

Draft

**Record of Decision
for Soil, Sediment, and Surface Water
at RVAAP-41 Load Line 8**

**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
8866 Commons Boulevard, Suite 201
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August 24, 2017

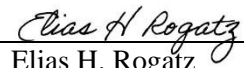
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14. ABSTRACT This Record of Decision documents the selection of No Further Action (NFA) with respect to soil, sediment, and surface water to attain Unrestricted (Residential) Land Use at Load Line 8. In addition, this document presents the physical characteristics, geology, and hydrogeology of Load Line 8. 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.						
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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-41 Load Line 8 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.



Elias H. Rogatz
Study/Design Team Leader

8/24/2017

Date




Crystal Hann
Independent Technical Review Team Leader

8/24/2017

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

8/24/2017

Date

PLACEHOLDER FOR:

**Documentation of Ohio EPA Concurrence of Final
Document**

(Documentation to be provided once concurrence is issued.)

Draft

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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

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August 24, 2017

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Portage and Trumbull Counties, Ohio

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ARNG = Army National Guard.

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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ACRONYMS AND ABBREVIATIONS

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
BHC	Hexachlorocyclohexane
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
COPC	Chemical of Potential Concern
COPEC	Chemical of Potential Ecological Concern
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
ERA	Ecological Risk Assessment
FPA	Former Production Area
FWCUG	Facility-wide Cleanup Goal
HHRA	Human Health Risk Assessment
HMX	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
HQ	Hazard Quotient
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
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
RI	Remedial Investigation
ROD	Record of Decision
RVAAP	Ravenna Army Ammunition Plant
SL	Screening Level
SRC	Site-related Contaminant
TNT	2,4,6-Trinitrotoluene

TR	Target Risk
USEPA	U.S. Environmental Protection Agency
USP&FO	United States Property & Fiscal Officer
VOC	Volatile Organic Compound

PART I: THE DECLARATION

A SITE NAME AND LOCATION

This Record of Decision (ROD) addresses soil, sediment, and surface water contaminants at Load Line 8. Load Line 8 is designated as area of concern (AOC) RVAAP-41 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 8 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 8 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 supporting state regulatory agency, concurred with the *Remedial Investigation Report for Soil, Sediment, and Surface Water at RVAAP-41 Load Line 8* (USACE 2016) (herein referred to as the Load Line 8 RI Report) and *Proposed Plan for Soil, Sediment, and Surface Water at RVAAP-41 Load Line 8* (USACE 2017) (herein referred to as the Load Line 8 PP). The Remedial Investigation (RI) Report evaluated contaminated soil, sediment, and surface water at Load Line 8 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 8 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 8 for Unrestricted (Residential) Land Use. Consequently, no further action is necessary for the future use of the site (Military Training). Groundwater at Load Line 8 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 8 does not pose a potential risk to human health or the environment, five-year reviews will not be required.

E AUTHORIZING SIGNATURE

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

Date _____

PART II: DECISION SUMMARY

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 8. These activities are being funded and conducted under the IRP. Ohio EPA is the supporting state regulatory 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. 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 8, formerly known as Booster Line #2, is an approximately 44-acre AOC located south of Fuze and Booster Road, west of Load Line 6, and south of the 40mm Test Area in the south-central portion of Camp Ravenna (Figure 2). The buildings at Load Line 8, including building slabs, foundations, and wood framed walkways connecting these buildings, were demolished and removed in 2006. The distinct surface features of the AOC are shown on Figure 3.

Remaining features at Load Line 8 include a one-lane road that enters the AOC from the northeast and surrounds the locations of the former production buildings along the northern and western sides. The Load Line 8 AOC fence is still in place, but it is not currently maintained. Small construction drainage ditches border the access road and run through the central portion of the AOC. The AOC boundary encompasses the former production area (FPA) and non-production area (NPA) exposure units. The FPA consists of 12.6 acres and is in the central portion of the AOC. The FPA encompasses the locations of the former production and storage buildings. The NPA is 39.1 acres and includes the areas between the FPA and AOC fence. The FPA and NPA are depicted on Figure 4.

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 8 is an approximately 44-acre fenced AOC located on Fuze and Booster Road in the south-central portion of Camp Ravenna, west of Load Line 6, and south of the 40mm Test Area (Figure 2). Below is a summary of historical operations at Load Line 8:

- 1941–1945 – Load Line 8 operated at full capacity to produce booster charges for artillery projectiles. With the exception of a tetryl booster that was loaded and assembled at Load Line 8, all primary explosive products were delivered to Load Line 8 as sealed, finished sub-assemblies (e.g., lead azide detonators from Load Line 9). The Installation Assessment (USATHAMA 1978) indicated 44,297,487 boosters were produced at Load Line 7 and Load Line 8 during the time of operation. Load Line 8 was deactivated at the end of World War II, and the process equipment removed.
- 1970 era (estimated 1969–1971) – Load Line 8 was reactivated for melt-pour operations and assembly (USACE 2009).

No historical data or information exists to indicate Load Line 8 was used for any process other than what is presented above. No fuel storage tanks were present at the AOC during operations.

There have been no CERCLA enforcement actions related to Load Line 8.

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 two to three times per year and are open to the public.
- **Community Relations Plan** – The *Community Relations Plan* (Vista 2017) is maintained 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.

1 In accordance with CERCLA Section 117(a) and National Oil and Hazardous Substances Pollution
2 Contingency Plan Section 300.430(f)(2), the Army released the Load Line 8 PP (USACE 2017) to the
3 public on June 12, 2017. The proposed plan (PP) and other project-related documents were made
4 available to the public in the Administrative Record maintained at Camp Ravenna and in the
5 Information Repositories at Reed Memorial Library in Ravenna, Ohio, and Newton Falls Public
6 Library in Newton Falls, Ohio. A notice of availability for the PP was sent to radio stations, television
7 stations, and newspapers (e.g., *Youngstown Vindicator*, *Warren Tribune-Chronicle*, *Akron Beacon*
8 *Journal*, and *Ravenna Record Courier*), as specified in the Community Relations Plan. The notice of
9 availability initiated the 30-day public comment period beginning June 12, 2017 and ending July 12,
10 2017.

11
12 The Army held a public meeting on June 27, 2017, at the Shearer Community Center, 9355 Newton
13 Falls Road, Ravenna, Ohio 44266 to present the PP. At this meeting, representatives of the Army
14 provided information and were available to answer any questions. A transcript of the public meeting
15 is available to the public and has been included in the Administrative Record. Responses to any
16 verbal comments received at this meeting and written comments received during the public
17 notification period are included in the Responsiveness Summary, which is Part III of this ROD.

18
19 The Army considered public input from the public meeting on the PP when selecting the remedy.
20

21 **D SCOPE AND ROLE OF RESPONSE ACTIONS**

22

23 The overall program goal of the IRP at the former RVAAP is to clean up previously contaminated
24 lands to reduce contamination to concentrations that are not anticipated to cause risks to human health
25 or the environment. No IRP cleanup activities have been performed at Load Line 8 to date.
26

27 This ROD addresses soil, sediment, and surface water. The CERCLA-related contamination at Load
28 Line 8 is at concentrations considered protective of human health and does not represent a risk to the
29 environment. Therefore, these media are already protective for Unrestricted (Residential) Land Use,
30 and the program goal of the IRP at RVAAP has been met for Load Line 8.

31 32 **E SITE CHARACTERISTICS**

33

34 This section presents site characteristics, nature and extent of contamination, and the conceptual site
35 model for Load Line 8. These characteristics and findings are based on investigations conducted from
36 1978–2010 and are further summarized in the Load Line 8 RI Report (USACE 2016).
37

38 **E.1 Physical Characteristics**

39

40 This section describes the topography/physiology, geology, hydrogeology, and ecological
41 characteristics of Camp Ravenna and Load Line 8 that were key factors in identifying the potential
42 contaminant transport pathways, receptor populations, and exposure scenarios to evaluate human
43 health and ecological risks.
44

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 surface elevations at Load Line 8 range from approximately 1,109–1,125 ft amsl, with the western portion being a topographic high.

Load Line 8 is located on Fuze and Booster Road in the south-central portion of Camp Ravenna, west of Load Line 6, and south of the 40mm Test Area (Figure 2). All buildings, including slabs and foundations, were removed in 2006. The work areas were re-graded, cavities were filled with approved fill dirt as needed, and the area was vegetated in 2007 (PIKA 2007). Remaining features at Load Line 8 include a one-lane road that enters the AOC from the northeast and surrounds the locations of the former production buildings along the northern and western sides. The Load Line 8 AOC fence is still in place, but is not currently maintained. Small construction drainage ditches border the access road and run through the central portion of the AOC. The northwestern portion of Load Line 8 is a topographic high that slopes downward to the southwestern portion of the AOC.

There are five wetlands within the AOC boundary that range in size from 0.03 to 3.8 acres within the border of Load Line 8. Surface water drainage generally follows the topography of Load Line 8, flowing into ditch conveyances along the north, west, and central portions of the AOC. These ditches drain into an unnamed tributary of Hinkley Creek, which exits the AOC in the southwest. The perennial stream flows west to its confluence with Hinkley Creek. Hinkley Creek ultimately converges with the west branch of the Mahoning River south of Camp Ravenna (Figure 3) (USACE 2016).

E.1.2 Geology

Load Line 8 is located within Hiram Till glacial deposits (Figure 5). The soil type of Load Line 8 is the Mahoning silt loam. 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 below ground surface (bgs). Mahoning silt loam has low permeability with rapid runoff and seasonal wetness (USDA 2010). The composition of unconsolidated deposits at Load Line 8 generally consist of yellowish-brown to bluish-gray, medium dense, silty clay tills with trace gravel, with silt content increasing with depth.

As shown on Figure 6, the bedrock formation at Load Line 8, as inferred from existing geologic data, is the Pennsylvanian age Pottsville Formation, Mercer Member Shale (Winslow et al. 1966). Bedrock was encountered at Load Line 8 at 23.5–24 ft bgs during monitoring well installation activities as part of the Characterization of 14 AOCs (MKM 2007).

1 **E.1.3 Hydrogeology**

2
3 Six monitoring wells are present at Load Line 8, which were installed in 2004 during the
4 Characterization of 14 AOCs (MKM 2007). Monitoring wells LL8mw-001 through LL8mw-004
5 were screened in the unconsolidated soil to monitor groundwater in overburden, while LL8mw-005
6 and LL8mw-006 were screened in the bedrock zone (MKM 2007). Initial depths to groundwater
7 varied from 11–19 ft bgs. Monitoring wells at the AOC ranged in completion from 22.7–32.55 ft bgs.
8 Water level elevations from wells installed in the unconsolidated zone at the AOC ranged from
9 1104.49–1109.47 (11.29–18.62 ft below top of casing) with the highest elevation at the
10 unconsolidated well LL8mw-004. Potentiometric data indicate the groundwater table occurs within
11 unconsolidated soil throughout the AOC. The groundwater flow pattern at Load Line 8 is to the
12 southwest.

13 14 **E.1.4 Ecology**

15
16 Load Line 8 contains five wetlands and ditches that ultimately convey surface water to the unnamed
17 tributary to Hinkley Creek at the southwest portion of the site. The Ecological Risk Assessment
18 (ERA) in the Load Line 8 RI Report (USACE 2016) concluded that wetlands and the unnamed
19 tributary to Hinkley Creek are ecologically important and significant resources, which invoked the
20 Level II ERA.

21
22 A field survey conducted by SAIC field biologists at Load Line 8 indicated the AOC consists of
23 seven vegetation types (Figure 7). The habitat area is dominated by four vegetation types: dry, early-
24 successional herbaceous field in the north-central half of the AOC; dogwood (*Cornus spp.*)/willow
25 (*Salix spp.*) saturated shrubland alliance in the south-central part of the AOC; red maple (*Acer*
26 *rubrum*) successional forest along the northern and western boundaries of the AOC; and green ash
27 (*Fraxinus pennsylvanica*)/American elm (*Ulmus americana*)/sugarberry (*Celtis laevigata*)
28 temporarily flooded forest alliance along the southern and eastern boundaries of the AOC. Small
29 areas of two forest types are represented along the southeastern AOC boundary: mixed, cold-
30 deciduous successional forest and American beech (*Fagus grandifolia*)/oak (*Quercus spp.*)/maple
31 (*Acer spp.*) forest alliance. Small areas of dry, midsuccessional cold-deciduous shrubland are located
32 along the northwestern and southern boundaries of the AOC (USACE 2016).

33
34 The northern long-eared bat (*Myotis septentrionalis*; endangered species) exists at Camp Ravenna.
35 There are no other federally listed species and no critical habitat occurs on Camp Ravenna. Load Line
36 8 has not been previously surveyed for federal- or state-listed species; however, there have been no
37 documented sightings of state-listed, federally listed, threatened, or endangered species at the AOC
38 (OHARNG 2014).

39 40 **E.2 Site Investigations**

41
42 In 1978, the U.S. Army Toxic and Hazardous Materials Agency conducted an Installation Assessment
43 of RVAAP to review the potential for contaminant releases at multiple former operations areas, as
44 documented in *Installation Assessment of Ravenna Army Ammunition Plant* (USATHAMA 1978).

1 This assessment indicated historical operations at Load Lines 5, 7, 8, 10, and 12 may have utilized
2 primary explosives [2,4,6-trinitrotoluene (TNT); lead azide; lead styphnate; and black powder] and
3 heavy metals (lead, chromium, mercury, and arsenic) from munitions assembly activities. There is no
4 evidence that bulk handling of the primary explosives took place within the boundaries of Load Line
5 8; however, finished detonators from Load Line 9 contained lead azide, which were used in booster
6 assembly and stored at Load Line 8 (MKM 2007).

7
8 Since 1978, Load Line 8 has been included in various historical assessments and investigations
9 conducted at the former RVAAP. The following environmental investigations have been completed
10 for Load Line 8:

- 11
- 12 • Installation Assessment of Ravenna Army Ammunition Plant (USATHAMA 1978);
- 13 • Preliminary Assessment Screening of Boundary Load Line Areas (USAEHA 1994);
- 14 • Relative Risk Site Evaluation for Newly Added Sites (USACHPPM 1998);
- 15 • 2004 Characterization of 14 AOCs (MKM 2007);
- 16 • 2007 Investigation of the Under Slab Surface Soil (USACE 2009); and
- 17 • 2010 Performance-based Acquisition 2008 Remedial Investigation (PBA08 RI) (USACE
18 2016).
- 19

20 The results of the PBA08 RI sampling were combined with applicable results of previous sampling
21 events to evaluate the nature and extent of contamination, examine contaminant fate and transport,
22 and conduct risk assessments, as summarized in the Load Line 8 RI Report (USACE 2016).

23 24 **E.3 Nature and Extent of Contamination**

25
26 Data from the 2004 Characterization of 14 AOCs, 2007 Investigation of Under Slab Surface Soil, and
27 2010 PBA08 RI field investigation effectively characterize the nature and extent of the contamination
28 at the AOC. Figure 8 presents the sample locations. Based on previous information and the summary
29 below, it can be concluded that no further sampling is needed to evaluate Load Line 8.

30
31 Explosives identified as potential contaminants from previous use (TNT; hexahydro-1,3,5-trinitro-
32 1,3,5-triazine (RDX); octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX); and tetryl) were
33 thoroughly evaluated, including around former process buildings and across the AOC as a whole.
34 TNT and RDX were not detected in any of the environmental media sampled at Load Line 8, and
35 HMX and tetryl were not detected in subsurface soil or surface water. The maximum concentrations
36 of HMX and tetryl detected in the incremental sampling methodology (ISM) surface soil samples
37 were below their respective screening levels (SLs) and were not considered chemicals of potential
38 concern (COPCs). In addition, tetryl was detected in one ISM sediment sample below the SL and was
39 not considered a COPC.

40
41 Arsenic, chromium, lead, and mercury were identified as potential inorganic site-related contaminants
42 (SRCs) and as potentially related to previous site use. Arsenic was detected below its background
43 concentration in surface soil at Load Line 8. Chromium, lead, and mercury had concentrations above
44 their background concentrations, but all concentrations were below their respective SLs in soil and

1 sediment samples. Lastly, all detections of these four inorganic chemicals in surface water were
2 below their respective SLs in the most recent samples of surface water at Load Line 8.

3
4 Three other inorganic chemicals (cobalt, manganese, and nickel) exceeded their respective SLs in
5 surface soil. The exceeding concentrations of these inorganic chemicals were below the Resident
6 Receptor (Adult and Child) facility-wide cleanup goal (FWCUG) at a target risk (TR) of 1E-05,
7 hazard quotient (HQ) of 1 except manganese at three ISM surface soil locations (LL8ss-003M,
8 LL8ss-005M, and LL8ss-009M). No other inorganic chemicals exceeded their respective SLs in
9 subsurface soil at Load Line 8.

10
11 Aluminum exceeded its SL at discrete sediment sample location LL8sd-090; however, the
12 concentration was below the Resident Receptor (Adult and Child) FWCUG at a TR of 1E-05, HQ of
13 1. Cobalt was detected at concentrations exceeding its SL at LL8sw-091 and LL8sw-092; however,
14 the concentrations were below the regional screening level at a TR of 1E-05, HQ of 1.

15
16 Polycyclic aromatic hydrocarbons (PAHs) were identified as potential contaminants from previous
17 site use at former Buildings 2B-23 and 2B-24 that were used for heater houses; however,
18 concentrations detected in surface soil and the other environmental media adjacent to or surrounding
19 these former buildings were less than the SLs. PAHs were widely distributed in surface soil
20 throughout the AOC; however, the maximum detections of the five PAHs identified as COPCs
21 [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-
22 cd)pyrene] were observed at sample location LL8ss-072M, which is near former Building 2B-21. At
23 sample location LL8ss-072M, the detections of benzo(a)pyrene and dibenzo(a,h)anthracene exceeded
24 the Resident Receptor (Adult and Child) FWCUG at a TR of 1E-05, HQ of 1. Five surface soil
25 locations (LL8ss-071M, LL8ss-072M, LL8ss-073M, LL8ss-076M, and LL8ss-085M) slightly
26 exceeded the Resident Receptor (Adult and Child) FWCUG at a TR of 1E-05, HQ of 1 for
27 benzo(a)pyrene. In addition, benzo(a)pyrene was detected at ISM sediment sample location LL8sd-
28 001M above the SL and is therefore considered a COPC.

29
30 Former Building 2B-22 was the only building at Load Line 8 whose purpose was solvent storage. The
31 sample (LL8ss-019) associated with Building 2B-22 had no detectable volatile organic compound
32 (VOC) concentrations in surface soil. One VOC (2-butanone) was identified as an SRC in surface
33 soil, as estimated concentrations were reported from PBA08 RI multi-acre ISM samples LL8ss-074M
34 (0.002J mg/kg) and LL8ss088M (0.0024J mg/kg). In addition, the VOC acetone was detected in one
35 discrete subsurface sample at a low, estimated concentration (LL8sb-065 at 0.015J mg/kg). One VOC
36 (toluene) was detected at a low concentration in one discrete sediment sample (LL8sd-091 at
37 0.00059J mg/kg). All detected VOC concentrations were below their respective SLs.

38
39 One polychlorinated biphenyl (PCB) (PCB-1254) and four pesticides [4,4'-
40 dichlorodiphenyldichloroethane (DDD); 4,4'-dichlorodiphenyldichloroethylene (DDE); 4,4'-
41 dichlorodiphenyltrichloroethane (DDT); and beta-hexachlorocyclohexane (BHC)] were identified as
42 SRCs in surface soil. Three of the four pesticides (4,4'-DDD; 4,4'-DDE; and 4,4'-DDT) were
43 identified as SRCs in surface soil and sediment. None of the detections exceeded their respective SLs.

No pesticides or PCBs were detected in subsurface soil or surface water, and no PCBs were detected in sediment (USACE 2016).

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 8. 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 8 include:

- Eroding soil matrices with sorbed chemicals and mobilization in overland surface water storm runoff during heavy rainfall conditions,
- Dissolving soluble chemicals and transport in perennial surface water conveyances and intermittent surface water runoff,
- Re-suspending contaminated sediment during periods of high flow with downstream transport within the surface water system, and
- Leaching contaminants 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 Load Line 8 RI Report (USACE 2016). 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 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

1 monitoring data, as well as model limitations and assumptions, to identify chemicals to be retained as
2 contaminant migration chemicals of concern (USACE 2016).

3
4 Conclusions of the soil and sediment screening, leachate modeling, and groundwater modeling are as
5 follows:

- 6
7 • Arsenic, selenium, and naphthalene in soil were predicted with the AT123D model to exceed
8 the screening criteria in groundwater beneath the source area; however, none of these
9 constituents were predicted to exceed screening criteria at the downgradient receptor location.
- 10 • Barium; cadmium; chromium; cobalt; lead; mercury; nickel; selenium; benz(a)anthracene;
11 benzo(b)fluoranthene; naphthalene; and 4,4'-DDE in sediment were predicted with the
12 AT123D model to exceed the screening criteria in groundwater beneath the source area;
13 however, none of these constituents were predicted to exceed screening criteria at the
14 downgradient receptor location.

15
16 Evaluation of modeling results with respect to current AOC groundwater data and model limitations
17 indicate that identified CMCOPCs are not currently impacting groundwater beneath the source areas
18 and that modeling assumptions are conservative.

19
20 All SRCs identified in surface soil, subsurface soil, and sediment at Load Line 8 were evaluated
21 through the stepwise fate and transport evaluation. All SRCs were eliminated as posing future impacts
22 to groundwater, and no further action is necessary for surface soil, subsurface soil, and sediment to
23 protect groundwater (USACE 2016).

24 25 **E.4.3 Potential Human Receptors and Ecological Resources**

26
27 In February 2014, the Army and Ohio EPA amended the risk assessment process to address changes
28 in the RVAAP restoration program. The *Final Technical Memorandum: Land Uses and Revised Risk*
29 *Assessment Process for the RVAAP Installation Restoration Program* (ARNG 2014) identified the
30 following three Categorical Land Uses and Representative Receptors to be considered during the RI
31 phase of the CERCLA process.

- 32
33 1. Unrestricted (Residential) Land Use – Resident Receptor (Adult and Child) (formerly called
34 Resident Farmer).
- 35 2. Military Training Land Use – National Guard Trainee.
- 36 3. Commercial/Industrial Land Use – Industrial Receptor (USEPA Composite Worker).

37
38 An evaluation using Resident Receptor (Adult and Child) FWCUGs was used to provide an
39 Unrestricted (Residential) Land Use evaluation. Unrestricted (Residential) Land Use is considered
40 protective for all categories of Land Use at Camp Ravenna. Additional human health receptors
41 associated with Camp Ravenna are the National Guard Trainee and Industrial Receptor. No COCs
42 were identified as requiring remediation to be protective for the Resident Receptor or Unrestricted
43 (Residential) Land Use. The receptor is assumed to be exposed to surface soil from 0–1 ft bgs and
44 subsurface soil from 1–13 bgs.

1 Load Line 8 has important and significant ecological resources such as wetlands and surface water
2 features. Because contamination is at or near the important resources, these findings invoked a Level
3 II ERA. Groundwater is not considered an exposure medium for ecological receptors on the AOC.

4 5 **F CURRENT AND POTENTIAL FUTURE LAND USES**

6
7 Load Line 8 is currently managed by the Army National Guard/OHARNG. The AOC is not currently
8 being utilized for training purposes. The future use of Load Line 8 is Military Training. The Resident
9 Receptor was evaluated in the human health risk assessment (HHRA) to assess an Unrestricted
10 (Residential) Land Use scenario. This ROD discusses future Land Use, as it pertains to soil, sediment,
11 and surface water and how it impacts human health, the environment, and groundwater.

12 13 **G SUMMARY OF SITE RISKS**

14
15 The HHRA and ERA estimated risks to human receptors and ecological resources; identified
16 exposure pathways; COCs and chemicals of potential ecological concern (COPECs), if any; and
17 provided a basis for remedial decisions. This section of the ROD summarizes the results of the HHRA
18 and ERA, which are presented in detail in the Load Line 8 RI Report (USACE 2016) and Load Line 8
19 PP (USACE 2017) located in the Administrative Record and Information Repositories.

20 21 **G.1 Human Health Risk Assessment**

22
23 An HHRA was performed to identify COCs and provide a risk management evaluation to determine
24 if remediation is required under CERCLA based on potential risks to human receptors. The media
25 evaluated in the HHRA for the Resident Receptor (Adult and Child) were surface soil (0–1 ft bgs),
26 subsurface soil (1–13 ft bgs), sediment, and surface water.

27
28 No COCs were identified for the Resident Receptor in subsurface soil or sediment. Five PAHs
29 [benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and
30 indeno(1,2,3cd)pyrene] were identified as COCs for the Resident Receptor (Adult and Child) in
31 surface soil based on the results from five ISM sample locations containing gravel, slag, and crushed
32 building debris. The PAH concentrations at Load Line 8 are not indicative of an operations-related
33 point source of PAHs and are indicative of road sources. Due to the low concentrations of PAHs
34 reported in these samples collected from areas with no identified source of PAHs other than roads,
35 gravel, and building debris, PAHs were not identified as COCs for potential remediation.

36
37 Three COCs (cobalt, iron, and lead) were identified for the Resident Receptor in surface water. These
38 metals were not identified as COCs for remediation as (1) concentrations of these metals were
39 significantly lower in a subsequent surface water sample collected from the same location in April
40 2011, and (2) incidental exposure to surface water in a ditch would be much less than exposure from
41 ingestion of tap water or drinking water, which the conservative comparisons for cobalt and lead were
42 based on.

1 While COCs were identified, the evaluation in the Load Line 8 RI Report indicated that no COCs
2 required remediation for any media of concern for the Resident Receptor. Therefore, the site is
3 protective for Unrestricted (Residential) Land Use. Because the site is protective for Unrestricted
4 (Residential) Land Use, it is also protective for Commercial/Industrial Land Use and Military
5 Training Land Use (USACE 2016).

6 7 **G.2 Ecological Risk Assessment**

8
9 The ecological habitat in Load Line 8 is approximately 44 acres and consists of grasses, forest, and
10 scrub vegetation. The vegetation provides a habitat for birds, mammals, insects, and other organisms.
11 There are five wetland areas within the AOC, small drainage ditches bordering the roads and within
12 the FPA, and ditches in the southwest portion of the AOC that form the headwaters of an unnamed
13 tributary to Hinkley Creek.

14
15 Ecological resources at Load Line 8 were compared to the list of important ecological places and
16 resources. Based on the 39 criteria defining important places as identified by the Army and Ohio
17 EPA, the wetlands and surface water are important and significant ecological resources at Load Line
18 8 (USACE 2016). The vegetation types present at Load Line 8 are also found elsewhere near the
19 AOC, at Camp Ravenna, and in the ecoregion.

20
21 The northern long-eared bat (*Myotis septentrionalis*; federally threatened) exists at Camp Ravenna.
22 There are no other federally listed species or critical habitats on Camp Ravenna. Load Line 8 has not
23 been previously surveyed for federal- or state-listed species; however, there have been no
24 documented sightings of state-listed, federally listed, threatened, or endangered species at the AOC
25 (OHARNG 2014).

26
27 The ERA for Load Line 8 (USACE 2016) evaluated chemical contamination to determine if it posed
28 a risk to the environment. The ERA incorporated available data to identify integrated COPECs. A
29 total of 18 integrated soil COPECs were identified in the Level I ERA. In addition, nine integrated
30 sediment COPECs and nine integrated surface water COPECs were identified in the Level I ERA.

31
32 Because contamination is at or near important and significant ecological resources such as wetlands, a
33 Level II ERA was invoked. The soil, sediment, and surface water COPECs were further evaluated
34 with technical and refinement factors agreed upon by the Army and Ohio EPA. The Level II ERA
35 concluded that there are no chemicals requiring remediation or further evaluation to be protective of
36 the environment. No further action is recommended to be protective from an ecological perspective at
37 Load Line 8.

38 39 **H DOCUMENTATION OF NO SIGNIFICANT CHANGE**

40
41 The Load Line 8 PP (USACE 2017) was released for public comment on June 12, 2017. The PP
42 recommends no further action for soil, sediment, and surface water at Load Line 8. After the public
43 comment period, no significant changes were necessary or appropriate following the conclusion of
44 the public comment period.

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1 **PART III: RESPONSIVENESS SUMMARY FOR PUBLIC**
2 **COMMENTS ON THE ARMY PROPOSED PLAN FOR RVAAP-41**
3 **LOAD LINE 8**

4
5 **A OVERVIEW**
6

7 On June 12, 2017, the Army released the Load Line 8 PP (USACE 2017) for public comment. A 30-
8 day public comment period was held from June 12, 2017 to July 12, 2017. The Army hosted a public
9 meeting on June 27, 2017 to present the PP and take questions and comments from the public for the
10 record. This public comment period and public meeting also included PPs for Load Lines 5, 6, and
11 11.

12
13 For soil, surface water, and sediment at Load Line 8, the Army recommended no further
14 action. During the public meeting, Ohio EPA concurred with the recommendation of no further
15 action. Comments provided during the public comment period and public meeting are summarized in
16 the following section.

17
18 The community voiced no objections to the no further action recommendation. All public input was
19 considered during the selection of the final remedy for soil, surface water, and sediment at Load Line
20 8 in this ROD.

21
22 **B SUMMARY OF PUBLIC COMMENTS AND LEAD AGENCY RESPONSES**
23

24 The following subsections summarize the oral and written comments provided during the public
25 comment period and public meeting.
26

27 **B.1 Oral Comments from Public Meeting**
28

29 *Comment 1: If the report indicates that a chemical group (e.g., VOCs, explosives, PCBs) is not*
30 *detected at the site, does that mean there was zero detection of all of the chemicals within that*
31 *specific chemical group?*

32 Response: If the report indicates that a chemical group is not detected at the site, it means that all
33 chemicals analyzed as part of the chemical group were not detected during laboratory analysis.
34

35 *Comment 2: Was there a functional commonality among the various load lines that used chromium?*
36 *If chromium was used, was it in the hexavalent chromium form?*

37 Response: Chromium is a potential contaminant from operational history. Chromium was extensively
38 analyzed for at Load Line 8; 61 surface soil samples and 18 subsurface soil samples were analyzed
39 for chromium. The chromium concentrations were predominantly at or near the concentrations in
40 which chromium naturally occurs in the respective media. As part of the chromium analysis, Load
41 Line 8 was sampled to specifically assess the predominant form of chromium (trivalent or hexavalent)
42 that occurs at the site. It was determined that hexavalent chromium (maximum concentration of 2

1 mg/kg) is not of concern at Load Line 8, and trivalent chromium is the predominant form of
2 chromium. All concentrations were below the applicable risk levels for trivalent chromium.

3
4 *Comment 3: It would be helpful for the public for full-sheet maps to be provided in the slideshow*
5 *package handouts.*

6 Response: Agree. Future presentations will have full-sheet maps provided as part of the handouts
7 provided to the public.

8
9 *Comment 4: What are the interim land use controls that are used at these sites (Load Lines 5, 6, 8,*
10 *and 11)?*

11 Response: The Army is currently controlling/restricting the sites during the completion of the
12 CERCLA process. Based on the RIs and subsequent analysis, the current recommendation is to allow
13 for Unrestricted (Residential) Land Use at each site.

14
15 *Comment 5: Are the land use controls considering the possibility of tampering with, or vandalism of*
16 *the monitoring wells?*

17 Response: The groundwater wells will continue to be used as part of the Facility-wide Groundwater
18 Monitoring Program conducted at the former RVAAP. While the Army controls Camp Ravenna and
19 implements the Facility-wide Groundwater Monitoring Program, the potential for tampering or
20 vandalism of the wells is low. When the program discontinues use of the wells, the wells will be
21 abandoned per all appropriate rules and regulations.

22 23 **B.2 Written Comments**

24
25 No written comments were received during the public comment period.

26 27 **C TECHNICAL AND LEGAL ISSUES**

28
29 There were no technical or legal issues raised during the public comment period.

1 PART IV: REFERENCES

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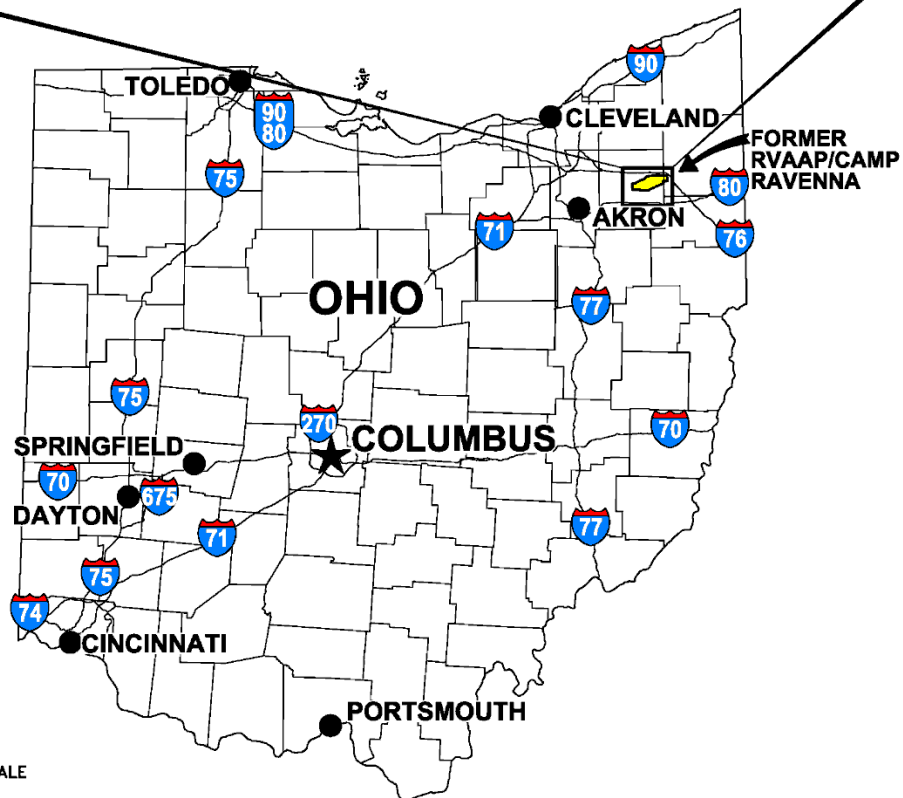
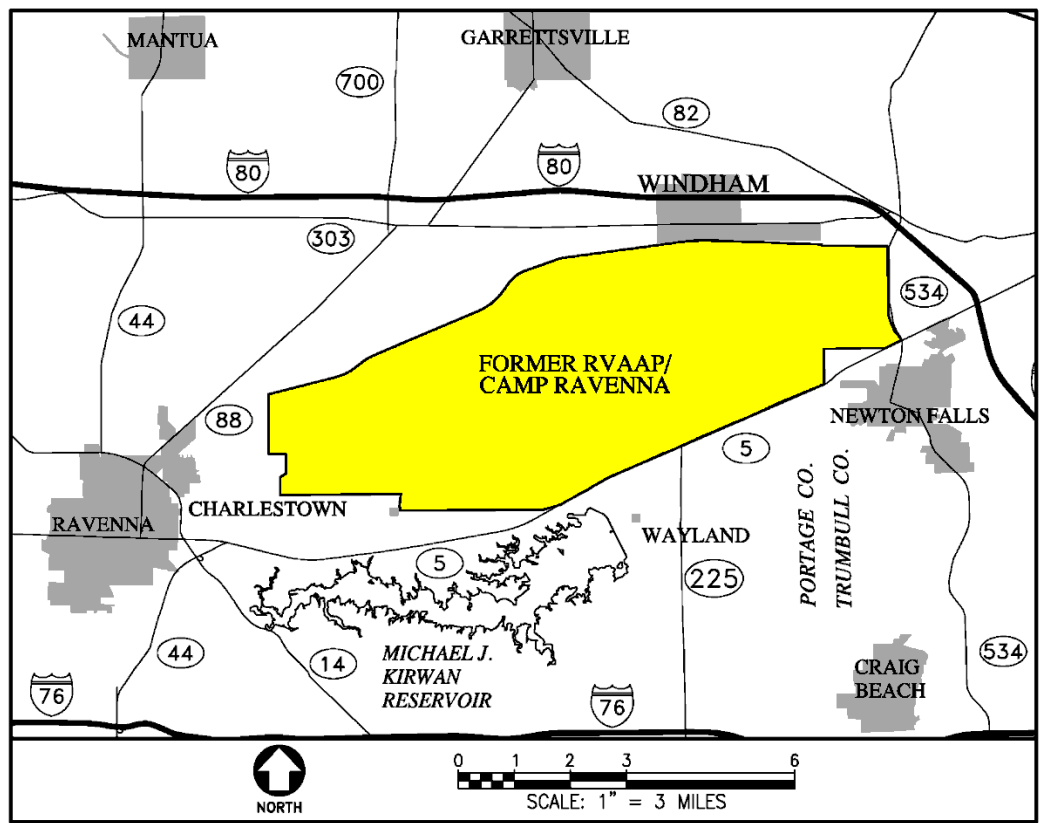
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FIGURES

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9/30/16 C:\08042\DWGS\HDSNA-FIG1-1

Figure 1. General Location and Orientation of Camp Ravenna

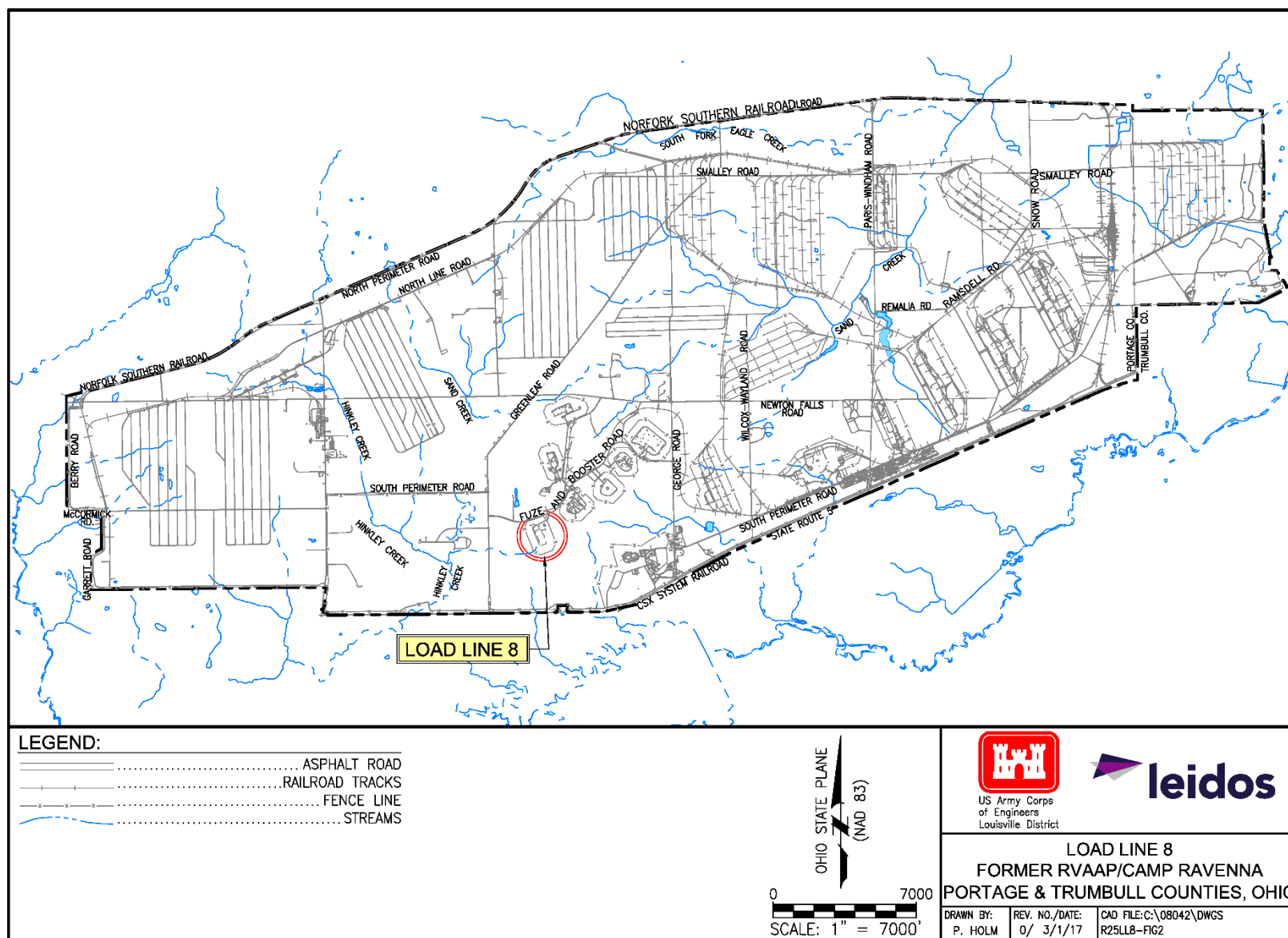


Figure 2. Camp Ravenna Installation Map

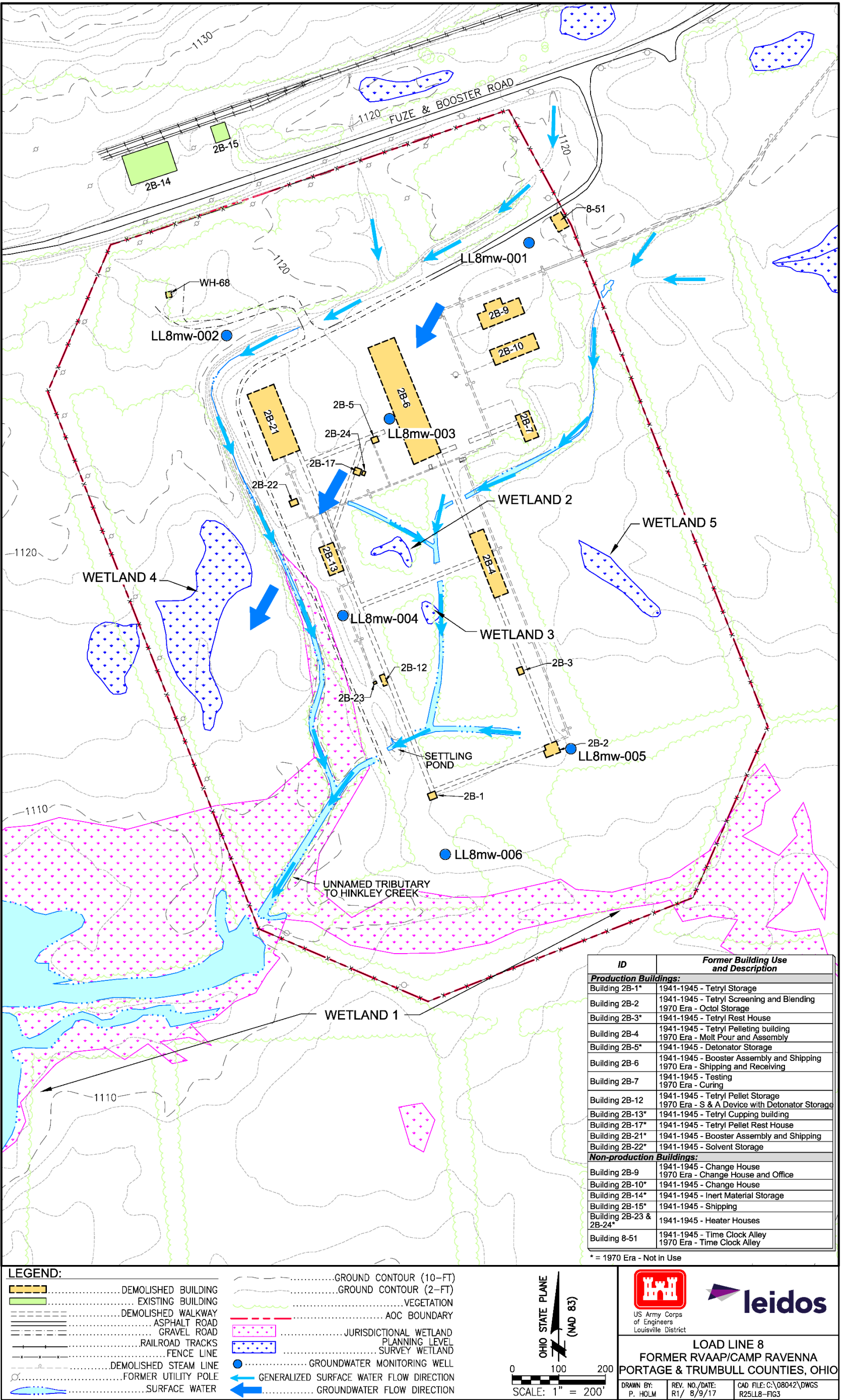
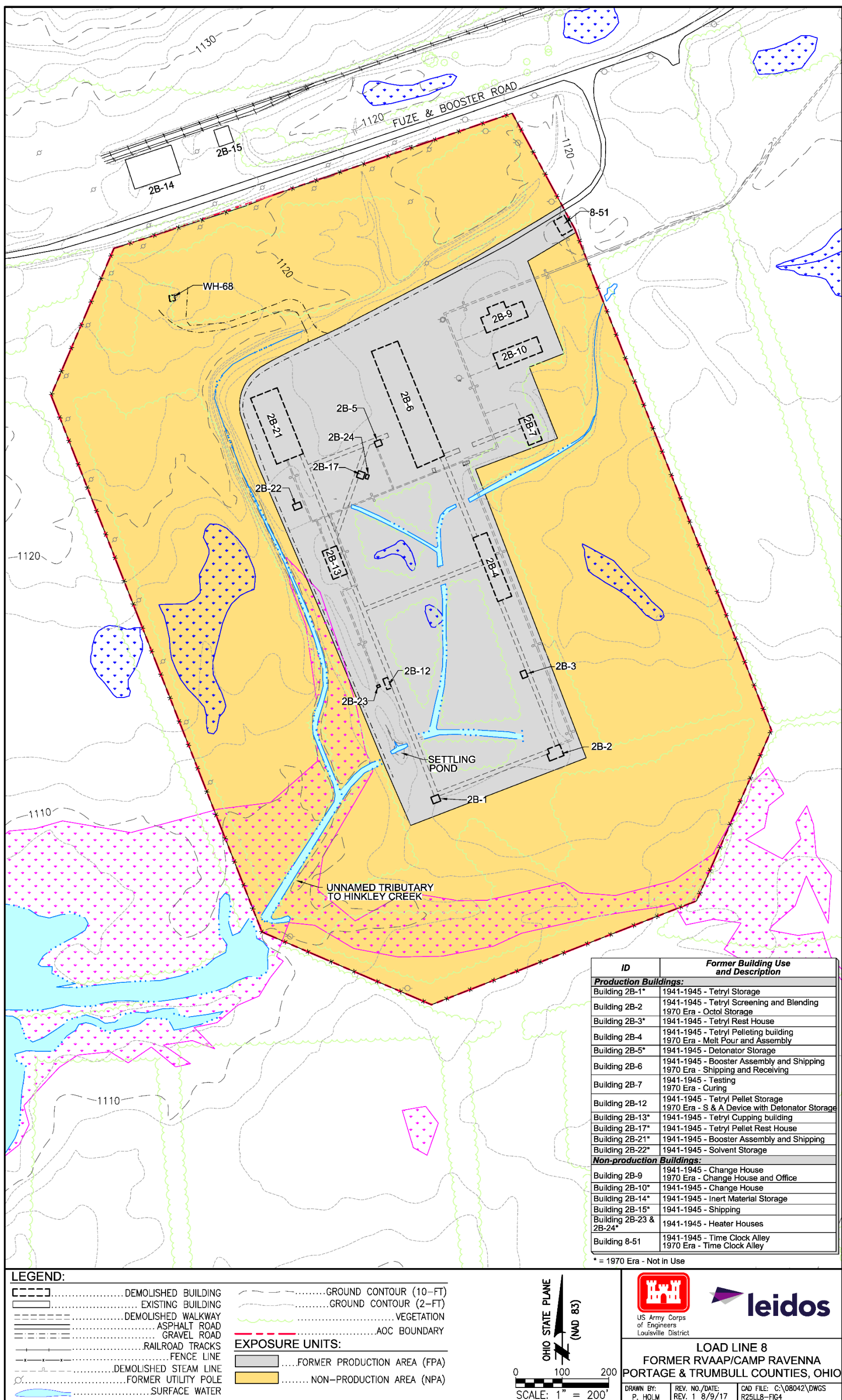


Figure 3. Load Line 8 Site Features



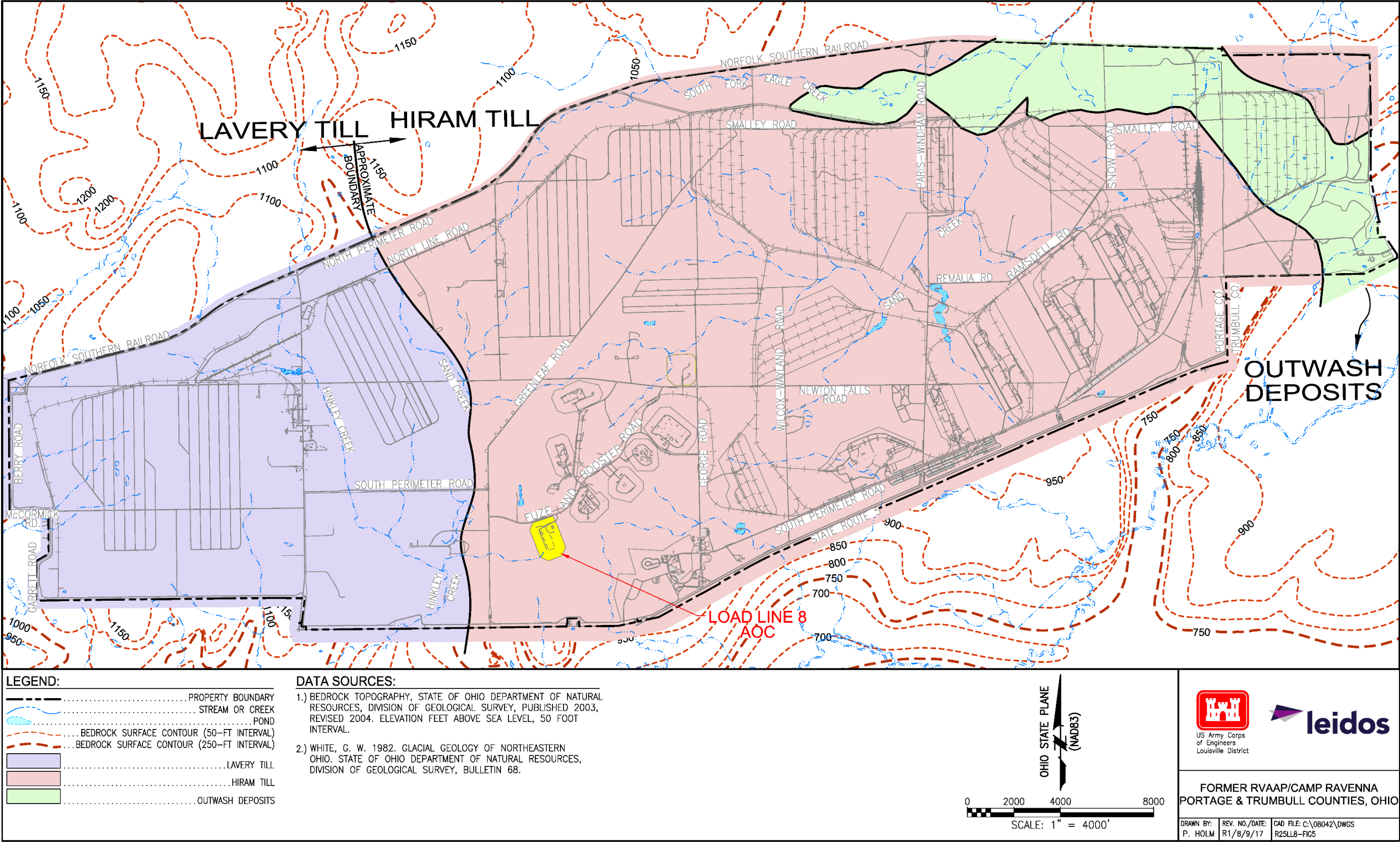


Figure 5. Geologic Map of Unconsolidated Deposits on Camp Ravenna

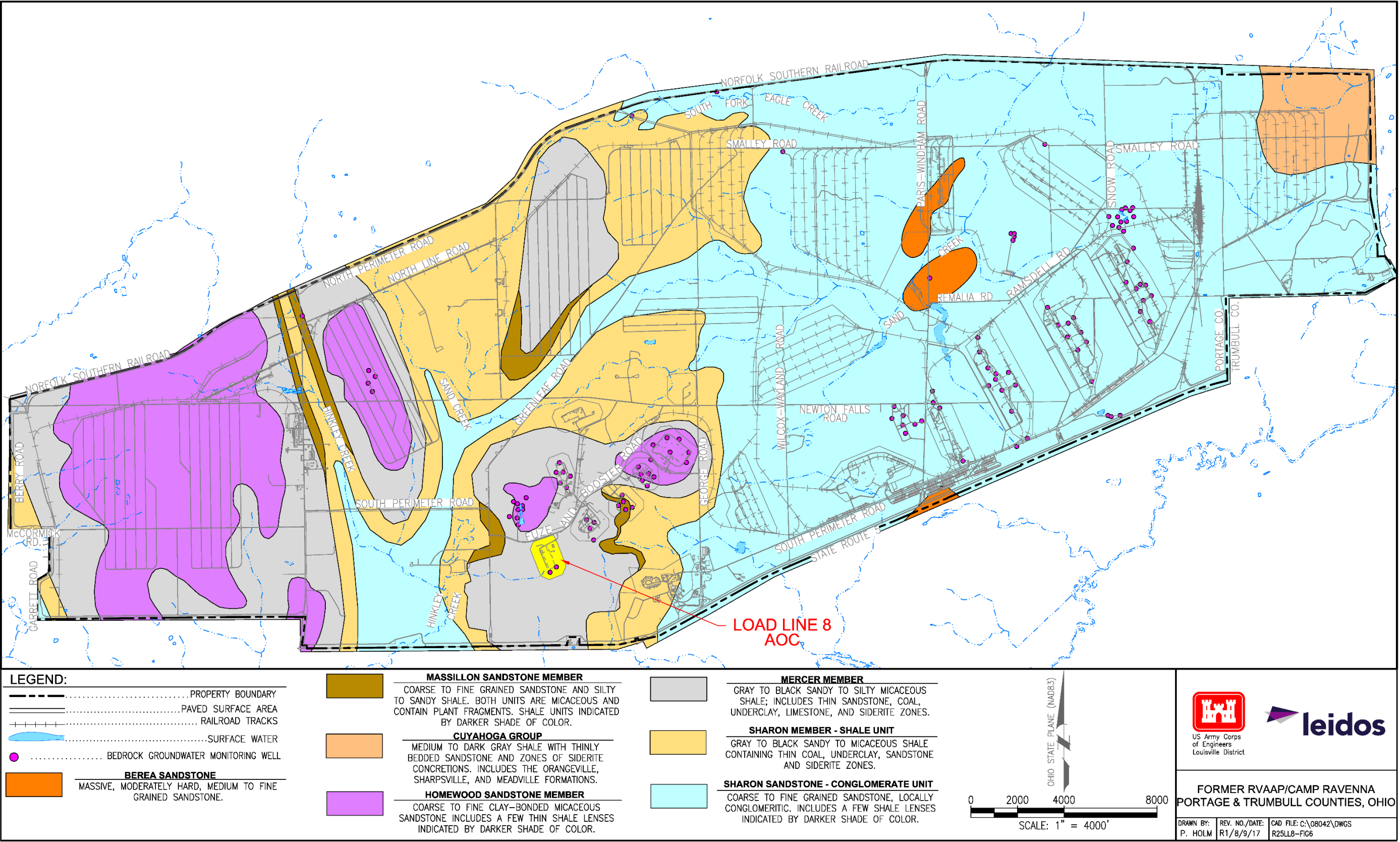


Figure 6. Geologic Bedrock Map and Stratigraphic Description of Units on Camp Ravenna

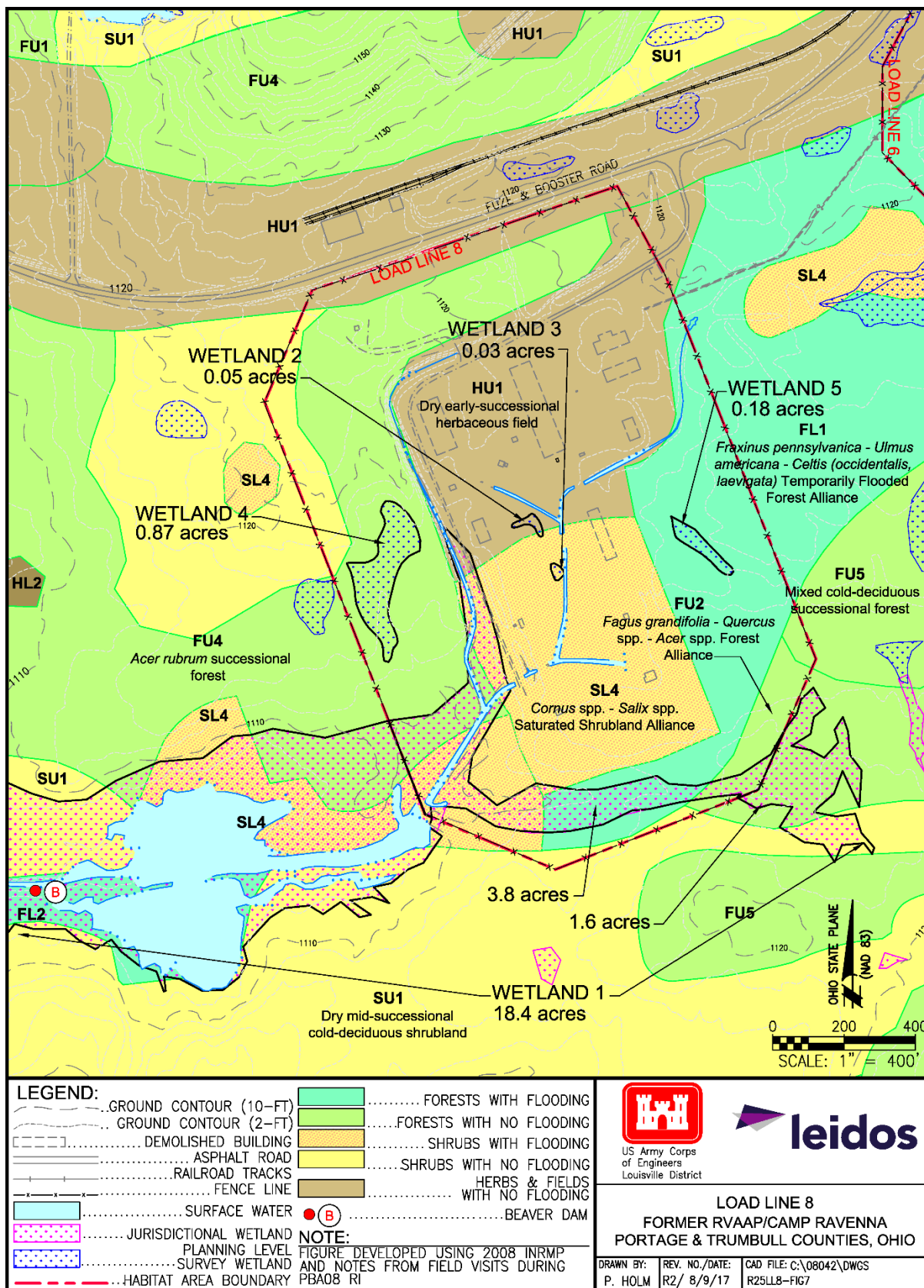
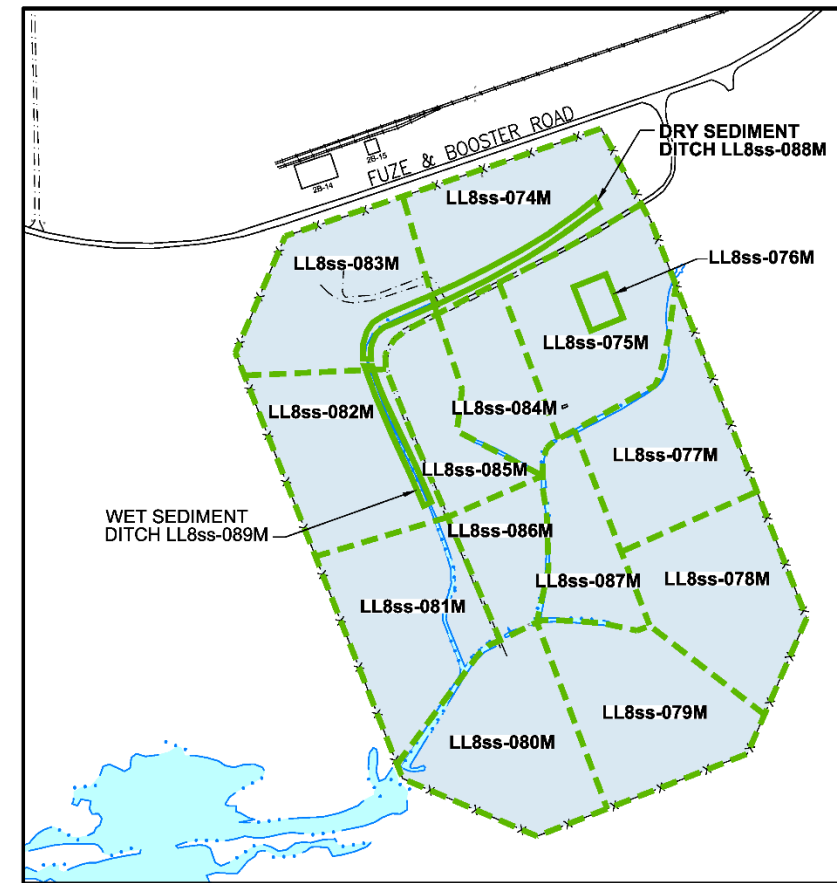
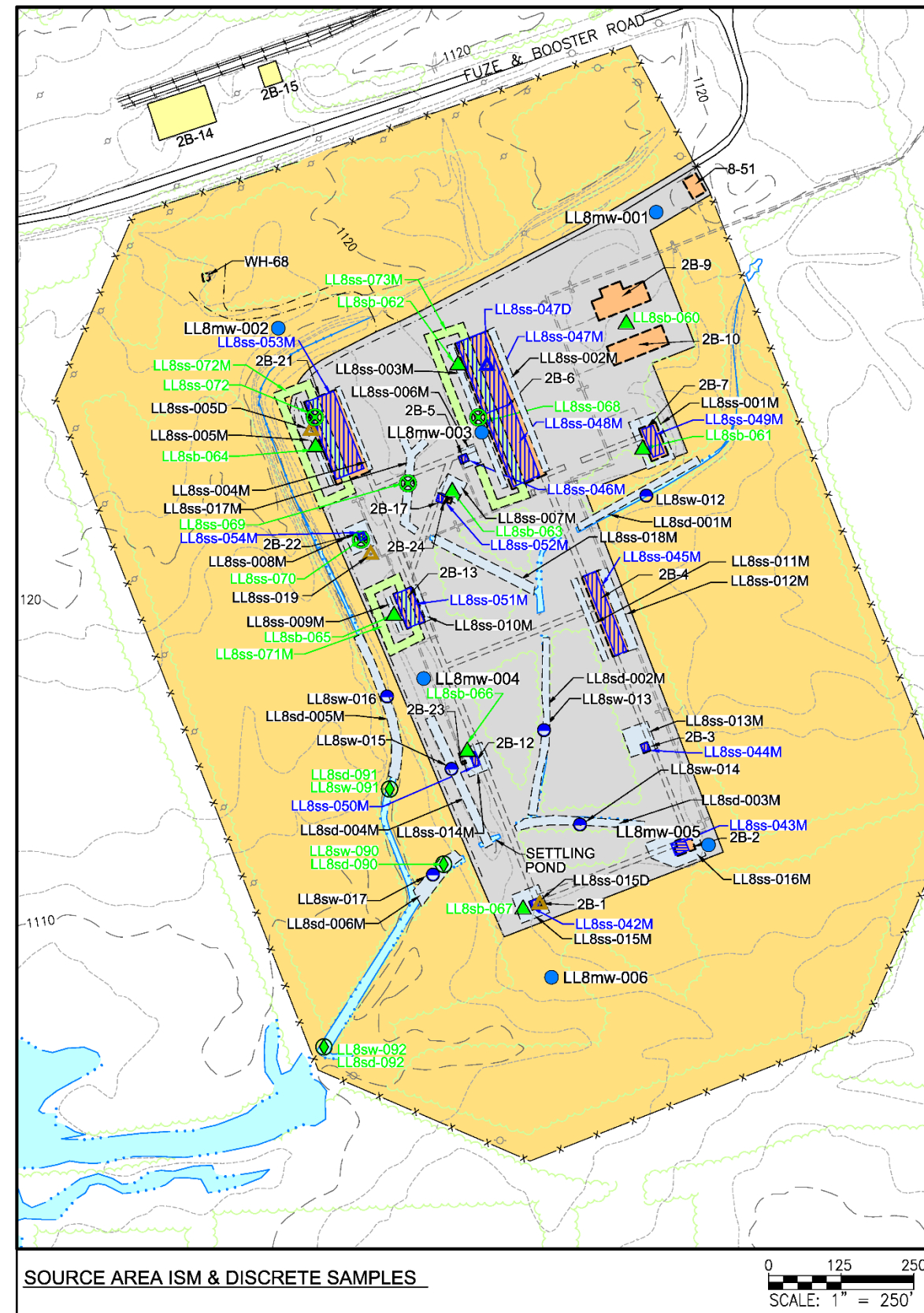


Figure 7. Natural Resources Inside and Near Habitat Area at Load Line 8


















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





<i>ID</i>	<i>Former Building Use and Description</i>
<i>Production Buildings:</i>	
Building 2B-1*	1941-1945 - Tetryl Storage
Building 2B-2	1941-1945 - Tetryl Screening and Blending 1970 Era - Octol Storage
Building 2B-3*	1941-1945 - Tetryl Rest House
Building 2B-4	1941-1945 - Tetryl Pelletting building 1970 Era - Melt Pour and Assembly
Building 2B-5*	1941-1945 - Detonator Storage
Building 2B-6	1941-1945 - Booster Assembly and Shipping 1970 Era - Shipping and Receiving
Building 2B-7	1941-1945 - Testing 1970 Era - Curing
Building 2B-12	1941-1945 - Tetryl Pellet Storage 1970 Era - S & A Device with Detonator Storage
Building 2B-13*	1941-1945 - Tetryl Cupping building
Building 2B-17*	1941-1945 - Tetryl Pellet Rest House
Building 2B-21*	1941-1945 - Booster Assembly and Shipping
Building 2B-22*	1941-1945 - Solvent Storage
<i>Non-production Buildings:</i>	
Building 2B-9	1941-1945 - Change House 1970 Era - Change House and Office
Building 2B-10*	1941-1945 - Change House
Building 2B-14*	1941-1945 - Inert Material Storage
Building 2B-15*	1941-1945 - Shipping
Building 2B-23 & 2B-24*	1941-1945 - Heater Houses
Building 8-51	1941-1945 - Time Clock Alley 1970 Era - Time Clock Alley

* = 1970 Era - Not in Use

LEGEND:

- | | |
|---|------------------------------------|
|  | DEMOLISHED BUILDING |
|  | EXISTING BUILDING |
|  | DEMOLISHED WALKWAY |
|  | ASPHALT ROAD |
|  | GRAVEL ROAD |
|  | RAILROAD TRACKS |
|  | FENCE LINE |
|  | DEMOLISHED STEAM LINE |
|  | FORMER UTILITY POLE |
|  | SURFACE WATER |
|  | GROUND CONTOUR (10'-FT) |
|  | GROUND CONTOUR (2'-FT) |
|  | VEGETATION |
|  | FORMER PRODUCTION AREA (FPA) |
|  | NON-PRODUCTION AREA (NPA) |
|  | 2007 POST-SLAB REMOVAL |
|  | ISM LOCATIONS |

PBA08 RI SAMPLE LOCATIONS:

-  SOIL BORING
 CHROMIUM SPECIATION
 CO-LOCATED SURFACE WATER/SEDIMENT
 ISM AREA TO DELINEATE
..... PREVIOUS EXCEEDANCE
 ISM GRID SAMPLE
- HISTORICAL SAMPLE LOCATIONS:**
-  GROUNDWATER MONITORING WELL
 SURFACE WATER SAMPLE
 SURFACE SOIL SAMPLE
 ISM SAMPLING AREA



LOAD LINE 8
FORMER RVAAP/CAMP RAVENNA
PORTAGE & TRUMBULL COUNTIES, OHIO

DRAWN BY: P. HOLM	REV. NO./DATE: 8/9/17	CAD FILE: C:\08042\DWGS R25LL8-FIG8
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Figure 8. Load Line 8 Sample Locations

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