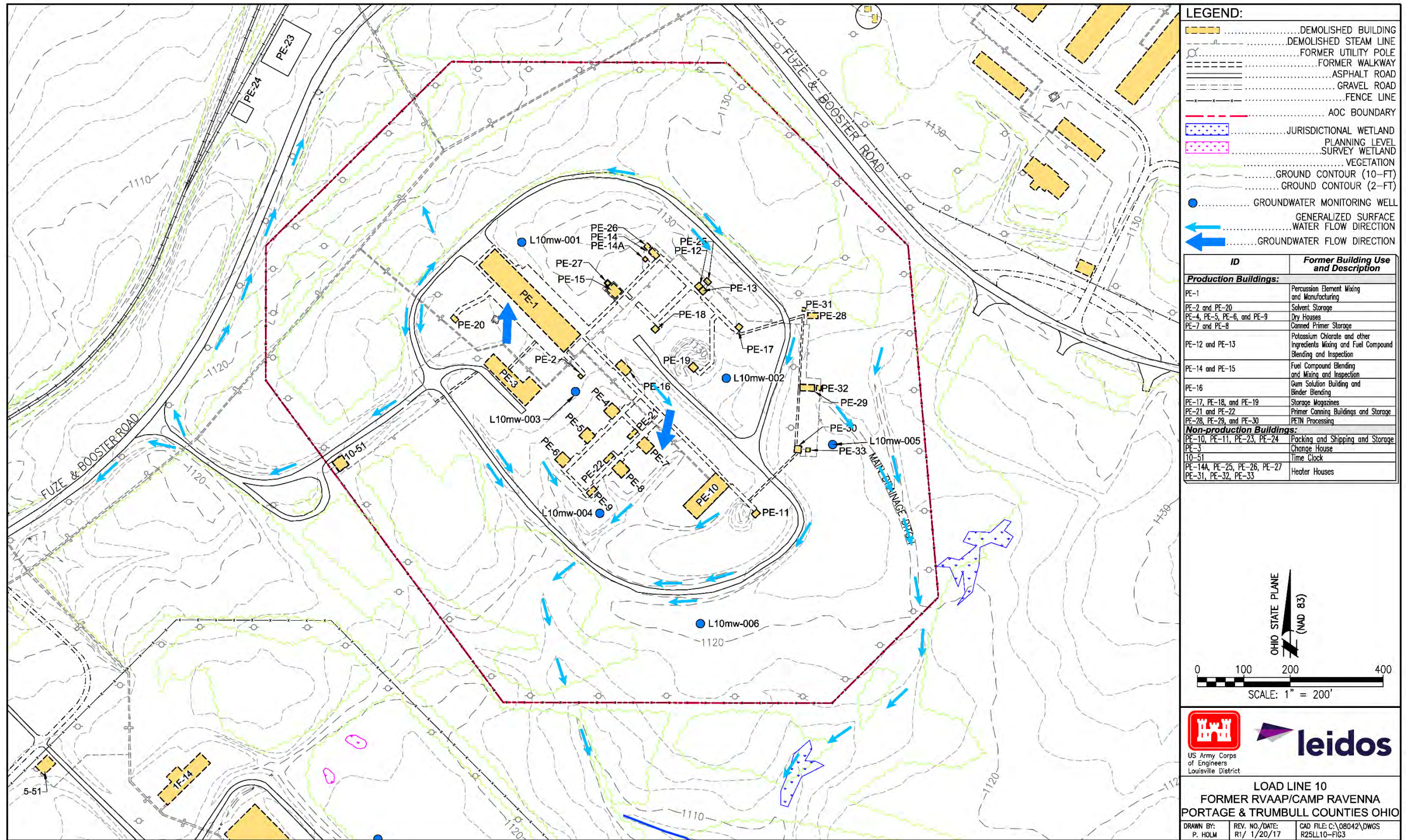


Figure 3. Load Line 10 Site Features



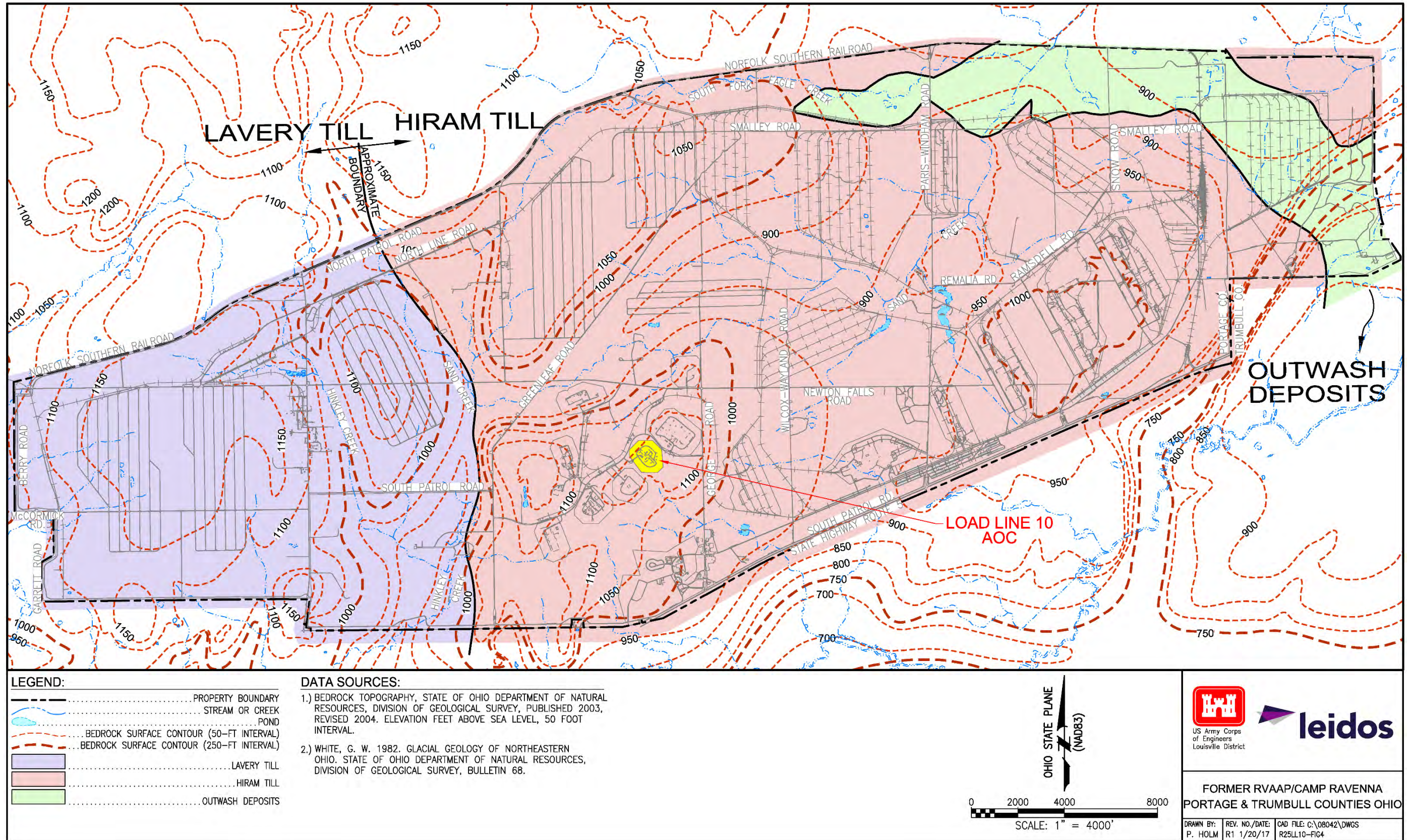


Figure 4. Geologic Map of Unconsolidated Deposits on Camp Ravenna



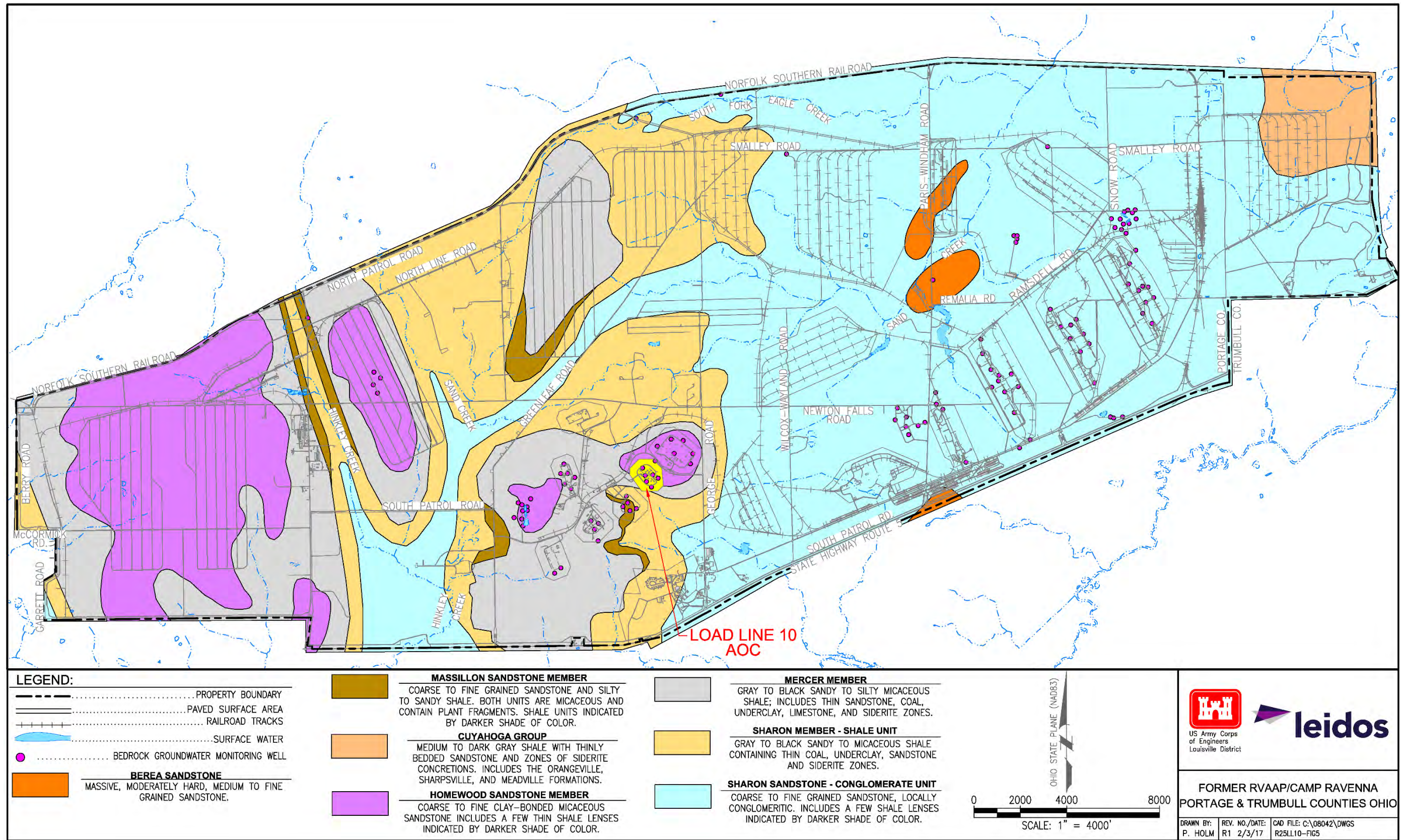
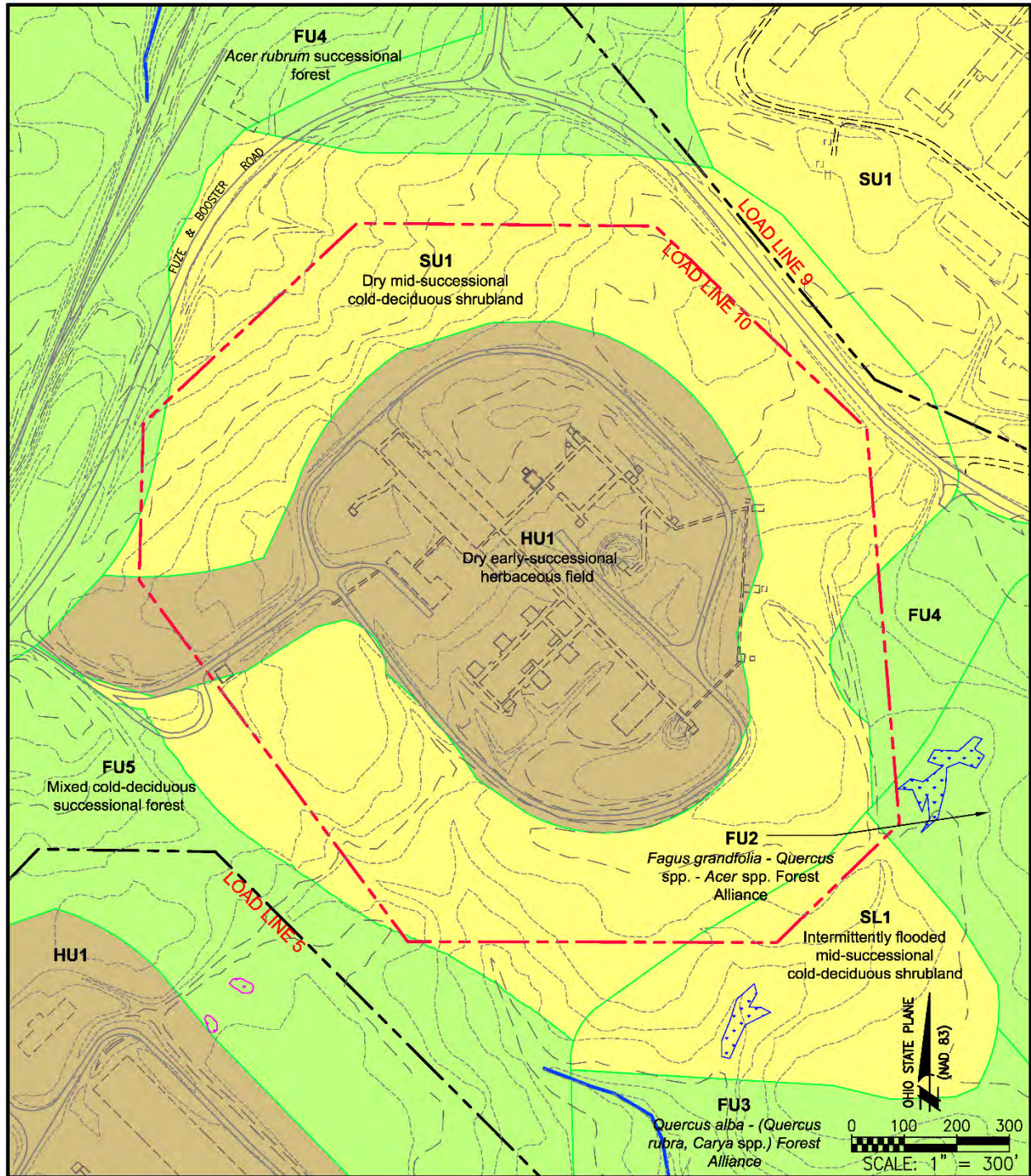


Figure 5. Geologic Bedrock Map and Stratigraphic Description of Units on Camp Ravenna



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<b>LEGEND:</b> - - - GROUND CONTOUR (10-FT) - - - GROUND CONTOUR (2-FT) [Solid] EXISTING BUILDING [Dashed] DEMOLISHED BUILDING [Dotted] ASPHALT ROAD [Dotted] RAILROAD TRACKS [Dotted] FENCE LINE [Blue] SURFACE WATER [Blue with dots] JURISDICTIONAL WETLAND [Pink with dots] PLANNING LEVEL SURVEY WETLAND		- - - HABITAT AREA BOUNDARY [Green] FORESTS WITH NO FLOODING [Yellow] SHRUBS WITH NO FLOODING [Brown] HERBS & FIELDS WITH NO FLOODING	
<b>NOTE:</b> FIGURE DEVELOPED USING 2008 INRMP AND NOTES FROM FIELD VISITS DURING PBA08 RI		 US Army Corps of Engineers Louisville District	
<b>NATURAL RESOURCES AT LOAD LINE 10          FORMER RVAAP/CAMP RAVENNA</b>			
DRAWN BY: P. HOLM	REV. NO./DATE: R1 1/20/17	CAD FILE: C:\08042\DWGS R25LL10-FIG6	

Figure 6. Natural Resources Inside and Near Habitat Area at Load Line 10

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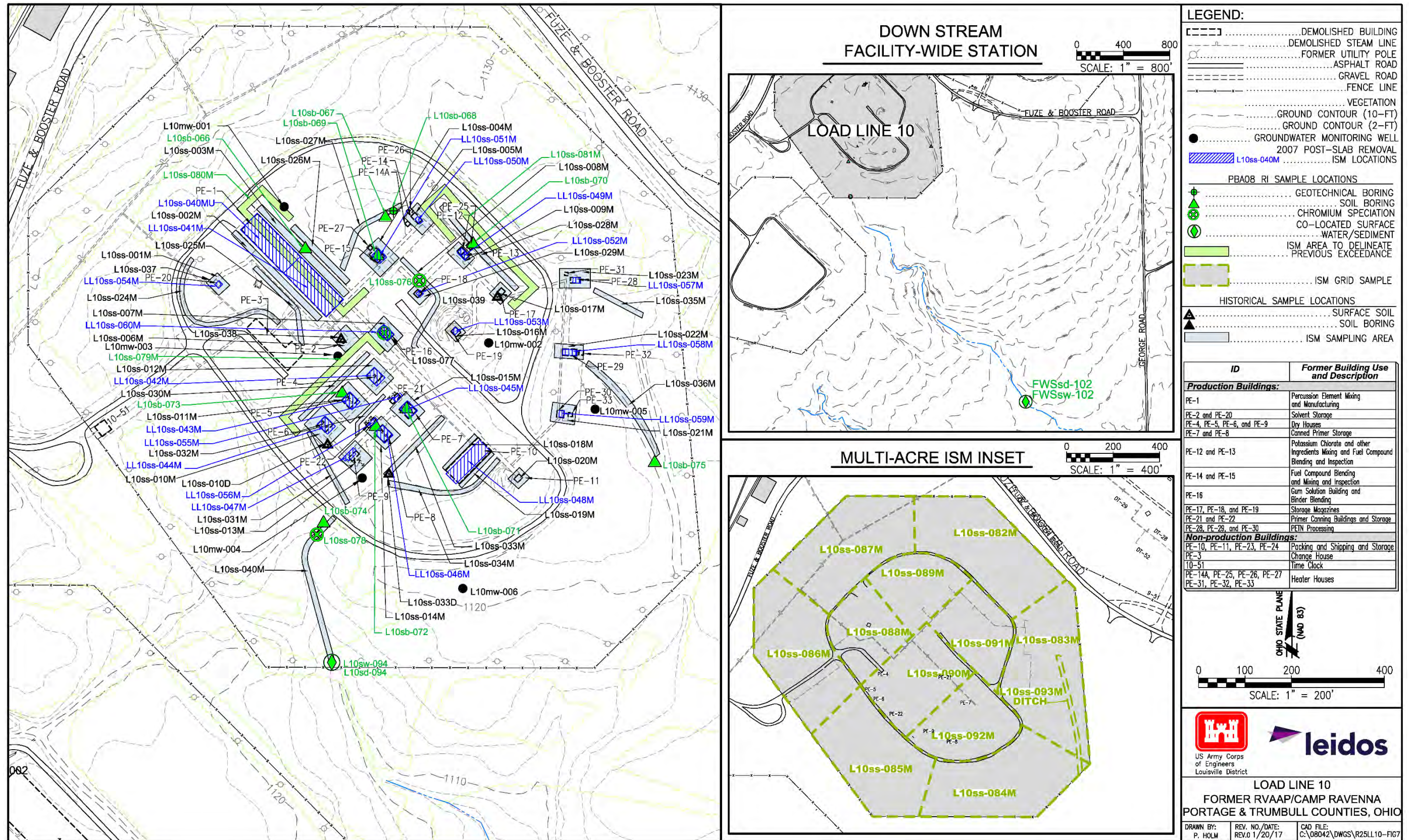


Figure 7. Load Line 10 Sample Locations



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