Draft

Record of Decision Amendment for Soil, Sediment, and Surface Water at RVAAP Load Lines 1, 2, 3, 4, and 12

Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Contract No. W912QR-15-C-0046

Prepared for:

U.S. Army Corps of Engineers
Louisville District

Prepared by:

Leidos
8866 Commons Boulevard, Suite 201
Twinsburg, Ohio 44087

November 13, 2019

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
13-11-2019	Technical	Nov 1978 – Nov 2019

4. TITLE AND SUBTITLE

Draft
Record of Decision Amendement for Soil, Sediment, and Surface Water
at RVAAP Load Lines 1, 2, 3, 4, and 12
Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

5a. CONTRACT NUMBER
W912QR-15-C-0046

5b. GRANT NUMBER
NA

5c. PROGRAM ELEMENT NUMBER
NA

6. AUTHOR(S)
Johnson, Sarika

5d. PROJECT NUMBER
NA

5e. TASK NUMBER
NA

5f. WORK UNIT NUMBER
NA

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Leidos
8866 Commons Boulevard
Suite 201
Twinsburg, Ohio 44087

8. PERFORMING ORGANIZATION REPORT NUMBER
NA

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

USACE - Louisville District
U.S. Army Corps of Engineers
600 Martin Luther King Jr., Place
PO Box 59
Louisville, Kentucky 40202-0059

10. SPONSOR/MONITOR'S ACRONYM(S)
USACE

11. SPONSOR/MONITOR'S REPORT NUMBER(S)
NA

12. DISTRIBUTION/AVAILABILITY STATEMENT

Reference distribution page.

13. SUPPLEMENTARY NOTES

None.

14. ABSTRACT

This Record of Decision Amendment for Load Lines 1-4 and 12 presents the rationale for amending previous records of decision associated these sites and provides a selected remedial alternative to attain Commercial/Industrial Land Use. This decision document summarizes nature and extent of contamination in soil, sediment, and surface water; contaminant fate and transport; and human health and ecological risk assessments. Remedial alternatives were developed and assessed, resulting in the selection of Alternative 3: Commercial/Industrial Land Use – Ex Situ Thermal Treatment of Soil and Administrative LUCs as the remedial alternative. This information was presented to the public, and all public input was considered during the selection of the final remedy.

15. SUBJECT TERMS

record of decision, amendment, proposed plan, land use, chemicals of concern, remediation

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Nathaniel Peters, II
U	U	U	U	101	19b. TELEPHONE NUMBER *(Include area code)* 502.315.2624

PLACEHOLDER FOR:

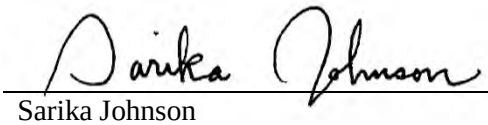
Documentation of Ohio EPA Concurrence of Final Document

(Documentation to be provided once concurrence is issued.)

DISCLAIMER STATEMENT

CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

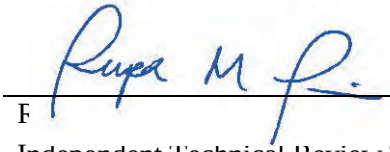
Leidos has completed the Record of Decision Amendment for Soil, Sediment, and Surface Water at RVAAP Load Lines 1, 2, 3, 4, and 12 at the Former Ravenna Army Ammunition Plant, Portage and Trumbull Counties, Ohio. Notice is hereby given that an independent technical review has been conducted that is appropriate 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.



11/13/2019

Sarika Johnson
Study/Design Team Leader

Date

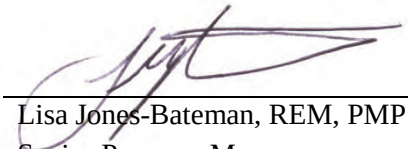


11/13/2019

F
Independent Technical Review Team Leader

Date

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



11/13/2019

Lisa Jones-Bateman, REM, PMP
Senior Program Manager

Date

Draft

Record of Decision Amendment for Soil, Sediment, and Surface Water at RVAAP Load Lines 1, 2, 3, 4, and 12

Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Contract No. W912QR-15-C-0046

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

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

November 13, 2019

DOCUMENT DISTRIBUTION
for the
Draft Record of Decision Amendment
for Soil, Sediment, and Surface Water at RVAAP Load Lines 1, 2, 3, 4, and 12
Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Name/Organization	Number of Printed Copies	Number of Electronic Copies
Susan Netzley-Watkins, Ohio EPA-NEDO	1	1
Natalie Oryshkewych, Ohio EPA-NEDO	Email transmittal letter only	
Bob Princic, Ohio EPA-NEDO	Email transmittal letter only	
Tom Schneider, Ohio EPA-SWDO	Email transmittal letter only	
David Connolly, ARNG-I&E Cleanup Branch	0	1
Katie Tait, OHARNG, Camp James A. Garfield Kevin Sedlak, ARNG, Camp James A. Garfield	Email transmittal letter only	
Craig Coombs, USACE – Louisville District	Email transmittal letter only	
Nathaniel Peters II, USACE – Louisville District	0	1
Admin Records Manager – Camp James A. Garfield	1	1
Jed Thomas, Leidos	1	1
Pat Ryan, Leidos-REIMS	Email transmittal letter only	
Leidos Contract Document Management System	0	1

ARNG = Army National Guard.
I&E = Installations & Environment.
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.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

ACRONYMS AND ABBREVIATIONS

amsl	Above Mean Sea Level
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
ARNG	Army National Guard
Army	U.S. Department of the Army
AT123D	Analytical Transient 1-, 2-, and 3-Dimensional Model
bgs	Below Ground Surface
BRACD	Base Realignment and Closure Division
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CJAG	Camp James A. Garfield
CMCOC	Contaminant Migration Chemical of Concern
CMCOPC	Contaminant Migration Chemical of Potential Concern
COC	Chemical of Concern
COEC	Chemical of Ecological Concern
COI	Chemical of Interest
COPEC	Chemical of Potential Ecological Concern
DERP	Defense Environmental Restoration Program
DFFO	Director's Final Findings and Orders
DNT	Dinitrotoluene
DoD	U.S. Department of Defense
DQO	Data Quality Objective
EPC	Exposure Point Concentration
ERA	Ecological Risk Assessment
ESV	Ecological Screening Value
FS	Feasibility Study
FWCUG	Facility-wide Cleanup Goal
FWGWMP	Facility-wide Groundwater Monitoring Program
HDPE	High-Density Polyethylene
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
LUC	Land Use Control
LUCRD	Land Use Control Remedial Design
MRS	Munitions Response Site
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl

ACRONYMS AND ABBREVIATIONS (continued)

PMP	Property Management Plan
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RDX	Hexahydro-1,3,5-Trinitro-1,3,5-Triazine
RGO	Remedial Goal Option
RI	Remedial Investigation
ROD	Record of Decision
RSL	Regional Screening Level
RVAAP	Ravenna Army Ammunition Plant
SEMS	Superfund Environmental Management System
SOR	Sum-of-Ratios
SVOC	Semi-volatile Organic Compound
TCLP	Toxicity Characteristic Leaching procedure
TNT	2,4,6-Trinitrotoluene
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USP&FO	U.S. Property and Fiscal Officer
VOC	Volatile Organic Compound

PART I: THE DECLARATION

A SITE NAME AND LOCATION

This Record of Decision (ROD) Amendment addresses soil, sediment, and surface water contaminants at Load Lines 1, 2, 3, and 4 and soil at Load Line 12. These areas of concern (AOCs) are within the former Ravenna Army Ammunition Plant (RVAAP). The load lines addressed in this ROD Amendment and AOC designations are as follows:

Load Line	AOC Designation
Load Line 1	RVAAP-08
Load Line 2	RVAAP-09
Load Line 3	RVAAP-10
Load Line 4	RVAAP-11
Load Line 12	RVAAP-12

The former RVAAP, now known as Camp James A. Garfield (CJAG) Joint Military Training Center, located in northeastern Ohio within Portage and Trumbull counties, is approximately 3 miles east/northeast of the city of Ravenna and 1 mile north/northwest of the city of Newton Falls (Figure 1). The facility is approximately 11 miles long and 3.5 miles wide. The facility is bounded by State Route 5, the Michael J. Kirwan Reservoir, and the CSX System Railroad to the south; Garrett, McCormick, and Berry roads to the west; the Norfolk Southern Railroad to the north; and State Route 534 to the east. In addition, the facility is surrounded by the communities of Windham, Garrettsville, Charlestown, and Wayland. The facility is federal property, which has had multiple accountability transfers amongst multiple U.S. Department of the Army (Army) agencies, making the property ownership and transfer history complex. The most recent administrative accountability transfer occurred in September 2013 when the remaining acreage (not previously transferred) was transferred to the U.S. Property and Fiscal Officer (USP&FO) for Ohio and subsequently licensed to the Ohio Army National Guard (OHARNG) for use as a military training site (Camp James A. Garfield).

Figure 2 depicts locations of the five load lines presented in this ROD Amendment. The Superfund Environmental Management System (SEMS) Identifier for RVAAP is OH5210020736.

B STATEMENT OF BASIS AND PURPOSE

Load Lines 1-4 and 12 all had previous RODs signed by the Army that addressed the soil and dry sediment media. These RODs include the following:

- *Interim Record of Decision for the Remediation of Soils at Load Lines 1 through 4* (Shaw 2007), signed by the Base Realignment and Closure Division (BRACD) on June 4, 2007. (This document is herein referred to as the "Load Lines 1-4 Interim ROD.")

- *Record of Decision for Soil and Dry Sediment for the RVAAP-12 Load Line 12* (SAIC 2009), signed by BRACD on August 20, 2009. (This document is herein referred to as the "Load Line 12 ROD.")

In addition, the *Record of Decision for Wet Sediment and Surface Water at RVAAP-12 Load Line 12* (Leidos 2019) selected no further action for wet sediment and surface water at Load Line 12.

The selected alternatives associated with both the Load Lines 1-4 Interim ROD and Load Line 12 ROD have been implemented. The post-remediation land use and land use controls (LUCs), if any, are documented in the *Property Management Plan for the Designated Areas of Concern and Munitions Response Sites, Version 2.0* (USACE 2018), herein referred to as the Property Management Plan (PMP). These include the following:

- Load Lines 1-4:
  - Land Use: National Guard Mounted Training – No Digging
  - LUCs: Load Lines 1-4 do not have any formal LUCs. The PMP states that OHARNG will ensure land use is limited to Mounted Training – No Digging. Annual inspections are conducted to confirm the land use remains appropriate.
- Load Line 12:
  - Land Use: National Guard Mounted Training – Digging to 4 ft below ground surface (bgs).
  - LUCs:
    - Activities are limited to tracked and wheeled vehicle operations and associated training activities along with training area development and maintenance, maintaining the integrity of monitoring wells, road and culvert repair, routine ditch maintenance, vegetation management, and compatible natural resources management.
    - All digging or excavation to depths more than 4 ft bgs is prohibited with the following exceptions: ground surface repairs, as required, resulting from maneuver damage; and routine maintenance of the roads, ditches, and culverts.
    - The facility perimeter fence, which is a 6-foot, chain-link fence topped with a v-shaped bracket slanting inward and outward with a three-strand barbed wire bracket, is to be maintained.

The Army National Guard (ARNG) is the lead agency and has assessed residual contamination to determine the feasibility of further optimizing the land use at these five AOCs. The Commercial/Industrial Land Use and Unrestricted (Residential) Land Use allow for less restricted use of these AOCs by the Army than is currently allowed. Therefore, the Army developed the *Feasibility Study Addendum for Soil, Sediment, and Surface Water at RVAAP Load Lines 1, 2, 3, 4, and 12* (Leidos 2017) (herein referred to as the Feasibility Study [FS] Addendum). This FS Addendum evaluated residual contamination in soil, sediment, and surface water at Load Lines 1-4; evaluated residual contamination in soil (inclusive of dry sediment) at Load Line 12; and assessed the feasibility of attaining one of these less restricted land uses.

The FS Addendum (Leidos 2017) concluded the following:

- Dry sediment is evaluated as soil; therefore, references to soil throughout this ROD Amendment are inclusive of dry sediment.
- No chemicals of concern (COCs) were identified in sediment or surface water that would prevent Unrestricted (Residential) Land Use at Load Lines 1, 3, and 4.
- Polycyclic aromatic hydrocarbons (PAHs) were identified as COCs requiring remediation in sediment at Load Line 2 to attain Unrestricted (Residential) Land Use. However, these COCs do not require remediation to attain Commercial/Industrial Land Use.
- All five AOCs contained soil COCs requiring remediation to attain either Commercial/Industrial Land Use or Unrestricted (Residential) Land Use.

The FS Addendum provided an evaluation of remedial alternatives for soil. Alternative 3: Commercial/Industrial Land Use – Ex Situ Thermal Treatment of Soil and Administrative LUCs is the selected remedial alternative. Implementation of this alternative will allow for Commercial/Industrial Land Use at these AOCs.

ARNG has chosen the selected final remedy for Load Lines 1-4 and 12 in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on information contained in the Administrative Record file for the AOCs. The Ohio Environmental Protection Agency (Ohio EPA), the supporting state regulatory agency, concurred with the FS Addendum (Leidos 2017).

The Director's Final Findings and Orders (DFFO) (Ohio EPA 2004) was issued to the Army on June 10, 2004. The objective of the DFFO was for the Army and Ohio EPA to "contribute to the protection of public health, safety, and welfare and the environment from the disposal, discharge, or release of contaminants at or from the site, through implementation of a CERCLA-based environmental remediation program. This program will include the development by respondent of a Remedial Investigation (RI)/FS for each AOC or appropriate group of AOCs at the site, and upon completion and publication of a Proposed Plan and ROD or other appropriate document for each AOC or appropriate group of AOCs, the design, construction, operation, and maintenance of the selected remedy as set forth in the ROD or other appropriate document for each AOC or appropriate group of AOCs." The decision to conduct a remedial action to address contamination at Load Lines 1-4 and 12 satisfies the requirements of the DFFO, as the Army and Ohio EPA have completed the CERCLA RI/FS phase of investigation at Load Lines 1-4 and 12.

ARNG is publishing this ROD Amendment to select a new remedy for these AOCs that is also protective of human health and the environment. Part II, Section M explains how the selected remedy is protective of human health and the environment and that the selected remedy satisfies the statutory requirements of CERCLA Section 121 and the NCP.

C ASSESSMENT OF SITE

The response action selected in this ROD Amendment is necessary to protect public health, welfare, or the environment from actual or threatened releases of contaminants in soil at Load Lines 1-4 and 12 and sediment at Load Line 2.

D DESCRIPTION OF THE SELECTED REMEDY

The nature and extent of potentially impacted media has been sufficiently characterized, the fate and transport modeling did not identify soil contaminant migration chemicals of concern (CMCOCs) impacting groundwater, and no ecological risk was identified. However, the human health risk assessment (HHRA) identified 1) COCs in soil at Load Lines 1-4 and 12 carried forward for remediation in order to attain Commercial/Industrial Land Use or Unrestricted (Residential) Land Use, and 2) COCs in sediment at Load Line 2 to be carried forward for remediation in order to attain Unrestricted (Residential) Land Use. There were no COCs in sediment requiring remediation to attain Commercial/Industrial Land Use.

The FS Addendum (Leidos 2017) developed and evaluated remedial alternatives for soil at Load Lines 1-4 and 12 and sediment at Load Line 2. The remedial alternatives are listed below:

- Alternative 1: No Action.
- Alternative 2: Commercial/Industrial Land Use – Excavation and Off-site Disposal of Soil and Administrative LUCs.
- Alternative 3: Commercial/Industrial Land Use – Ex Situ Thermal Treatment of Soil and Administrative LUCs.
- Alternative 4: Unrestricted (Residential) Land Use – Excavation and Off-site Disposal of Soil/Sediment.
- Alternative 5: Unrestricted (Residential) Land Use – Ex Situ Thermal Treatment of Soil/Sediment.

The selected remedy for Load Lines 1-4 and 12 is Alternative 3: Commercial/Industrial Land Use – Ex Situ Thermal Treatment of Soil and Administrative LUCs. This alternative involves thermally treating explosives-, polychlorinated biphenyl (PCB)-, and PAH-contaminated soil and disposing of the metals-impacted soil off-site at a licensed, engineered landfill. Implementing this remedy will allow for full-time occupational exposure at these AOCs without monitoring exposure parameters.

Some contaminated soil will be left in place; therefore, the AOCs will require LUCs. Upon completion of the remedial action, the following LUCs at these AOCs will be implemented:

- The AOCs cannot be used for Unrestricted (Residential) Land Use unless or until additional evaluation shows that risk levels resulting from residual contamination have been reduced to acceptable levels.

- The Army will conduct periodic monitoring of LUCs in the form of site inspections to confirm that the LUCs remain effective and still meet LUC objectives for continued remedy protectiveness. Site inspections will be conducted on an annual basis.

The selected remedy was chosen because it is cost effective; a green and highly sustainable alternative for on-site treatment; and implements a treatment alternative to reduce the toxicity, mobility, and volume of contamination. The thermal treatment technology is considered a green and sustainable technology as it can convert contaminants into a renewable source of fuel to run treatment operations, and reduces or eliminates air emissions, including carbon dioxide, which may normally result if vehicles are used to transport contaminated soil to a disposal facility.

In the event that a thermal treatment system is not on site at the former RVAAP, Alternative 2: Commercial/Industrial Land Use – Excavation and Off-site Disposal of Soil and Administrative LUCs is readily available and considered for implementation by the Army. The following is a brief list of activities associated with Alternative 3:

- Soil anticipated for treatment will be excavated and placed into a thermal treatment system to remove COCs from soil.
- Treated soil will be sampled and analyzed, and the sample results will be compared to the remedial goal options (RGOs).
- Once the treated soil is sampled and confirmed to be below RGOs, the treated soil will be placed back into the excavated area.
- Soil with metals concentrations above RGOs will be excavated and disposed of off-site.
- The excavated area will be sampled and analyzed, and the sample results will be compared to the RGOs.
- Both disturbed areas will be restored to grade, using approved clean backfill, as necessary; re-vegetated using an OHARNG-approved seed mixture; and mulched.
- Some contaminated soil will be left in place, preventing Unrestricted (Residential) Land Use.
- LUCs will be put in place to restrict use of this AOC.

The selected remedy will achieve a requisite level of protectiveness for the AOCs. The cost for the selected remedy is estimated to be $1,649,093.

E STATUTORY DETERMINATIONS

The selected remedy protects human health and the environment, complies with federal and state laws and regulations that are applicable or relevant and appropriate to the remedial action, is cost effective, and utilizes permanent solutions to the maximum extent practicable. The selected remedy satisfies the statutory preference for treatment, as a thermal treatment technology is part of the selected remedy.

Because this remedy will result in COCs remaining on site above concentrations that allow for Unrestricted (Residential) Land Use and exposure, 5-year reviews will be performed in compliance with CERCLA Section 121(c) to ensure the remedy remains protective of human health and the environment.

F DATA CERTIFICATION CHECKLIST

Table 1 provides the location of key remedy selection information contained in Part II, Decision Summary. Additional information is provided in the Administrative Record file for Load Lines 1-4 and 12.

Table 1. ROD Data Certification Checklist

ROD Data Checklist Item	ROD Section
COCs	II.G.1
Baseline risk represented by the COCs	II.G
Cleanup goals established for COCs and the basis for these goals	II.H
How source materials constituting principal threats are addressed	II.K
Current and reasonably anticipated future land use assumptions used in the baseline risk assessment and ROD	II.F
Suitable potential land uses, following the selected remedy	II.L.4
Estimated capital and the total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected	II.L.3
Key factor(s) that led to selecting the remedy	II.L.1

COC = Chemical of Concern.
ROD = Record of Decision.

G AUTHORIZING SIGNATURE AND APPROVAL

Hallet Brazelton, Jr.
Acting Chief,
I&E, Army National Guard

Date

PART II: DECISION SUMMARY

A SITE NAME, LOCATION, AND DESCRIPTION

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

The most recent administrative accountability transfer occurred in September 2013 when the remaining acreage (not previously transferred) was transferred to USP&FO for Ohio and subsequently licensed to OHARNG for use as a military training site (Camp James A. Garfield). ARNG is the lead agency for any remediation, decisions, and applicable cleanup at Load Lines 1-4 and 12. These activities are being funded and conducted under the IRP. Ohio EPA is the supporting state regulatory agency.

CJAG is located in northeastern Ohio within Portage and Trumbull counties, approximately 3 miles east-northeast of the city of Ravenna and approximately 1 mile northwest of the city of Newton Falls. 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.

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

Load Lines 1-3 are located in the southeastern portion of the facility and Load Lines 4 and 12 are located in the south central portion. All buildings and structures at Load Lines 1-4 and 12 have been demolished.

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

In June 2004, the DFFO (Ohio EPA 2004) was issued to the Army. The objective of the DFFO was for the Army and Ohio EPA to "contribute to the protection of public health, safety, and welfare and the environment from the disposal, discharge, or release of contaminants at or from the site, through implementation of a CERCLA-based environmental remediation program. This program will include the development by respondent of an RI/FS for each AOC or appropriate group of AOCs at the site,

and upon completion and publication of a Proposed Plan and ROD or other appropriate document for each AOC or appropriate group of AOCs, the design, construction, operation, and maintenance of the selected remedy as set forth in the ROD or other appropriate document for each AOC or appropriate group of AOCs."

The following subsections present the site histories of Load Lines 1-4 and 12 and a summary of the remedial activities performed in accordance with the original RODs. The following subsections present the current LUCs, if any, as documented on the PMP (USACE 2018).

No CERCLA enforcement actions related to Load Lines 1-4 and 12 have been conducted.

B.1 Load Line 1

B.1.1 Site History

From 1941 through 1945, Load Line 1 was used to melt and load 2,4,6-trinitrotoluene (TNT) and Composition B into large-caliber shells and bombs. From 1947 to 1949, demilitarization projects occurred at Load Line 1. In 1949, the TNT washout plant and debanding equipment were moved from Load Line 1 to Load Line 12. From 1950 to 1952, Load Line 1 reclaimed cartridge bases for reuse. Sulfuric acid, sodium orthosilicate, chromic acid, and alkali were used in the annealing process. From 1961 to 1967, Load Line 1 was the site of munitions rehabilitation activities and the demilitarization of 90mm projectiles; activities included dismantling, replacing components, and repainting mines. In 1965 and 1966, Load Line 1 was used for demilitarizing propellant charges and cartridges. In 1973 and 1974, demilitarization operations on 90mm cartridges occurred at the load line. Load Line 1 was rehabilitated in 1951 to remove and replace soil contaminated with accumulated explosives and to remove and replace wastewater lines. All buildings and structures at Load Line 1 have been demolished.

B.1.2 CERCLA Remedial Actions

In 2007, in accordance with the Load Lines 1-4 Interim ROD (Shaw 2007), a total of 539 tons of PCB-contaminated soil and 3,126 tons of non-hazardous soil were removed from Load Line 1. A total of 51 discrete areas were excavated within Load Line 1. The remedial action is summarized in the *Remedial Action Completion Report for the Remediation of Soils and Dry Sediments at RVAAP 08-11 (Load Lines 1-4)* (Shaw 2008) (herein referred to as the Load Lines 1-4 Remedial Action Completion Report).

In May 2009, building slabs at Load Line 1 were removed. Subsequent to the slab removal, a sampling program was implemented to determine if chemical concentrations in sub-slab soil presented a concern for human health. The sampling program identified two areas requiring remediation at Buildings CB-4WN and CB-4AWS. Excavation of the contaminated soil was conducted from September 20 through 23, 2010 and resulted in the removal of approximately 359 yd^3 of contaminated soil to a maximum depth of 5 ft bgs. The remedial action is summarized in the *Remediation Completion Report Sub-Slab Soils at RVAAP-08 Load Line 1* (URS 2011).

B.1.3 Current Land Use Controls

The Load Lines 1-4 Interim ROD did not specify the requirement for formal LUCs at Load Line 1. However, OHARNG ensures land use is limited to Mounted Training – No Digging (tracked and wheeled vehicle use, no digging beyond 4 ft bgs, exposure of 24 hours/day for 39 days/year for 25 years). Annual inspections are performed to confirm the land use remains appropriate.

B.2 Load Line 2

B.2.1 Site History

From 1941 through 1945, Load Line 2 was used to melt and load TNT and Composition B into large-caliber shells and bombs. Demilitarization projects also occurred at Load Line 2 from 1947 through 1949 when a washout plant was installed. From 1950 to 1952, Load Line 2 reclaimed cartridge bases using an annealing process for reuse. During the entirety of its operational history, Load Line 2 produced about 10 million munitions, and approximately 4 million lb of TNT were salvaged during demilitarization activities. In 1951, Load Line 2 was rehabilitated, including the removal of explosive accumulations. All buildings and structures at Load Line 2 have been demolished.

B.2.2 CERCLA Remedial Actions

In 2007, in accordance with the Load Lines 1-4 Interim ROD (Shaw 2007), a total of 320 tons of PCB-contaminated soil and 2,617 tons of non-hazardous soil were removed from a total of 24 discrete areas within Load Line 2. The remedial action is summarized in the *Load Lines 1-4 Remedial Action Completion Report* (Shaw 2008).

In 2008, building slabs at Load Line 2 were removed. Subsequent to the slab removal, a sampling program was implemented to determine if chemical concentrations in sub-slab soil presented a concern for human health. The sampling program identified two areas requiring remediation at Buildings DB-4 and DB-10. Excavation of the contaminated soil was conducted from June 21 to June 24, 2010 and resulted in the removal of approximately 885 yd^3 of contaminated soil to a maximum depth of 4 ft bgs. The remedial action is summarized in the *Remediation Completion Report Sub-Slab Soils at RVAAP-09 Load Line 2, RVAAP-10 Load Line 3, and RVAAP-11 Load Line 4* (URS 2010).

B.2.3 Current Land Use Controls

The Load Lines 1-4 Interim ROD did not specify the requirement for formal LUCs at Load Line 2. However, OHARNG ensures land use is limited to Mounted Training – No Digging (tracked and wheeled vehicle use, no digging beyond 4 ft bgs, exposure of 24 hours/day for 39 days/year for 25 years). Annual inspections are performed to confirm the land use remains appropriate.

B.3 Load Line 3

B.3.1 Site History

Load Line 3 was primarily used to melt bulk explosives and load Composition B into large-caliber shells and bombs. During its operational history from 1941 to 1945, Load Line 3 produced approximately 6.5 million munitions. Demilitarization activities were conducted between 1951 and 1957, during which time approximately 228,000 munitions were processed at the load line. During the operation of Load Line 3, bulk TNT and octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) were offloaded at Buildings EA-6 and EA-6A for screening and preparation before being transported to melt pour Buildings EA-4 and EA-4A for processing and loading into shells. Bulk explosive carrier washout activities were conducted at Building EB-25. All buildings and structures at Load Line 3 have been demolished.

B.3.2 CERCLA Remedial Actions

In 2007, in accordance with the Load Lines 1-4 Interim ROD, a total of 893 tons of PCB-contaminated soil and 2,538 tons of non-hazardous soil were removed from a total of 35 discrete areas within Load Line 3. The remedial action is summarized in the Load Lines 1-4 Remedial Action Completion Report (Shaw 2008).

In 2008, building slabs at Load Line 3 were removed. Subsequent to the slab removal, a sampling program was implemented to determine if chemical concentrations in sub-slab soil presented a concern for human health. The sampling program identified two areas requiring remediation at Buildings EB-4, EA-6, and EA-6A. Excavation of the contaminated soil was conducted from June 4 to June 17, 2010 and resulted in the removal of approximately 1,602 yd^3 of contaminated soil to a maximum depth of 5 ft bgs. The remedial action is summarized in the *Remediation Completion Report Sub-Slab Soils at RVAAP-09 Load Line 2, RVAAP-10 Load Line 3, and RVAAP-11 Load Line 4* (URS 2010).

B.3.3 Current Land Use Controls

The Load Lines 1-4 Interim ROD did not specify the requirement for formal LUCs at Load Line 3. However, OHARNG ensures land use is limited to Mounted Training – No Digging (tracked and wheeled vehicle use, no digging beyond 4 ft bgs, exposure of 24 hours/day for 39 days/year for 25 years). Annual inspections are performed to confirm the land use remains appropriate.

B.4 Load Line 4

B.4.1 Site History

Load Line 4 operated from 1941 to 1945 to produce 91,970 projectiles and bombs and again from 1951 to 1957 to produce 1,269,262 mines. Load Line 4 was used to melt and load TNT into large-caliber shells, bombs, and antitank mines. During its operational history, Load Line 4 produced about 1.2 million munitions. All buildings and structures at Load Line 4 have been demolished.

B.4.2 CERCLA Remedial Actions

In 2007, in accordance with the Load Lines 1-4 Interim ROD, a total of 1,208 tons of non-hazardous soil were removed from nine discrete areas in Load Line 4. The remedial action is summarized in the Load Lines 1-4 Remedial Action Completion Report (Shaw 2008).

In 2008, building slabs at Load Line 4 were removed. Subsequent to the slab removal, a sampling program was implemented to determine if chemical concentrations in sub-slab soil presented a concern for human health. The sampling program concluded that no remedial activities were required for the soil beneath the slabs at Load Line 4. However, five stockpiles of soil and broken concrete were located within Buildings G-1 and G-3 totaling approximately 501 tons. This material was removed from the site in July 2008. The removal of these stockpiles is summarized in the *Remediation Completion Report Sub-Slab Soils at RVAAP-09 Load Line 2, RVAAP-10 Load Line 3, and RVAAP-11 Load Line 4* (URS 2010).

B.4.3 Current Land Use Controls

The Load Lines 1-4 Interim ROD did not specify the requirement for formal LUCs at Load Line 4. However, OHARNG ensures land use is limited to Mounted Training – No Digging (tracked and wheeled vehicle use, no digging beyond 4 ft bgs, exposure of 24 hours/day for 39 days/year for 25 years). Annual inspections are performed to confirm the land use remains appropriate.

B.5 Load Line 12

B.5.1 Site History

Load line 12 is a 76-acre former ammonium nitrate manufacturing facility that was operational from 1941 to 1946. From 1941 to 1943, explosive-grade ammonium nitrate was manufactured. Munitions renovation and demilitarization operations were performed after 1943. Load Line 12 was leased by the Silas Mason Company from 1946 to 1950 to manufacture fertilizer-grade ammonium nitrate. To improve the quality of TNT recovered from demilitarization operations, washout operations were converted to a steam melt-out process in the late 1950s. A pinkwater treatment plant located near Building 904 was operational from 1981 to 2000. From 1965 to 1967, Hercules Alcor, Inc. leased Building FF-19 to produce aluminum chloride. From 1969 to 1971, Load Line 12 produced M54 primers in support of the Southeast Asian conflict. Demolition of buildings occurred between 1973 and 2000. In 1999, approximately 1,500 ft^3 of soil were removed as part of an explosives composting pilot study.

B.5.2 CERCLA Remedial Actions

In 2010, in accordance with the *Record of Decision for Soil and Dry Sediment for the RVAAP-12 Load Line 12* (SAIC 2009), 1,181 tons of contaminated sediment were removed from the Main Ditch. This remedial action was documented in the *Remedial Acton Report for the RVAAP-12 Load Line 12* (SAIC 2010).

B.5.3 Current Land Use Controls

B.5.3.1 Soil and Dry Sediment

Land use is limited to use of Load Line 12 for National Guard mounted training operations due to residual contamination in soil. Activities at Load Line 12 are limited to the following: tracked and wheeled vehicle operations and associated training activities along with training area development and maintenance, maintaining the integrity of monitoring wells, road and culvert repair, routine ditch maintenance, vegetation management [mowing, brush and weed cutting, controlled burning, and herbicide application]; and compatible natural resources management activities (including but not limited to such activities as flora and fauna surveys, timber management to include timber stand improvement and forest products harvesting, soil stabilization and erosion control, invasive/non-native species control, nuisance wildlife control, drainage maintenance, wetland delineations, grassland management, and scientific research).

Duration of exposure is based upon the established National Guard Trainee exposure scenario cited per person at 39 days per year at 24 hour per day for a maximum of 25 years (USACE 2005). All activities must be in compliance with established digging restrictions and established exposure limits. All other uses of Load Line 12 are prohibited, and the Army will cause appropriate notice to be posted.

All digging or excavation on Load Line 12 to depths more than 4 ft bgs is prohibited with the following exceptions: ground surface repairs, as required, resulting from maneuver damage; and routine maintenance of the roads, ditches, and culverts.

In addition, land use of Load Line 12 is limited by the maintenance of the existing CJAG perimeter fence, which is a 6-foot, chain-link fence topped with a v-shaped bracket slanting inward and outward with a three-strand barbed wire bracket.

B.5.3.2 Wet Sediment and Surface Water

No LUCs are required due to the wet sediment and surface water media at Load Line 12. The selection of the no further action remedy for wet sediment and surface water at Load Line 12 is documented in the *Record of Decision for Wet Sediment and Surface Water at RVAAP-12 Load Line 12* (Leidos 2019).

C COMMUNITY PARTICIPATION

Using the RVAAP community relations program, the Army and Ohio EPA have interacted with the public through public notices, public meetings, reading materials, direct mailings, an internet website, and receiving and responding to public comments.

Specific items in the community relations program include the following:

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

In accordance with CERCLA Section 117(a) and the NCP Section 300.430(f)(2), the Army released the *Proposed Plan for Soil, Sediment, and Surface Water at RVAAP Load Lines 1, 2, 3, 4, and 12* (Leidos 2018) (herein referred to as the Load Lines 1-4 and 12 Proposed Plan) to the public on June 10, 2019. The Proposed Plan and other project-related documents were made available to the public in the Administrative Record maintained at CJAG and in the Information Repositories at Reed Memorial Library in Ravenna, Ohio, and Newton Falls Public Library in Newton Falls, Ohio. A notice of availability for the Load Lines 1-4 and 12 Proposed Plan was sent to radio stations, television stations, and newspapers (e.g., *Warren Tribune-Chronicle* and *Ravenna Record Courier*), as specified in the Community Relations Plan. The notice of availability initiated the 30-day public comment period beginning June 10, 2019 and ending July 10, 2019.

The Army held a public meeting on June 20, 2019, at the Shearer Community Center, 9355 Newton Falls Road, Ravenna, Ohio 44266 to present the Load Lines 1-4 and 12 Proposed Plan. 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 comments received at this meeting and during the public notification period are included in the Responsiveness Summary, which is Part III of this ROD Amendment.

The Army considered public input from the public meeting on the Proposed Plan 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. Removal of approximately 1,752 tons of hazardous and 9,484 tons of non-hazardous contaminated soil occurred at Load Lines 1-4 from August to November 2007 as a remedy to achieve National Guard Mounted Training – No Digging land use. The buildings also were removed in 2007; however, removal of the floor slabs and associated foundation walls was not completed until 2009. A sampling program was implemented after the floor slab removal. Based on the sampling results, approximately 2,804 yd^3 of sub-slab soil were removed at Load Lines 1-3 in 2010 (URS 2010 and 2011).

At Load Line 12, building demolition and slab removal occurred from 1998 to 2000. Removal of 1,181 tons of contaminated sediment from the Main Ditch was completed in 2010 to attain National Guard Mounted Training – Digging to 4 ft bgs land use.

This ROD Amendment addresses soil, sediment, and surface water at Load Lines 1-4 and soil at Load Line 12. The wet sediment and surface water media at Load Line 12 require no further action, as documented in the *Record of Decision for Wet Sediment and Surface Water at RVAAP-12 Load Line 12* (Leidos 2019).

The potential future land use for Load Lines 1-4 and 12 is Commercial/Industrial Land Use, represented by the Industrial Receptor, which is consistent with the intended future land use for CJAG. No COCs required remediation for sediment or surface water to attain Commercial/Industrial Land Use. COCs requiring remediation were identified in soil at all five AOCs. The soil contamination present at Load Lines 1-4 and 12 pose a potential risk to human health because the COC concentrations exceeded RGOs for the Commercial/Industrial Land Use.

The selected remedy described in the ROD Amendment is consistent with, and protective for, the intended future use (Commercial/Industrial Land Use) at the AOCs. Implementing the remedy described in this ROD Amendment will address potential risk through thermal treatment and removal and off-site disposal of contaminated soil. LUCs will be implemented to prevent exposure to contaminants in soil in areas where unacceptable risk will remain on site for the Resident Receptor.

A qualitative assessment of the sample results and considerations of the limitations and assumptions of the models were performed to identify if any CMCOCs are present in soil and sediment at these AOCs that may impact the groundwater beneath their respective source or at the downstream receptor locations. This qualitative assessment concluded that for Load Line 1, hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) contamination in surface and subsurface soil could potentially impact the groundwater beneath the site; however, implementation of the selected remedy will address RDX contamination in soil. Groundwater will be evaluated as an individual AOC for the entire facility (designated as RVAAP-66) under the Facility-wide Groundwater Monitoring Program (FWGWMP).

E SITE CHARACTERISTICS

This section presents site characteristics, nature and extent of contamination, and the conceptual site model for Load Lines 1-4 and 12. These characteristics and findings are based on investigations conducted from 1978 to 2016 and are further summarized in the FS Addendum (Leidos 2017).

E.1 Physical Characteristics

This section describes the topography/physiology, geology, hydrogeology, and ecological characteristics of CJAG and Load Lines 1-4 and 12 that were key factors in identifying the potential contaminant transport pathways, receptor populations, and exposure scenarios to evaluate human health and ecological risks.

Load Line 1 – Load Line 1 is located in the southeastern portion of the facility (Figure 3). The load line is characterized by moderately subdued topography, and ground surface elevations range from approximately 1,016 to 975 ft above mean sea level (amsl). Effluent and runoff from the main production area exited through ditches and storm sewers to discharge points along the perimeter of the load line. Wash-down water and wastewater from the load line operations were discharged to the unlined settling ponds: Charlie's Pond and Criggy's Pond. Water from the settling ponds was discharged to a surface stream (Sand Creek) that exited the installation. Depths to groundwater range from 19 to 35 ft bgs, with the exception of one well in the southwestern portion of the AOC (approximately 10 ft bgs) (EQM 2010). The range of hydraulic gradient at the AOC is 2.35×10^{-5} to 7.3×10^{-4} cm/s.

Load Line 2 – Load Line 2 is located in the southeastern portion of the facility (Figure 4). The AOC is characterized by moderately subdued topography and ground surface elevations range from approximately 990 to 1,010 ft amsl. However, topography decreases sharply to the south of the AOC, in the direction of Kelly's Pond. The primary surface water conveyance at Load Line 2 drains to the south and ultimately discharges into Kelly's Pond; water from the pond is discharged to Sand Creek. Surface water flows through a series of manmade ditches, and the majority of surface water runoff is to the south. Flow in the ditches is intermittent and driven primarily by storm events. Soil at the AOC exhibits seasonal wetness, rapid runoff, and low permeability. Groundwater depths range from approximately 5 to 14.7 ft bgs (EQM 2010). Hydraulic conductivities ranged from 1.04×10^{-2} to 7.43 ft/day.

Load Line 3 – Load Line 3 is located in the southeastern portion of the facility (Figure 5). The load line is characterized by sloping topography on a reworked sandstone bedrock surface. Elevations vary from approximately 980 to 1,020 ft amsl. Ditches comprise the primary surface water conveyance at Load Line 3, which, ultimately, drain into Cobbs Pond. Runoff is typically medium to rapid, and the soil is seasonally wet. Groundwater depths range from approximately 8 to 27 ft bgs (EQM 2010). Hydraulic conductivity ranged from 1.86×10^{-3} to $8.36 \times 10^{+1}$ ft/day.

Load Line 4 – Load Line 4 is located in the south central portion of the facility (Figure 6). The topography is subdued on a glacial till surface. Elevations vary from approximately 980 to 1,000 ft amsl. A perennial stream crosses the AOC from northwest to southeast and flows into the large settling pond, which discharges to a surface stream that exits the facility at a point south of the load line. Runoff is typically medium to rapid, and the soil is seasonally wet. Groundwater depths range from approximately 3.4 to 15.8 ft bgs (EQM 2010). Hydraulic conductivities range from 1.15×10^{-1} to 8.23 ft/day.

Load Line 12 – Load Line 12 is located in the south central portion of the facility (Figure 7). The topography is moderately subdued on a reworked sandstone bedrock surface. Elevations vary from approximately 970 to 987 ft amsl. The primary north-south drainage feature (Main Ditch) flows north until its intersection with the Active Area Channel, the primary surface water conveyance. Runoff is typically medium to rapid, and the soil is seasonally wet. Depth to groundwater ranges from approximately 1.5 to 10 ft bgs. The average hydraulic conductivity is 5.64E-05 cm/s for the monitoring wells at Load Line 12.

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 1978 Installation Assessment identified the major contaminants of the former RVAAP to be TNT, composition B (a combination of TNT and RDX), sulfates, nitrates, lead styphnate, and lead azide (USATHAMA 1978). Additional potential contaminants at Load Lines 1-4 and 12 include explosives and inorganic chemicals (e.g., metals) along with other contaminants related to ancillary activities, including volatile organic compounds (VOCs), PCBs from on-site transformers, and PAHs.

Since 1978, Load Lines 1-4 and 12 have been the subject of multiple investigations and/or assessments leading to CERCLA decisions and remedial actions at the AOCs. The Preliminary Assessment conducted in 1996 concluded that all five AOCs were high-priority AOCs requiring future environmental investigations (USACE 1996). Subsequently, Phase I RIs were conducted for each AOC, and recommendations included additional investigations in a Phase II RI. Based on the results of the HHRA and ecological risk assessment (ERA) in the Phase II RIs, each site was recommended for further evaluation in an FS.

The *Focused Feasibility Study for the Remediation of Soils at Load Lines 1-4* (Shaw 2005) was developed for Load Lines 1-4 and recommended excavation with off-site disposal as a remedy to address COCs in soil that exceeded human health Facility-wide Cleanup Goals (FWCUGs) established for the National Guard Trainee. Removal of approximately 1,752 tons of hazardous and 9,484 tons of non-hazardous contaminated soil occurred at Load Lines 1-4 from August to November 2007, which allowed for use of the AOCs by the National Guard Trainee for Mounted Training – No Digging. The buildings also were removed in 2007; however, removal of the floor slabs and associated foundation walls was not completed until 2009.

At Load Line 12, building demolition and slab removal occurred from 1998 to 2000. The *Feasibility Study for Load Line 12 (RVAAP-12)* (SAIC 2010) recommended excavation with off-site disposal as a remedy to address COCs in dry sediment within the Main Ditch that exceeded FWCUGs established for the National Guard Trainee.

Removal of 1,181 tons of contaminated sediment from the Main Ditch was completed in 2010 (SAIC 2010), which allowed for use of the AOC by the National Guard Trainee for Mounted Training – Digging to 4 ft bgs.

After the removal actions were completed, the Army conducted multiple sampling events to assess if additional remedial actions are necessary to achieve potential future Commercial/Industrial Land Use or Unrestricted (Residential) Land Use. In 2009 and 2010, the U.S. Army Corps of Engineers (USACE) collected surface and subsurface soil incremental sampling methodology (ISM) samples at Load Lines 1-4 to characterize deeper subsurface soil beneath the former building slabs that was not

previously investigated via subsurface soil ISM techniques. Based on the sampling results, sub slab soil was removed at Load Lines 1-3 in 2010, in addition to previously stockpiled soil at Load Line 4 (URS 2010 and 2011).

In 2011 and 2012, additional characterization sampling was completed at Load Lines 1-4 and 12 to guide future remedial and administrative measures. Surface and subsurface ISM samples were collected at Load Lines 1-4; only surface ISM samples were collected at Load Line 12 (Prudent 2011).

In 2016, additional surface water and sediment sampling was conducted to address data gaps at Load Lines 1-3. Sediment sampling was conducted at Load Line 1; surface water and sediment sampling was conducted at Load Lines 2 and 3.

The FS Addendum summarized all data collected since remedial activities occurred, provided updated risk assessments, and evaluated the Resident Receptor (Adult and Child) and the Industrial Receptor (U.S Environmental protection Agency [USEPA] Composite Worker) to be protective of full-time occupational exposures, including Military Training Land Use (Leidos 2017).

E.3 Investigation Results

The chemicals of interest (COIs) for exposure of the Resident Receptor (Adult and Child) to soil, sediment, and surface water at Load Lines 1-4 and soil at Load Line 12 are described in the following paragraphs. The Phase II RIs completed for each of the five AOCs presented the results of human health screening evaluations that identified COCs exceeding residential screening criteria. These COCs were compiled for each medium under investigation in the FS Addendum (Leidos 2017) and identified as COIs. Following screening, constituents exceeding criteria were developed in the FS as COIs for data gap analysis and determination of further action.

Load Line 1 – Load Line 1 COIs were developed from the chemicals identified as exceeding residential risk in the *Phase II RI Report for the Load Line 1* (SAIC 2003) and *Supplemental Baseline Human Health Risk Assessment for Load Line 1 Alternative Receptors* (Shaw 2004a). Load Line 1 COIs for exposure of Resident Receptors (Adult and Child) to soil, sediment, and surface water include four metals, four explosives, one PCB, one pesticide, and five PAHs.

Load Line 2 – Load Line 2 COIs were developed from the chemicals identified as exceeding residential risk targets in the *Phase II Remedial Investigation Report for Load Line 2* (Shaw 2004b). Load Line 2 COIs for exposure of Resident Receptors (Adult and Child) to soil, sediment, and surface water include nine metals, three explosives, two PCBs, one pesticide, and five PAHs.

Load Line 3 – Load Line 3 COIs were developed from the chemicals identified as exceeding residential risk in the *Phase II Remedial Investigation Report for Load Line 3* (Shaw 2004c). Load Line 3 COIs for exposure of Resident Receptors (Adult and Child) to soil, sediment, and surface water include eight metals, four explosives, two PCBs, four pesticides, and five PAHs (PAHs evaluated for soil only).

Load Line 4 – Load Line 4 COIs were developed from the chemicals identified as exceeding residential risk targets in the *Phase II Remedial Investigation Report for Load Line 4* (Shaw 2004d). Load Line 4 COIs for exposure of Resident Receptors (Adult and Child) to soil, sediment, and surface water include five metals, two PCBs, and five PAHs.

Load Line 12 – Load Line 12 COIs were developed from the chemicals identified as exceeding residential risk targets in the *Phase II Remedial Investigation Report for Load Line 12* (SAIC 2004). Load Line 12 COIs for exposure of Resident Receptors (Adult and Child) to soil include one metal, three explosives, one PCB, one pesticide, and five PAHs. As noted previously, the wet sediment and surface water media at Load Line 12 require no further action, as documented in the *Record of Decision for Wet Sediment and Surface Water at RVAAP-12 Load Line 12* (Leidos 2019).

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 Lines 1-4 and 12. All buildings and structures have been demolished. Remnant contamination in soil and sediment is considered a secondary source of contamination. However, much of the contamination in these secondary sources has been previously remediated, as summarized in Part II, Section B.

The potential mechanisms for contaminant releases from secondary sources at Load Lines 1-4 and 12 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 a fate and transport evaluation. The details of the fate and transport analysis identifying constituents that may leach from soil (defined as soil leaching COIs) and impact groundwater beneath the source and at a nearest downgradient receptor location are presented in the FS Addendum (Leidos 2017).

Maximum site-related contaminant 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 USEPA maximum contaminant levels, USEPA tap water Regional Screening Levels (RSLs), 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 site-related contaminant 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 CMCOCs.

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

- **Load Line 1**
  - Among the soil leaching COIs, only RDX was predicted to exceed the screening criteria in groundwater beneath the source area; however, it was not predicted to be above criteria at the downgradient receptor location.
  - Among the sediment CMCOPCs, none were predicted by analytical solutions to exceed screening criteria in groundwater beneath the source.
- **Load Line 2**
  - The soil leaching COIs, 2,4-dinitrotoluene (DNT) and RDX, were predicted to exceed the screening criteria in groundwater beneath the source; however, only RDX was predicted to be above criteria at the downgradient receptor location.
  - Among the sediment CMCOPCs, only antimony was predicted by analytical solutions to exceed screening criteria in groundwater beneath the source; however, it was not predicted to be above criteria at the downgradient receptor location.
- **Load Line 3**
  - Among the soil leaching COIs, 2,6-DNT and RDX were predicted to exceed the screening criteria in groundwater beneath the source; however, none of these COIs were predicted to be above criteria at the downgradient receptor location.
  - Among the sediment CMCOPCs, only cobalt was predicted by analytical solutions to exceed screening criteria in groundwater beneath the source; however, it was not predicted to be above criteria in the downgradient receptor location.
- **Load Line 4**
  - The soil leaching COI, RDX, was predicted to exceed the screening criteria in groundwater beneath the source as well as at the downgradient receptor location.
  - Among the sediment CMCOPCs, only hexavalent chromium was predicted by analytical solutions to exceed screening criteria in groundwater beneath the source; however, it was not predicted to be above criteria at the downgradient receptor location.
- **Load Line 12**
  - The soil leaching COIs (1,3-dinitrobenzene; 2,4-DNT; 2,6-DNT; 3-nitrotoluene; nitrobenzene, and RDX) were predicted to exceed the screening criteria in groundwater

beneath the source; however, none of these COIs were predicted to be above criteria in the downgradient receptor location.

The qualitative assessment concluded that other than RDX from Load Line 1, no other constituents were present in soil and sediment that may impact the groundwater beneath their respective sources or at the downstream receptor locations. A remedial action is required for the surface and subsurface soil at Load Line 1 for protection of groundwater beneath this AOC. Groundwater will be further evaluated under the FWGWMP.

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. If a site meets the standards for Unrestricted (Residential) Land Use, it can be used for all categories of land use at CJAG. The receptor is assumed to be exposed to surface soil from 0–1 ft bgs and subsurface soil from 1–13 ft bgs.

Perennial surface water in streams and/or ponds and wetlands are important ecological resources at the load lines. 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 AND RESOURCE USES

Load Lines 1-4 and 12 are currently managed by ARNG/OHARNG. All five AOCs have been remediated in accordance with previous RODs. The current use of Load Lines 1-4 is limited to National Guard Mounted Training – No Digging, and the current use of Load Line 12 is limited to National Guard Mounted Training – Digging to 4 ft bgs.

The potential future use for Load Lines 1-4 and 12 is Commercial/Industrial Land Use. The Resident Receptor was evaluated in the HHRA to assess an Unrestricted (Residential) Land Use scenario. This ROD Amendment discusses future land use as it pertains to soil, sediment, and surface water at Load Lines 1-4 and soil (inclusive of dry sediment) at Load Line 12 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; presented COCs and chemicals of potential ecological concern (COPECs), if any; and provided a basis for remedial decisions. This section of the ROD Amendment summarizes the results of the HHRA and ERA, which are presented in detail in the FS Addendum (Leidos 2017) and Load Lines 1-4 and 12 Proposed Plan (Leidos 2018) located in the Administrative Record and Information Repositories.

G.1 Human Health Risk Assessment

The HHRA identifies COCs that may pose potential health risks to humans resulting from exposure to residual contamination in surface soil (0-1 ft bgs), subsurface soil (1-13 ft bgs), sediment, and surface water at Load Lines 1-4 and surface soil (0-1 ft bgs) and subsurface soil (1-13 ft bgs) at Load Line 12. The methodology of comparing COI exposure concentrations to RGOs and determining COCs generally follows guidance presented in the *Position Paper for the Application and Use of Facility-wide Human Health Cleanup Goals at the Ravenna Army Ammunition Plant* (USACE 2012) and Technical Memorandum (ARNG 2014) and includes calculating a sum-of-ratios (SOR) for all non-carcinogenic and carcinogenic COIs. The reported concentration in each discrete or ISM sample was compared to RGOs (i.e., the exposure point concentration [EPC] is the concentration in each individual sample). COIs are identified as COCs for a given receptor if:

- The EPC exceeds the most stringent RGO for either the 1E-05 target cancer risk or the 1 target hazard quotient (HQ); or
- The SOR for all carcinogens or non-carcinogens that may affect the same organ is greater than 1; chemicals contributing at least 5% to an SOR greater than 1 are also considered COCs.

Metals present at concentrations consistent with naturally occurring background concentrations are not identified as COCs.

The HHRA identified COCs and conducted risk management analysis to determine if COCs pose unacceptable risk to the Industrial Receptor and Resident Receptor. If there is no unacceptable risk to the Industrial Receptor or Resident Receptor, it can be concluded that no further action is required from a human health perspective. The results of the HHRA by Load Line are provided below:

- **Load Line 1**
  - Unrestricted (Residential) Land Use – The soil COCs recommended for remediation include metals (lead and antimony), explosives (TNT and RDX), PCB-1254, and PAHs. No COCs were identified in sediment or surface water.
  - Commercial/Industrial Land Use – The soil COCs recommended for potential remediation include metals (lead and antimony), explosives (TNT and RDX), and PCB-1254. No COCs were identified in sediment or surface water.

- **Load Line 2**
  - Unrestricted (Residential) Land Use – The soil COCs recommended for remediation include metals (lead and antimony), explosives (TNT and 2,4-DNT), PCBs (PCB-1254 and PCB-1260), and PAHs. In Kelly's Pond sediment, PAHs were identified as COCs. No COCs were identified in surface water.
  - Commercial/Industrial Land Use – Only TNT was identified as a COC to be carried forward for potential remediation in soil. No COCs were recommended for remediation in sediment or surface water.
- **Load Line 3**
  - Unrestricted (Residential) Land Use – The soil COCs recommended for remediation include lead; TNT, PCB-1254, PCB-1260, and PAHs. No COCs were identified in sediment or surface water.
  - Commercial/Industrial Land Use – The soil COCs recommended for remediation include TNT, PCB-1254, and PAHs. No COCs were identified in sediment or surface water.
- **Load Line 4**
  - Unrestricted (Residential) Land Use – The soil COCs recommended for remediation include lead, PCBs, and PAHs. No COCs were identified in sediment or surface water.
  - Commercial/Industrial Land Use – The soil COCs recommended for remediation include lead, PCB-1260, and PAHs. No COCs were identified in sediment or surface water.
- **Load Line 12**
  - Unrestricted (Residential) Land Use – The soil COCs recommended for remediation include explosives (2,6-DNT; TNT; and RDX), PCB-1260, and PAHs.
  - Commercial/Industrial Land Use – The soil COCs recommended for remediation include explosives (2,6-DNT and TNT), PAHs, and PCB-1260.

G.2 Ecological Risk Assessment

The ecological risk assessments associated with the initial site evaluations and presented in the original RODs concluded that no remedial action was required at the sites. However, remediation to meet human health cleanup goals will reduce overall contaminant concentrations and ecological risk.

To reassess the potential ecological risk at Load Lines 1-4, the FS Addendum included an ERA for surface water and sediment in accordance with the Level I Scoping ERA and Level II Screening ERA outlined in the *Guidance for Conducting Ecological Risk Assessments* (Ohio EPA 2008) with specific application of components from other ecological risk guidance such as *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (USEPA 1997).

A Level I ERA was conducted for Load Lines 1-4 to determine the presence/absence of important ecological places and resources and the presence of contamination. Perennial surface water in streams and/or ponds and wetlands are important ecological resources at these four load lines, and chemical contamination is present based on the historical ERAs. Because there is contamination and important/significant ecological resources at each of the load lines, the ERAs continued to a Level II Screening ERA.

The Level II Screening ERA identified procedures to determine integrated COIs for each load line and defined habitats/environmental setting, suspected contaminants, and possible exposure pathways. Technical and refinement factors were then used to refine the integrated COIs from the Level II Screening ERA. The factors included use of mean exposure concentrations, discussion of approved ecological screening values (ESVs), and other topics. This type of assessment is Step 3A in the ERA process (USEPA 1997). Step 3A refined the list of integrated COIs to determine if: (1) there are chemicals of ecological concern (COECs) requiring further evaluation in Level III or remediation to protect ecological receptors, or (2) integrated COIs can be eliminated from further consideration. This evaluation is an important part of Level II and is adapted from USEPA Step 3A, outlined in the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (USEPA 1997) and *Risk Assessment Handbook Volume II: Environmental Evaluation* (USACE 2010).

For Load Lines 1-4, the evaluation in Step 3A showed that no further evaluation is necessary for integrated COIs and no ecological concern requires remediation. Consequently, the ERAs for Load Lines 1-4 concluded with Level II that no further action is necessary to be protective of important ecological resources.

An updated ERA was not conducted for Load Line 12 in the FS Addendum. Based on conclusions documented in the Load Line 12 ROD (SAIC 2009), additional ecological risk evaluation in soil was not required at Load Line 12. The ERA for wet sediment and surface water media at Load Line 12 requires no further action, as documented in the *Record of Decision for Wet Sediment and Surface Water at RVAAP-12 Load Line 12* (Leidos 2019).

H REMEDIAL ACTION OBJECTIVES

The remedial action objective (RAO) for Load Lines 1-4 and 12 is to reduce risk from COCs in surface and subsurface soil to acceptable levels (RGOs) for likely future land use (i.e., Commercial/Industrial Land Use) that are protective of human health at Load Lines 1-4 and 12.

Table 2 presents the COCs and RGOs. RGOs are cleanup goals that establish acceptable exposure levels to be protective of human health while considering potential land uses. The soil volume estimates summarized for Load Lines 1-4 and 12 to meet Commercial/Industrial Land Use are presented in Table 3. The soil and sediment volume estimates to meet Unrestricted (Residential) Land Use are presented in Table 4. Figures 8 through 12 present the proposed extent of soil requiring remediation for each load line under the recommended alternative.

The purpose of the FS was to evaluate a defined selection of alternatives that best achieves the RAO. In addition to the RAO RGOs, applicable or relevant and appropriate requirements (ARARs) were developed to be applied during the evaluation of FS alternatives.

Table 2. Remedial Goal Options

Media	Chemical of Concern	Cleanup Goals (mg/kg)	
		Industrial RGO	Residential RGO
Load Line 1			
Soil	Antimony	470	31
	Lead	800	400
	TNT	510	36
	RDX	280	61
	Benz(a)anthracene	29	1.6
	Benzo(a)pyrene	2.9	0.16
	Benzo(b)fluoranthene	29	1.6
	PCB-1254	9.7	1.2
Load Line 2			
Soil	Antimony	N/A	31
	Lead	N/A	400
	TNT	510	36
	2,4-DNT	N/A	17
	Benz(a)anthracene	N/A	1.6
	Benzo(a)pyrene	N/A	0.16
	Benzo(b)fluoranthene	N/A	1.6
	Dibenz(a,h)anthracene	N/A	0.16
	PCB-1254	N/A	1.2
Sediment*	Benz(a)anthracene	N/A	1.6
	Benzo(a)pyrene	N/A	0.16
	Benzo(b)fluoranthene	N/A	1.6
	Dibenz(a,h)anthracene	N/A	0.16
	Indeno(1,2,3-cd)pyrene	N/A	1.6
Load Line 3			
Soil	Lead	N/A	400
	TNT	510	36
	Benz(a)anthracene	29	1.6
	Benzo(a)pyrene	2.9	0.16
	Benzo(b)fluoranthene	29	1.6
	Dibenz(a,h)anthracene	2.9	0.16
	Indeno(1,2,3-cd)pyrene	N/A	1.6
	PCB-1254	9.7	1.2
	PCB-1260	N/A	2.4
Load Line 4			
Soil	Lead	800	400
	Benz(a)anthracene	29	1.6
	Benzo(a)pyrene	2.9	0.16
	Benzo(b)fluoranthene	29	1.6
	Dibenz(a,h)anthracene	2.9	0.16
	Indeno(1,2,3-cd)pyrene	N/A	1.6
	PCB-1254	N/A	1.2
	PCB-1260	9.9	2.4

1

1 **Table 2. Remedial Goal Options (continued)**

Media	Chemical of Concern	Cleanup Goals (mg/kg)	
		Industrial RGO	Residential RGO
Load Line 12			
Soil	TNT	510	36
	2,6-DNT	15	3.6
	RDX	N/A	61
	Benz(a)anthracene	29	1.6
	Benzo(a)pyrene	2.9	0.16
	Benzo(b)fluoranthene	29	1.6
	Dibenz(a,h)anthracene	2.9	0.16
	Indeno(1,2,3-cd)pyrene	N/A	1.6

*Residential RGOs are the same for soil and sediment, resulting in a very conservative evaluation of sediment.

DNT = Dinitrotoluene.
N/A = Not applicable. The chemical of concern does not require remediation for the receptor within the specified area of concern (AOC).
PCB = Polychlorinated Biphenyl.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
RGO = Remedial Goal Option.
TNT = Trinitrotoluene.

2
3

Table 3. Estimated Volume Requiring Remediation for Commercial/Industrial Land Use

Commercial/Industrial						
			In Situ		Ex Situ	
Remediation Area	Area (ft^2)	Impacted Interval (ft bgs)	Volume (yd^3)	Volume with Constructability[a] (yd^3)	Volume[b] (yd^3)	Weight (tons)
Load Line 1	11,815	varies (max depth = 5 ft bgs)	1,491	1,864	2,236	2,795
Load Line 2	400	0-2	30	37	46	56
Load Line 3	25,056	varies (max depth = 6 ft bgs)	1,649	2,062	2,474	3,093
Load Line 4	5,994	varies (max depth = 7 ft bgs)	474	592	710	888
Load Line 12	2,633	varies (max depth = 4.5 ft bgs)	248	310	372	465
Total	**45,898**		**3,892**	**4,865**	**5,839**	**7,297**

[a] Constructability factor accounts for over excavation, sloping of sidewalls, and addresses limitations of removal equipment. The in situ volume is increased by 25% for a constructability factor.
[b] Includes 20% swell factor.
In Situ = In place. The soil volume presented is without the soil being disturbed or removed from the ground surface.
Ex Situ = The soil volume presented is after the soil has been disturbed and removed from the ground surface.
bgs = Below Ground Surface.

4

Table 4. Estimated Volume Requiring Remediation for Unrestricted (Residential) Land Use

Unrestricted (Residential)						
			In Situ		Ex Situ	
Remediation Area	Area (ft^2)	Impacted Interval (ft bgs)	Volume (yd^3)	Volume with Constructability[a] (yd^3)	Volume[b] (yd^3)	Weight (tons)
Load Line 1	49,017	varies (max depth = 8 ft bgs)	4,584	5,730	6,876	8,595
Load Line 2 soil	31,616	varies (max depth = 6 ft bgs)	1,972	2,465	3,081	3,698
Load Line 2 sediment	53,027	0-1	1,966	2,457	3,071	3,686
Load Line 3	69,435	varies (max depth = 7 ft bgs)	8,865	11,082	13,298	16,622
Load Line 4	31,337	varies (max depth = 7 ft bgs)	2,940	3,674	4,409	5,512
Load Line 12	4,233	varies (max depth = 4.5 ft bgs)	475	593	712	890
Total	**238,665**		**20,802**	**26,001**	**31,448**	**39,003**

[a] Constructability factor accounts for over excavation, sloping of sidewalls, and addresses limitations of removal equipment. The in situ volume is increased by 25% for a constructability factor.
[b] Includes 20% swell factor.
In Situ = In place. The soil/sediment volume presented is without the soil being disturbed or removed from the ground surface.
Ex Situ = The soil/sediment volume presented is after the soil has been disturbed and removed from the ground surface.
bgs = Below Ground Surface.

I DESCRIPTION OF ALTERNATIVES

The FS Addendum (Leidos 2017) developed and evaluated remedial alternatives for Load Lines 1-4 and 12. The remedial alternatives are listed below:

- Alternative 1: No Action.
- Alternative 2: Commercial/Industrial Land Use – Excavation and Off-site Disposal of Soil and Administrative LUCs.
- Alternative 3: Commercial/Industrial Land Use – Ex Situ Thermal Treatment of Soil and Administrative LUCs.
- Alternative 4: Unrestricted (Residential) Land Use – Excavation and Off-site Disposal of Soil/Sediment.
- Alternative 5: Unrestricted (Residential) Land Use – Ex Situ Thermal Treatment of Soil/Sediment.

This section includes a description of various components of the remedial alternatives identified in the FS Addendum.

I.1 Alternative 1: No Action

Alternative 1 provides no remedial action and is required under the NCP as a baseline for comparison with other remedial alternatives. Alternative 1 provides no additional protection to human health and the environment. Any current legal and administrative LUC mechanisms at the AOC will be

discontinued. No future legal, administrative, or physical LUC mechanisms will be employed at the AOC. Environmental monitoring will not be performed, and five-year reviews will not be conducted in accordance with CERCLA 121(c). In addition, no restrictions on land use will be pursued.

I.2 Alternative 2: Commercial/Industrial Land Use – Excavation and Off-site Disposal of Soil and Administrative LUCs

This alternative will include the removal and off-site disposal of surface and subsurface soil containing COCs at concentrations above the Industrial RGOs to achieve Commercial/Industrial Land Use. Implementation of Alternative 2 will result in excavation and off-site disposal of approximately 5,838 yd^3 of soil from Load Lines 1-4 and 12. The volume of soil being removed from each excavation area and each load line is presented in Table 3. Under this alternative, unacceptable risk will remain on site for the Resident Receptor at each load line; therefore, this alternative also will rely on LUCs to prevent Resident Receptor exposure to contaminants in soil in those areas. The following subsections describe activities associated with this alternative.

I.2.1 Remedial Design

A remedial design (RD) will be developed prior to initiating remedial actions. This RD will outline the site preparation activities (e.g., staging and equipment storage areas, truck routes, storm water controls); extent of the excavation; sequence and description of excavation and site restoration activities; decontamination; and segregation, transportation, and disposal of various waste streams. Erosion and health and safety controls will be enforced during the active construction period to ensure remediation workers and the environment are protected.

I.2.2 Excavation and Off-site Disposal of Soil

Site preparation will include clearing any obstacles, surface structures, or vegetation that will interfere with excavation; identifying utilities; and setting up temporary decontamination facilities. In addition, sediment and erosion control measures, including a silt fence, will be installed to control runoff from the work area. Soil removal will be accomplished using conventional construction equipment, such as backhoes, bulldozers, front-end loaders, and scrapers. Oversized debris will be crushed or otherwise processed to meet disposal facility requirements.

Excavated soil will be hauled by truck to a licensed and permitted disposal facility. All trucks would be inspected prior to exiting the AOC. Appropriate waste manifests will accompany each waste shipment. Only regulated and licensed transporters and vehicles will be used. All trucks will travel pre-designated routes within CJAG.

Excavated soil will be disposed of at an existing off-site facility licensed and permitted to accept the characterized waste stream. The selection of an appropriate facility will consider the type of waste, location, transportation options, and cost.

I.2.3 Waste Characterization Sampling

Waste characterization analysis will be completed to characterize the excavated material. The excavated soil will be sampled and analyzed for toxicity characteristic leaching procedure (TCLP) metals, TCLP semi-volatile organic compounds (SVOCs), TCLP pesticides, TCLP herbicides, reactive cyanide, reactive sulfide, and PCBs to support waste profiling requirements for off-site disposal or as required by the receiving landfill. Based on available site data and for cost estimating purposes, the excavated soil is assumed to be non-hazardous and will be disposed of at a Resource Conservation and recovery Act (RCRA) Subtitle D permitted landfill.

I.2.4 Confirmation Sampling

Upon completing the excavations at each load line, confirmatory ISM samples will be collected from each floor and sidewall of the excavation areas to ensure contaminated soils has been successfully removed. ISM samples collected for confirmation will include 30 to 50 aliquots per sample and be collected in duplicate to achieve data quality objectives (DQOs). The confirmatory soil samples will be analyzed for COCs associated with each respective excavation area. The laboratory results will be compared to Industrial Receptor RGOs, and additional excavation will be conducted at locations with exceeding results until RGOs are met. Once the laboratory analysis determines COC concentrations upon final excavation are below RGOs, the AOC will meet requirements for Commercial/Industrial Land Use.

I.2.5 Restoration

Upon completing soil excavation, all disturbed and excavated areas will be backfilled with clean soil and graded to meet neighboring contours. The backfill soil will come from a clean source that was previously sampled and approved for use by the Army and Ohio EPA. After the area is backfilled and graded, workers will apply a seed mixture (as approved by OHARNG) and mulch. Restored areas will be inspected and monitored as required in the storm water best management practices established in the RD.

I.2.6 Land Use Controls

Unacceptable risk will remain on site for the Resident Receptor in portions of each of the load lines; therefore, this alternative also will rely on LUCs to prevent Resident Receptor exposure to COCs in soil in those areas. A Land Use Control Remedial Design (LUCRD) will be developed to present the land use constraint (i.e., no residential use) and RAOs, and will specify the LUC requirements for Load Lines 1-4 and 12.

The LUCRD will include LUC objectives, land restrictions (i.e., no residential use), potential modification and termination of LUCs, monitoring and reporting requirements, CERCLA 5-year reviews, LUC enforcement, and property transfers. This information will be presented in an attachment to the PMP (USACE 2018). The PMP identifies LUCs and restrictions for specific AOCs/Munitions Response Sites (MRSs) within the former RVAAP. The procedures within the PMP are intended to

comply with the DoD Manual, Defense Environmental Restoration Program (DERP) Management, Number 4715.20, March 9, 2012, (Department of Defense Office of the Under Secretary of Defense for Acquisition, Technology and Logistics) and Ohio Revised Code 5913.10.

I.2.7 Five-year Reviews

CERCLA Section 121(c) 5-year reviews will be conducted for the load lines to assess the effectiveness of the LUCs and whether there is a need to modify the LUCs. The Army will verify whether the LUCs continue to be properly documented and maintained. Each review of the remedy will evaluate whether land use has changed. If the risk levels have changed since initial LUC implementation, LUC modifications will be considered, which may include a change in monitoring frequency. A 5-year review report will be submitted.

I.3 Alternative 3: Commercial/Industrial Land Use – Ex Situ Thermal Treatment of Soil and Administrative LUCs

This alternative will utilize ex situ thermal treatment for soil with PAH, explosives, or PCB contamination above Industrial RGOs in conjunction with excavation and off-site disposal of soil with metals concentrations above the cleanup goals. Implementing these remedial technologies will attain Commercial/Industrial Land Use. The evaluation of this alternative assumes that a mobile thermal treatment system is already on site and readily available for use. Implementation of Alternative 3 will result in thermal treatment of 5,683 yd^3 of soil and excavation and off-site disposal of approximately 156 yd^3 of soil from Load Lines 1-4 and 12. The volume of soil being removed from each load line is presented in Table 3. Under this alternative, unacceptable risk will remain on site for the Resident Receptor at each load line; therefore, this alternative also will rely on LUCs to prevent Resident Receptor exposure to contaminants in soil in those areas. The following subsections describe activities associated with this alternative.

I.3.1 Remedial Design

An RD will be developed prior to initiating remedial actions. This RD will outline the site preparation activities (e.g., staging and equipment storage areas, truck routes, storm water controls); extent of the excavation; sequence and description of excavation and site restoration activities; decontamination; and segregation, transportation, and disposal of various waste streams. The RD will include details of the thermal treatment system, including requirements for bench-scale or treatability testing. Erosion and health and safety controls will be enforced during the active construction period to ensure remediation workers and the environment are protected.

I.3.2 Thermal Treatment of Soil

Site preparation will include clearing any obstacles, surface structures, or vegetation that could interfere with excavation, identifying utilities, and setting up temporary decontamination facilities. In addition, sediment and erosion control measures, including a silt fence, will be installed to control runoff from the work area.

The PAH-, explosives-, or PCB-contaminated soil will undergo ex situ thermal treatment. The treatment system will be pre-heated to the optimal treatment temperature based on results of past bench- and pilot-scale tests. Additional treatability testing may be conducted as necessary during the RD phase to ensure optimal conditions for treatment of all COCs. While the system is being heated, soil will be excavated using conventional construction equipment, such as backhoes, bulldozers, front-end loaders, and scrapers, and will be stockpiled immediately adjacent to the treatment system into approximately 50-yd^3 piles.

Contaminated soil will be fed directly into the fully enclosed, preheated chamber by being placed onto a conveyor. Steam at a temperature of approximately 1,300°F will be vented into the renewal/treatment chamber, where it will serve as the heat source for thermally treating soil. As the soil moves through the system via a rotational auger, the soil contaminants will be desorbed at specified temperatures and residence times and passed as vapors into the box head space within the enclosed chamber.

Induced vapors from the contaminated soil will be routed through a filtration system to remove the acidic gases (i.e., nitrous oxides, sulfur oxides, hydrogen chloride) and carbon dioxide components by using an engineered mixture of sodium hydroxide, lime, zero valent iron, steam, and water within a slender packed column. The filtration system converts remaining vapors into a synthetic gas to continue operating the treatment system, creating a renewable source of fuel to replace the propane that was used initially to generate steam.

After treatment, the soil will be stockpiled into approximately 50-yd^3 stockpiles on tarp and covered with plastic sheeting.

I.3.3 Excavation and Off-site Disposal of Soil

The thermal treatment has limited effectiveness at treating metals; therefore, soil with metals concentrations above RGOs will be excavated and disposed of off-site. Removal of metal-contaminated soil will be accomplished using conventional construction equipment, such as backhoes, bulldozers, front-end loaders, and scrapers. Oversized debris will be crushed or otherwise processed to meet disposal facility requirements.

Excavated soil will be hauled by truck to a licensed and permitted disposal facility. All trucks will be inspected prior to exiting the AOC. Appropriate waste manifests will accompany each waste shipment. Only regulated and licensed transporters and vehicles will be used. All trucks will travel pre-designated routes within CJAG.

Excavated soil will be disposed of at an existing off-site facility licensed and permitted to accept the characterized waste stream. The selection of an appropriate facility will consider the type of waste, location, transportation options, and cost.

I.3.4 Waste Characterization Sampling

Waste characterization analysis will be completed to characterize the excavated material. The excavated soil will be sampled and analyzed for TCLP metals, TCLP SVOCs, TCLP pesticides, TCLP herbicides, reactive cyanide, reactive sulfide, and PCBs to support waste profiling requirements for off-site disposal or as required by the receiving landfill. Based on available site data and for cost estimating purposes, the excavated soil is assumed to be non-hazardous and will be disposed of at a RCRA Subtitle D permitted landfill.

I.3.5 Confirmation Sampling

Upon completing the excavations at each load line, confirmatory ISM samples will be collected from each floor and sidewall of the excavation areas to ensure contaminated soils have been successfully removed. ISM samples collected for confirmation will include 30 to 50 aliquots per sample and be collected in duplicate to achieve DQOs. The confirmatory soil samples will be analyzed for COCs associated with each respective excavation area. The laboratory results will be compared to Industrial Receptor RGOs, and additional excavation will be conducted at locations with exceeding results until RGOs are met.

In addition to ISM confirmation samples collected from the excavation areas, soil samples also will be collected from the individual stockpiles of thermally treated soil and will be analyzed for COCs. The laboratory results will be compared to RGOs. Once the laboratory analysis determines COCs are below RGOs, the treated soil will be used for backfill and site restoration. Should confirmation samples indicate that any contaminants are not sufficiently treated, the soil will be rerun through the thermal treatment system, likely at a higher temperature, until the target post-treatment levels are reached.

Once the laboratory analysis determines COC concentrations upon final excavation are below RGOs, the AOC will meet requirements for Commercial/Industrial Land Use.

I.3.6 Restoration

Upon completing soil remediation and excavation, all disturbed and excavated areas will be backfilled with treated soil and graded to meet neighboring contours. Backfill soil may be required to attain adequate restoration. The backfill soil will come from a clean source that was previously sampled and approved for use by the Army and Ohio EPA. After the area is backfilled and graded, workers will apply a seed mixture (as approved by OHARNG) and mulch. Restored areas will be inspected and monitored as required in the storm water best management practices established in the RD.

I.3.7 Land Use Controls

Unacceptable risk will remain on site for the Resident Receptor in portions of each of the load lines; therefore, this alternative also will rely on LUCs to prevent Resident Receptor exposure to COCs in soil in those areas. An LUCRD will be developed to present the land use constraint (i.e., no residential use) and RAOs, and will specify the LUC requirements for Load Lines 1-4 and 12.

The LUCRD will include LUC objectives, land restrictions (i.e., no residential use), potential modification and termination of LUCs, monitoring and reporting requirements, CERCLA 5-year reviews, LUC enforcement, and property transfers. This information will be presented in an attachment to the PMP (USACE 2018). The PMP identifies LUCs and restrictions for specific AOCs/MRSs within the former RVAAP. The procedures within the PMP are intended to comply with the DoD Manual, DERP Management, Number 4715.20, March 9, 2012, (Department of Defense Office of the Under Secretary of Defense for Acquisition, Technology and Logistics) and Ohio Revised Code 5913.10.

I.3.8 Five-year Reviews

CERCLA Section 121(c) 5-year reviews will be conducted for the load lines to assess the effectiveness of the LUCs and whether there is a need to modify the LUCs. The Army will verify whether the LUCs continue to be properly documented and maintained. Each review of the remedy will evaluate whether land use has changed. If the risk levels have changed since initial LUC implementation, LUC modifications will be considered, which may include a change in monitoring frequency. A 5-year review report will be submitted.

I.4 Alternative 4: Unrestricted (Residential) Land Use – Excavation and Off-site Disposal of Soil/Sediment

This alternative will include the excavation and off-site disposal of surface soil and subsurface soil from Load Lines 1-4 and 12 and sediment from Kelly's Pond containing COCs at concentrations above the Residential RGOs to achieve Unrestricted (Residential) Land Use. Implementation of Alternative 4 will result in excavation and off-site disposal of approximately 31,447 yd^3 of soil and sediment. The volume of soil being removed from each load line is presented in Table 4. LUCs will not be required for any receptor upon completion of the excavation and disposal activities. The following subsections describe activities associated with this alternative.

The RD, excavation and off-site disposal, waste characterization sampling, confirmation sampling, and site restoration associated with the areas requiring soil remediation are anticipated to occur as described for Alternative 2.

Sediment Removal at Kelly's Pond (Load Line 2) – It is estimated that approximately 3,071 yd^3 of sediment will be removed from Kelly's Pond under the alternative. Sediment excavation at the pond will involve site preparation, excavation area dewatering, removal of sediment, dewatering of excavated material, and offsite disposal. Site preparation will include clearing any obstacles (i.e., fencing) and vegetation that could interfere with the implementation of the remedy, identifying utilities, constructing an access road, and setting up temporary decontamination facilities. Sediment removal activities will be initiated with installation of a temporary stream diversion system using 24-inch (or appropriate size determined during the RD) corrugated, high-density polyethylene (HDPE) piping. Approximately 500 ft of piping will be used to divert the water from the inlet channels to the Kelly's Pond exit drainage area via an outlet structure extending from the eastern shore of Kelly's Pond. The outlet structure for the former retention basin contains a control mechanism able to drain the surface water from Kelly's Pond. Sediment from the pond bottom will be excavated and staged in the dry pond

bottom for dewatering. Dewatering fluid will be discharged to the outlet structure or exit drainage area east of Kelly's Pond. In addition to the excavation of 52,270 ft^2 (1.2 acres) of the pond bottom, approximately 400 ft^2 of sediment will be removed around LL2sd-632 and LL2sd-633. A total of approximately 3,071 yd^3 of contaminated sediment will be removed for off-site disposal as non-hazardous waste, following appropriate characterization. Following completion of excavation activities, confirmatory ISM samples will be collected from the excavation areas for COC analysis to ensure contaminated sediment has been successfully removed. The laboratory results will be compared to Resident Receptor RGOs, and additional excavation will be conducted at locations with exceeding results until RGOs are met. Once the laboratory analysis determines COCs are below RGOs, the AOC will meet requirements for Unrestricted (Residential) Land Use. Restoration of Kelly's Pond will include removal of the temporary stream diversion and revegetation of disturbed areas.

I.5 Alternative 5: Unrestricted (Residential) Land Use – Ex Situ Thermal Treatment of Soil/Sediment

This alternative will utilize ex situ thermal treatment for soil with PAH, explosives, or PCB contamination above Residential RGOs in conjunction with excavation and off-site disposal of soil with metals concentrations above the cleanup goals. Implementing these remedial technologies will attain Unrestricted (Residential) Land Use. The evaluation of this alternative assumes that a mobile thermal treatment system is already on site and readily available for use.

The RD, thermal treatment of soil, excavation and off-site disposal, waste characterization sampling, confirmation sampling, and site restoration are anticipated to occur as described for Alternative 3. The following paragraphs describe additional activities associated with this alternative.

Sediment Removal and Thermal Treatment at Kelly's Pond (Load Line 2) – Pond dewatering and sediment excavation at Kelly's Pond will occur similar to that described for Alternative 4. A total of approximately 3,071 yd^3 of sediment is estimated to be excavated under this alternative. Sediment will be stockpiled within the dry pond bottom for dewatering prior to implementation of treatment to the method described for soil. Upon completion of treatment, sediment samples will be collected from the individual stockpiles of thermally treated sediment and analyzed for COCs. The laboratory results will be compared to RGOs. Once the laboratory analysis determines COCs are below RGOs, the treated sediment will be placed back in the dewatered pond or stockpiled at CJAG for backfilling in areas where soil is undergoing treatment at Load Lines 1-4 and 12. Should confirmation samples indicate that any contaminants are not sufficiently treated, the sediment will be rerun through the treatment system, likely at a higher temperature, until the target post-treatment levels are attained.

Following completion of excavation activities, confirmatory ISM samples will be collected from the excavation areas for COC analysis to ensure contaminated sediment has been successfully removed. The laboratory results will be compared to Resident Receptor RGOs, and additional excavation will be conducted at locations with exceeding results until RGOs are met. Once the laboratory analysis determines COCs are below RGOs, the AOC will meet requirements for Unrestricted (Residential) Land Use.

J COMPARATIVE ANALYSIS OF ALTERNATIVES

These alternatives were evaluated with respect to the nine comparative analysis criteria. These criteria are further described, as outlined by CERCLA, in Table 5.

Table 5. CERCLA Evaluation Criteria

Overall Protection of Human Health and the Environment – Considers whether or not an alternative provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.
Compliance with ARARs – Considers how a remedy will meet all the applicable or relevant and appropriate requirements of other federal and state environmental statutes and/or provide grounds for invoking a waiver.
Long-term Effectiveness and Permanence – Considers the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.
Reduction of Toxicity, Mobility, or Volume Through Treatment – Considers the anticipated performance of the treatment technologies that may be employed in a remedy.
Short-Term Effectiveness – Considers the speed with which the remedy achieves protection, as well as the potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.
Implementability – Considers the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.
Cost – Considers capital costs and operation and maintenance costs associated with the implementation of the alternative.
State Acceptance – Indicates whether the state concurs with, opposes, or has no comment on the preferred alternative.
Community Acceptance – Considers public input following a review of the public comments received on the RI/FS Report and Proposed Plan.

The nine criteria are categorized into three groups: threshold criteria, primary balancing criteria, and modifying criteria, as follows:

- Threshold Criteria – Must be met for the alternative to be eligible for selection as a remedial option.
  - Overall protection of human health and the environment.
  - Compliance with ARARs.

- Primary Balancing Criteria – Used to weigh major trade-offs among alternatives.
  - Long-term effectiveness and permanence.
  - Reduction of toxicity, mobility, or volume through treatment.
  - Short-term effectiveness.
  - Implementability.
  - Cost.

- Modifying Criteria – FS consideration to the extent that information was available. Evaluated fully after public comment period on the Proposed Plan.
  - State acceptance.
  - Community acceptance.

The following subsections discuss the comparative analysis of the alternatives developed for Load Lines 1-4 and 12, and a scoring of these alternatives is presented in Table 6.

J.1 Overall Protection of Human Health and the Environment

Overall protection and compliance with ARARs are threshold criteria that must be met by any alternative to be eligible for selection. If any alternative is considered "not protective" for overall protectiveness of human health and the environment or "not compliant" for compliance with ARARs, it is not eligible for selection as the recommended alternative.

Alternative 1 is not protective of human health and is not compliant with ARARs. In addition, Alternative 1 does not meet the RAO. Therefore, Alternative 1 is not eligible for selection.

For the remaining alternatives, the balancing criteria (short- and long-term effectiveness; reduction of contaminant toxicity, mobility, or volume through treatment; ease of implementation; and cost) are used to select a recommended alternative among the alternatives that satisfy the threshold criteria. The remaining alternatives are ranked among one another for each of the balancing criteria and a total score is generated. This is presented in Table 6.

Alternatives 2 and 3 provide adequate long-term protection of human health provided there is proper enforcement of the administrative controls. Comparatively, Alternatives 4 and 5 provide a higher degree of long-term effectiveness and permanence because the contaminated soil/sediment would either be excavated and removed from the AOCs or thermally treated to reduce COCs to below RGOs. Alternatives 4 and 5 remediate an estimated 39,003 tons of contaminated soil/sediment, compared to the estimated 7,297 tons remediated in Alternatives 2 and 3. Therefore, Alternatives 2 and 3 score lower due to the remaining residual risk for the Resident Receptor and the necessity of LUCs.

Alternatives 3 and 5 will reduce the toxicity, mobility, and volume of contamination through treatment. Alternative 5 received the higher score because a larger volume of soil would be treated. Alternatives 2 and 4 reduce the mobility of contaminants by placing contamination in an engineered landfill; however, they receive a lower score because no treatment is included in waste management.

Short-term effectiveness is achieved for all alternatives with implementation of expedited remediation efforts posing minimal impacts to the environment. Excavation and off-site disposal pose a modest risk to the community due to the transportation of contaminated soil and sediment on public roads. Proper soil handling techniques would be implemented to prevent or minimize adverse environmental impacts during the implementation of this alternative. Risks to site workers during soil excavation and loading would be mitigated through appropriate health and safety practices addressed in the Health and Safety Plan. With the thermal treatment alternatives (Alternatives 3 and 5), workers may be exposed during excavation activities, stockpiling soil, and loading soil into the treatment system. The higher score was given to Alternatives 2 and 3 because smaller quantities of soil are being actively remediated.

Table 6. Summary of Comparative Analysis of Remedial Alternatives

NCP Evaluation Criteria	Alternative 1: No Action	Alternative 2: Commercial/Industrial Land Use – Excavation and Off-site Disposal of Soil and Administrative LUCs	Alternative 3: Commercial/Industrial Land Use – Ex Situ Thermal Treatment of Soil and Administrative LUCs	Alternative 4: Unrestricted (Residential) Land Use – Excavation and Off-site Disposal of Soil/Sediment	Alternative 5: Unrestricted (Residential) Land Use – Ex Situ Thermal Treatment of Soil/Sediment
Threshold Criteria	***Result***	***Result***	***Result***	***Result***	***Result***
1. Overall Protectiveness of Human Health and the Environment	Not protective	Protective	Protective	Protective	Protective
2. Compliance with ARARs	Not compliant	Compliant	Compliant	Compliant	Compliant
Balancing Criteria	***Score***	***Score***	***Score***	***Score***	***Score***
3. Long-term Effectiveness and Permanence	Not applicable	2	2	3	3
4. Reduction of Toxicity, Mobility, or Volume through Treatment	Not applicable	1	2	1	3
5. Short-term Effectiveness	Not applicable	2	3	1	2
6. Implementability	Not applicable	3	3	2	2
7. Cost	Not applicable ($0)	3 $2,011,655	3 $1,649,093	1 $6,990,292	1 $4,702,011
Balancing Criteria Score	*Not applicable*	*11*	*13*	*8*	*11*

Any alternative considered "not protective" for overall protectiveness of human health and the environment or "not compliant" for compliance with ARARs, it is not eligible for selection as the recommended alternative. Therefore, that alternative is not ranked as part of the balancing criteria evaluation.
Scoring for the balancing criteria is as follows: Most favorable = 3, favorable = 2, least favorable = 1. The alternative with the highest total balancing criteria score is considered the most feasible.

ARAR = Applicable or Relevant and Appropriate Requirement.
LUC = Land Use Control.
NCP = National Contingency Plan.

Alternatives 2 and 4 are easily implementable, since excavation and off-site disposal alternatives have been employed multiple times at the former RVAAP. Alternatives 3 and 5 are also easily implementable assuming the on-site availability of the thermal treatment system. Alternatives 4 and 5 score lower due to the increased difficulties associated with implementing the sediment removal from Kelly's Pond at Load Line 2.

Alternative 3 scores the highest and is the recommended alternative. Alternative 3 is effective in the long term, easily implementable, and has the lowest cost. Alternative 3 has a cost estimate of $1,649,093, which is approximately $363,000 less than alternative with the next lowest cost. In addition, Alternative 3 is a green and highly sustainable alternative for on-site treatment, and implements a treatment alternative to reduce the toxicity, mobility, and volume of contamination.

The implementability of Alternative 3 is predicated on the on-site availability of the thermal treatment system. In the event that a thermal treatment system is not available on site at the former RVAAP, Alternative 2 is readily available for implementation. Excavation and off-site disposal alternatives have been implemented multiple times during restoration efforts at the former RVAAP. As with Alternative 3, Alternative 2 is effective in the long term and reduces the mobility of contaminants by placing contamination in an engineered landfill.

J.2 State Acceptance

State acceptance was evaluated formally after the public comment period on the Load Lines 1-4 and 12 Proposed Plan (Leidos 2018). Ohio EPA has expressed its support for Alternative 3: Commercial/Industrial Land Use – Ex Situ Thermal Treatment of Soil and Administrative LUCs.

J.3 Community Acceptance

Community acceptance was evaluated formally after the public comment period. During the public meeting, the community voiced no objections to Alternative 3: Commercial/Industrial Land Use – Ex Situ Thermal Treatment of Soil and Administrative LUCs, as indicated in Part III of this ROD Amendment, the Responsiveness Summary.

K PRINCIPAL THREAT WASTES

Principal threat wastes, as defined by the USEPA in *A Guide to Principal Threat and Low Level Threat Wastes* (USEPA 1991), are source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur.

Wastes that generally are considered to constitute principal threats include, but are not limited to:

- Liquids – Wastes contained in drums, lagoons, or tanks, free product floating on or under groundwater.
- Mobile Source Material – Surface soil or subsurface soil containing high concentrations of chemicals that are mobile due to wind entrainment, volatilization, surface runoff, or subsurface transport.
- Highly Toxic Source Material – Buried drummed non-liquid wastes, buried tanks containing non-liquid wastes, or soils containing significant concentrations of highly toxic materials.

USEPA guidance indicates where mobility and toxicity of source material combine to pose a potential risk of 10^{-3} or greater, generally treatment alternatives should be considered. Load Lines 1-4 and 12 do not contain source materials that are considered principal threat wastes, as described above, and no chemicals pose a risk of 10^{-3} or greater. As such, no remedies are required to address principal threat wastes at these AOCs.

L SELECTED REMEDY

Alternative 3: Commercial/Industrial Land Use – Ex Situ Thermal Treatment of Soil and Administrative LUCs is selected for implementation at Load Lines 1-4 and 12, if an on-site thermal treatment system is available at the former RVAAP. Alternative 3 meets the threshold and primary balancing criteria and is protective of the likely future land user (Industrial Receptor).

L.1 Rationale for the Selected Remedy

The selected remedy meets the threshold criteria and provides the best overall balance of trade-offs in terms of the five balancing criteria:

- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, and volume;
- Short-term effectiveness;
- Implementability; and
- Cost.

The selected remedy is effective in the long term, easily implementable, and has the lowest cost. Based on the available risk assessment information, the selected remedy will achieve the RAO, which reduces risk from COCs in surface and subsurface soil and sediment to acceptable levels (RGOs) for the likely future land use (i.e., Industrial and/or Military Training) that are protective of human health at Load Lines 1-4 and 12. Exposure of Resident Receptor to soil containing COCs would be mitigated by administrative controls at the site.

Using engineering controls, personal protective equipment, erosion and sediment controls, proper waste handling practices, and monitoring will mitigate short-term effects during construction. The selected remedy addresses state and community concerns by removing and either treating or disposing of contaminated soil offsite.

Alternative 3 is a green and highly sustainable alternative for on-site treatment, and implements a treatment alternative to reduce the toxicity, mobility, and volume of contamination.

L.2 Description of the Selected Remedy

Alternative 3 consists of a combination of ex situ thermal treatment and excavation with off-site disposal to achieve Commercial/Industrial Land Use. In the event that a thermal treatment system is not on-site at the former RVAAP, Alternative 2: Commercial/Industrial Land Use – Excavation and Off-site Disposal of Soil and Administrative LUCs is readily available and considered for implementation by the Army. Residual risks after implementing the selected remedy will be within the acceptable risk range for the Industrial Receptor. LUCs will be implemented to prevent exposure to contaminants in soil in areas where unacceptable risk will remain on site for the Resident Receptor. This alternative is described in more detail in Section I.3.

L.3 Summary of the Estimated Remedy Costs

The cost to complete Alternative 3 at all five load lines is $1,649,093. This cost assumes an existing thermal treatment system is on site and ready for mobilization. This cost estimate is based on the best available information regarding the anticipated scope of the selected remedy. This is an order of magnitude engineering cost estimate that is expected to be within -30 to +50% of the actual project cost in accordance with USEPA guidance (USEPA 1988).

L.4 Expected Outcomes of the Selected Remedy

Table 2 summarizes the COCs and RGOs to be achieved for soil at Load Lines 1-4 and 12 after the remedial activities are complete. Residual risks after implementing the selected remedy will be within the acceptable risk range for the Industrial Receptor, and the sites will attain Commercial/Industrial Land Use. LUCs will be implemented to prevent exposure to contaminants in soil in areas where unacceptable risk will remain on site for the Resident Receptor. Removing contaminated soil will reduce the likelihood of contaminant migration to other environmental media, such as surface water or groundwater. Removing soil to attain human health RGOs will also reduce risks to ecological receptors.

No negative socioeconomic and community revitalization impacts are expected from this remedial action. Positive socioeconomic impacts are expected from treating and excavating soil exceeding the RGOs because additional resources will available for use by the OHARNG training mission.

M STATUTORY DETERMINATIONS

The selected remedy satisfies the statutory requirements of CERCLA Section 121 and the NCP, as described below.

M.1 Protection of Human Health and the Environment

Human exposure to COCs will be eliminated to levels that are protective for the future use through treatment and excavation and off-site disposal of soil at Load Lines 1-4 and 12. The selected remedy also protects environmental resources from potential exposure to COC-contaminated media. The selected remedy will attain the Industrial RGOs listed in Table 2. LUCs will be implemented to prevent exposure to contaminants in soil in areas where unacceptable risk will remain on site for the Resident Receptor.

M.2 Compliance with ARARs

The selected remedy will comply with the action-specific ARARs listed in Attachment A.

M.3 Cost Effectiveness

The selected remedy meets the statutory requirement for a cost-effective remedy. Cost effectiveness is concerned with the reasonableness of the relationship between the effectiveness afforded by each alternative and its costs compared to other available options.

M.4 Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable

The selected remedy represents the maximum extent to which permanent solutions are practicable for soil at Load Lines 1-4 and 12. The selected remedy represents the best balance of trade-offs between the alternatives because it is cost-effective; a green and highly sustainable alternative for on-site treatment; and implements a treatment alternative to reduce the toxicity, mobility, and volume of contamination.

M.5 Preference for Treatment as a Principal Element

The selected remedy satisfies the statutory preference for treatment, as a thermal treatment technology is part of the selected remedy for contaminated soil at Load Lines 1-4 and 12.

M.6 Five-year Review Requirements

Because this remedy will result in COCs remaining on site above concentrations that allow for Unrestricted (Residential) Land Use and exposure, five-year reviews will be performed in compliance with CERCLA Section 121(c) to ensure the remedy remains protective of human health and the environment.

N DOCUMENTATION OF SIGNIFICANT CHANGES FROM PREFERRED ALTERNATIVE OF PROPOSED PLAN

The Load Lines 1-4 and 12 Proposed Plan (Leidos 2018) was released for public comment on June 10, 2019. Feedback received from the public during the public comment period and public meeting are presented in Part III of this ROD Amendment. The Proposed Plan identified Alternative 3: Commercial/Industrial Land Use – Ex Situ Thermal Treatment of Soil and Administrative LUCs as the recommended alternative for Load Lines 1-4 and 12.

No significant changes were necessary or appropriate following the conclusion of the public comment period. However, Figure 10 of the Load Lines 1-4 and 12 Proposed Plan presented a remediation area in Load Line 3 at sample LL3-056 (near the location of former Building EA-5). Consistent with the HHRA in the FS Addendum, the final selected remedy does not require remediation in this area.

THIS PAGE INTENTIONALLY LEFT BLANK.

PART III: RESPONSIVENESS SUMMARY FOR PUBLIC COMMENTS ON THE ARMY PROPOSED PLAN FOR LOAD LINES 1-4 AND 12

A OVERVIEW

On June 10, 2019, the Army released the Load Lines 1-4 and 12 Proposed Plan (Leidos 2018) for public comment. A 30-day public comment period was held from June 10, 2019 to July 10, 2019. The Army hosted a public meeting on June 20, 2019 to present the Proposed Plan and take questions and comments from the public for the record.

For soil, surface water, and sediment at Load Lines 1-4 and soil at Load Line 12, the Army recommended Alterative 3: Commercial/Industrial Land Use – Ex Situ Thermal Treatment of Soil and Administrative LUCs. During the public meeting, Ohio EPA concurred with the recommendation of this alternative.

The community voiced no objections to this recommendation. All public input, including the oral and written comments provided, was considered during the selection of the final remedy for soil, surface water, and sediment at Load Lines 1-4 and soil at Load Line 12 in this ROD Amendment.

B STAKEHOLDER ISSUES AND LEAD AGENCY RESPONSES

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

B.1 Oral Comments from Public Meeting

Comment 1: When the Army changes and optimized the land use to "Commercial/Industrial Land Use," are those areas going to be opened to industrial complexes?

Response: There are no plans to use these sites for industrial complexes. The anticipated future use of the sites is military training, and the additional remediation recommended in the Load Lines 1-4 and 12 Proposed Plan will allow for more extensive Army usage of the site than what is currently allowed. When Load Lines 1-4 and 12 attain "Commercial/Industrial Land Use," it means that the Army can have a full-time worker on site.

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.

THIS PAGE INTENTIONALLY LEFT BLANK.

PART IV: REFERENCES

ARNG (Army National Guard) 2014. *Final Technical Memorandum: Land Uses and Revised Risk Assessment Process for the Ravenna Army Ammunition Plant (RVAAP) Installation Restoration Program, Portage/Trumbull Counties, Ohio*. Memorandum between ARNG-ILE Cleanup and the Ohio Environmental Protection Agency. February 2014.

Chenega (Chenega Tri-Services, LLC) 2019. *2019 Community Relations Plan for the Ravenna Army Ammunition Plant Restoration Program*. March 2019.

EQM (Environmental Quality Management, Inc.) 2010. *Facility-wide Groundwater Monitoring Program Report on the January 2010 Sampling Event, Ravenna Army Ammunition Plant, Ravenna, Ohio*. July 2010.

Leidos 2017. *Feasibility Study Addendum for Soil, Sediment, and Surface Water at RVAAP Load Lines 1, 2, 3, 4, and 12*. June 2017.

Leidos 2018. *Proposed Plan for Soil, Sediment, and Surface Water at RVAAP Load Lines 1, 2, 3, 4, and 12*. October 2018.

Leidos 2019. *Record of Decision for Wet Sediment and Surface Water at RVAAP-12 Load Line 12*. February 2019.

Ohio EPA (Ohio Environmental Protection Agency) 2004. *Director's Final Findings and Orders for the Ravenna Army Ammunition Plant*. June 2004.

Ohio EPA 2008. *Guidance for Conducting Ecological Risk Assessments* (Ohio EPA). Division of Emergency and Remedial Response. April 2008.

Prudent (Prudent Technologies, Inc.) 2011. *Final Sampling Report of Surface and Subsurface Incremental Sampling Methodology at Load Lines 1, 2, 3, and 4 (RVAAP-08, 09, 10, and 11)*. March 2011.

SAIC (Science Applications International Corporation) 2003. *Phase II Remedial Investigation Report for the Load Line 1*. June 2003.

SAIC 2004. *Phase II Remedial Investigation Report for Load Line 12*. March 2004.

SAIC 2009. *Record of Decision for Soil and Dry Sediment for the RVAAP-12 Load Line 12*. March 2009.

SAIC 2010. *Remedial Acton Report for the RVAAP-12 Load Line 12*. August 2010.

Shaw (Shaw Environmental, Inc.) 2004a. *Supplemental Baseline Human Health Risk Assessment for Load Line 1 Alternative Receptors*. July 2004.

Shaw 2004b. *Phase II Remedial Investigation Report for Load Line 2*. July 2004.

Shaw 2004c. *Phase II Remedial Investigation Report for Load Line 3*. July 2004.

Shaw 2004d. *Phase II Remedial Investigation Report for Load Line 4.* September 2004.

Shaw 2005. *Focused Feasibility Study for the Remediation of Soils at Load Lines 1-4*. May 2005.

Shaw 2007. *Interim Record of Decision for the Remediation of Soils at Load Lines 1 through 4*. January 2007.

Shaw 2008. *Remedial Action Completion Report for the Remediation of Soils and Dry Sediments at RVAAP 08-11 (Load Lines 1-4)*. June 2008.

USACE (U.S. Army Corps of Engineers) 1996. *Preliminary Assessment for the Characterization of Areas of Contamination at the Ravenna Army Ammunition Plant, Ravenna, Ohio*. February 1996.

USACE 2005. *RVAAP Facility-wide Human Health Risk Assessors Manual – Amendment 1*. December 2005.

USACE 2010. *Risk Assessment Handbook Volume II: Environmental Evaluation*. December 2010.

USACE 2012. *Final (Revised) Position Paper for the Application and Use of Facility-Wide Human Health Cleanup Goals at the Ravenna Army Ammunition Plant*. February 2012.

USACE 2018. *Revised Property Management Plan for the Designated Areas of Concern and Munitions Response Sites, Version 2.0*. March 2018.

USATHAMA (U.S. Army Toxic and Hazardous Materials Agency) 1978. *Installation Assessment of Ravenna Army Ammunition Plant*, Records Evaluation Report No. 132. November 1978.

USEPA (U.S. Environmental Protection Agency) 1988. *Guidance for Conducting Remedial Investigation/Feasibility Studies under CERCLA*. October 1988.

USEPA 1991. *A Guide to Principal Threat and Low Level Threat Wastes*. Superfund Publication 9380.3-06FS. November 1991.

USEPA 1997. *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments*. Interim Final. June 1997.

URS (URS Group, Inc.) 2010. *Remediation Completion Report Sub-Slab Soils at RVAAP-09 Load Line 2, RVAAP-10 Load Line 3, and RVAAP-11 Load Line 4*. December 2010.

URS 2011. *Remediation Completion Report Sub-Slab Soils at RVAAP-08 Load Line 1*. March 2011.

THIS PAGE INTENTIONALLY LEFT BLANK.

FIGURES

THIS PAGE INTENTIONALLY LEFT BLANK.

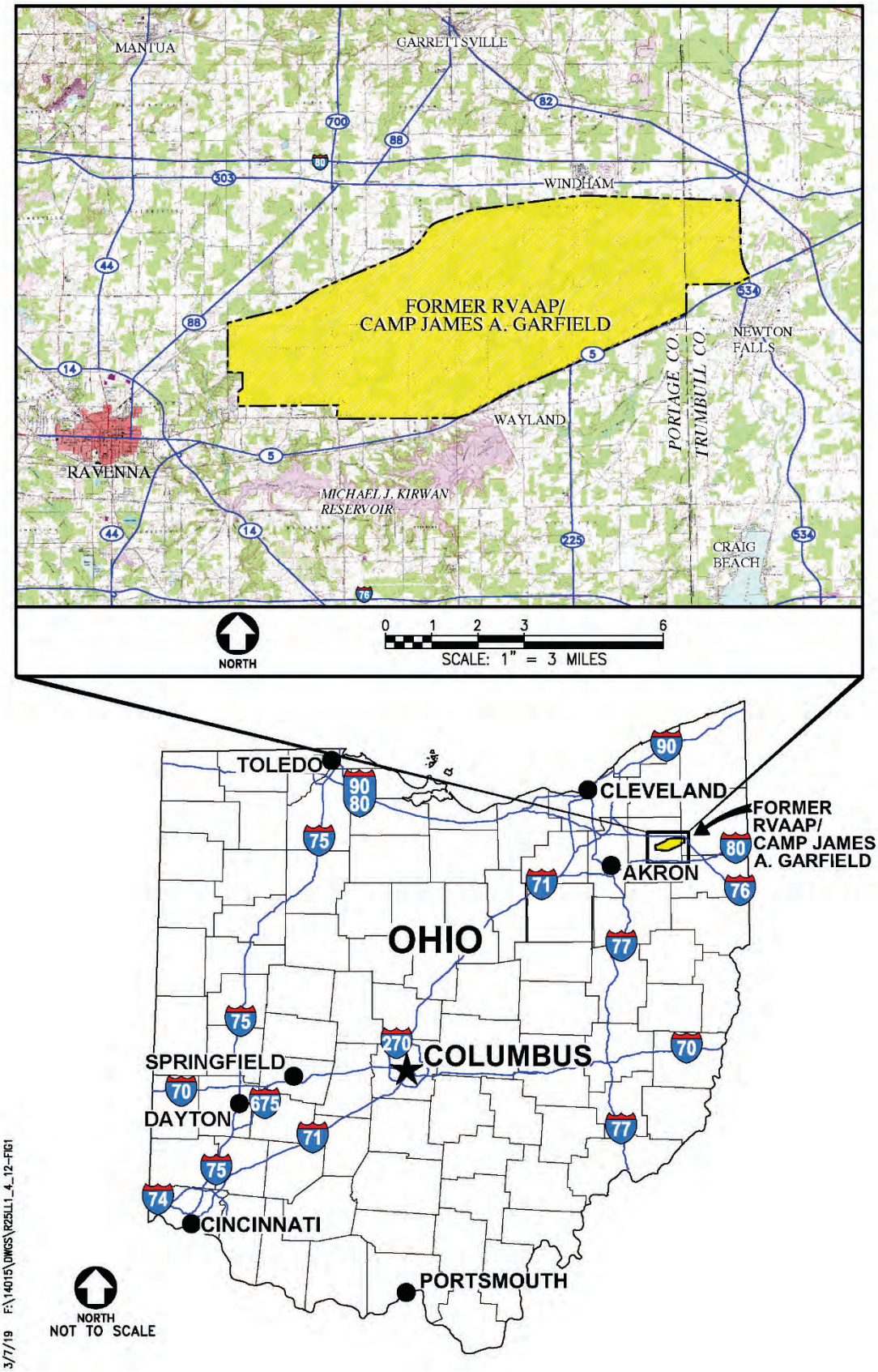


Figure 1. General Location and Orientation of Camp James A. Garfield

THIS PAGE INTENTIONALLY LEFT BLANK.

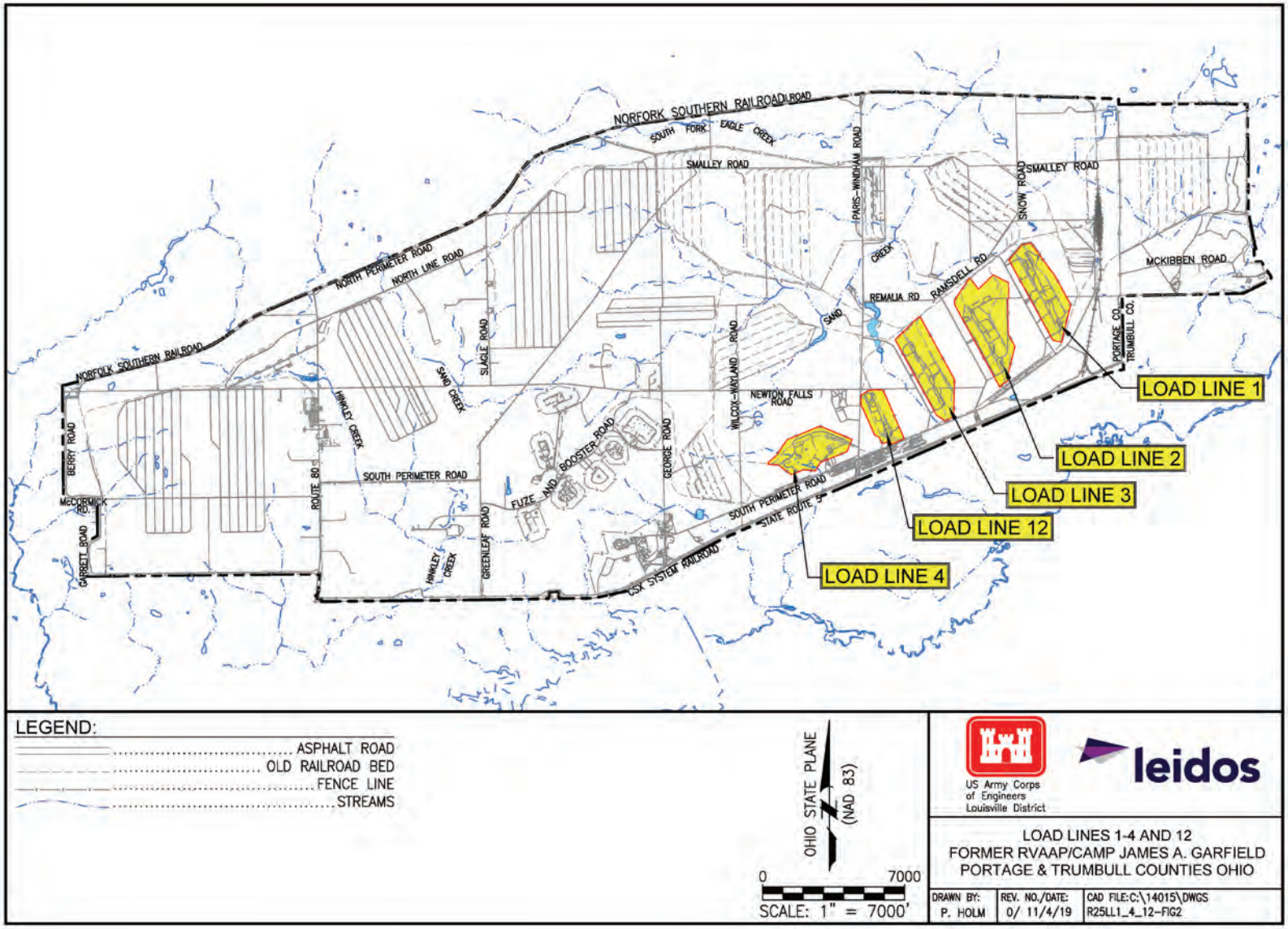
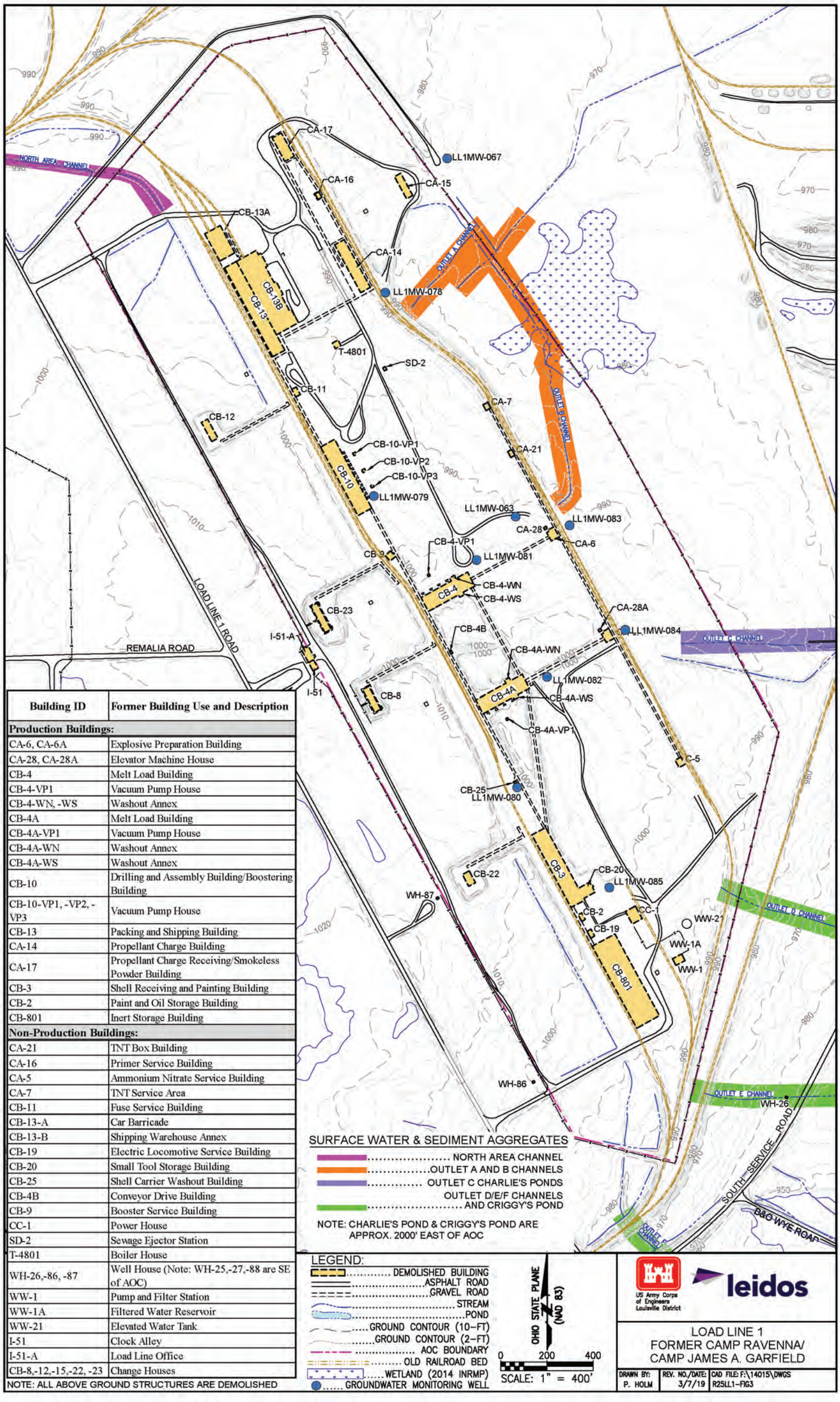


Figure 2. Location of Load Line 1-4 and Load Line 12 within Camp James A. Garfield

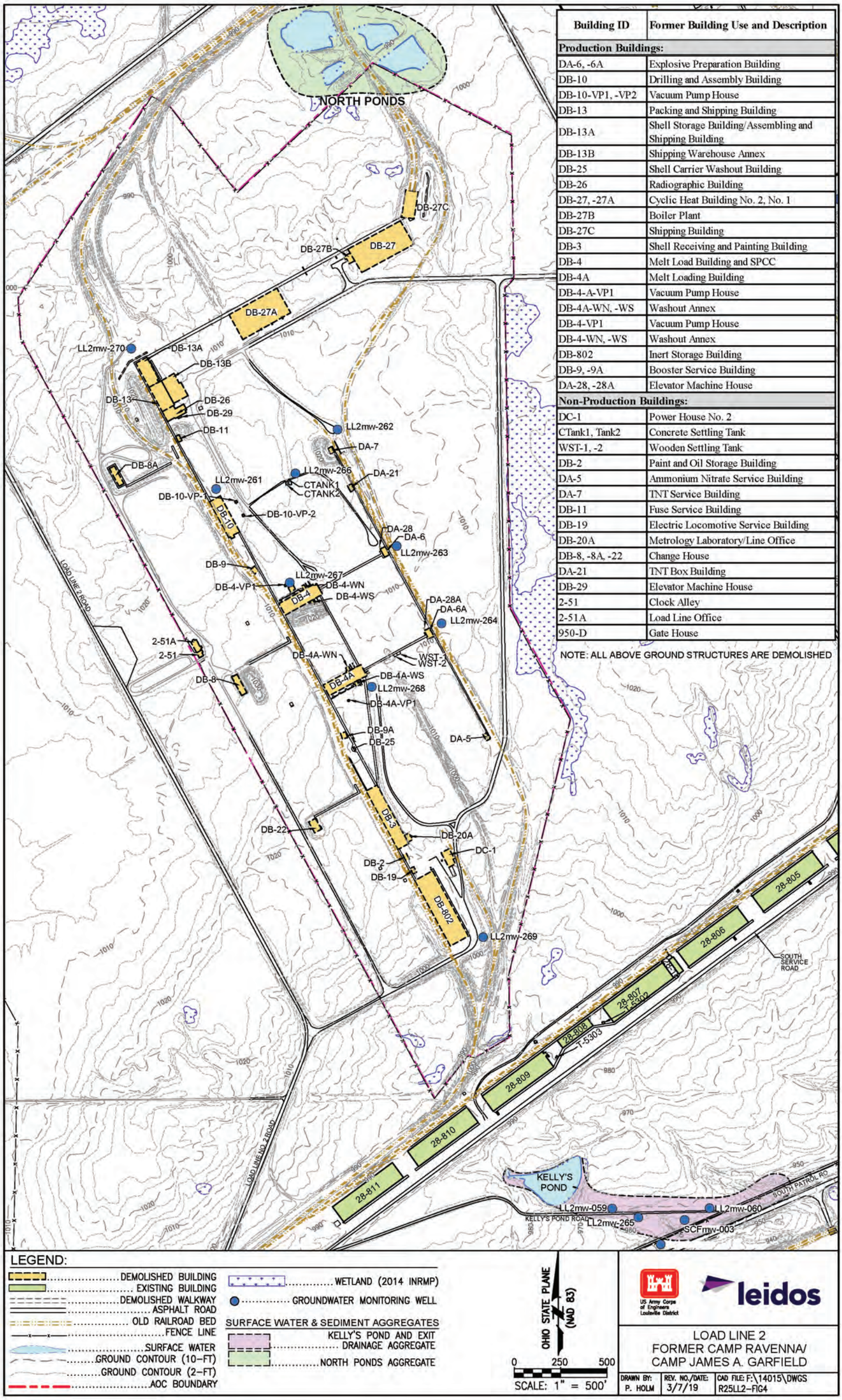
THIS PAGE INTENTIONALLY LEFT BLANK.



Building ID	Former Building Use and Description
Production Buildings:	
CA-6, CA-6A	Explosive Preparation Building
CA-28, CA-28A	Elevator Machine House
CB-4	Melt Load Building
CB-4-VP1	Vacuum Pump House
CB-4-WN, -WS	Washout Annex
CB-4A	Melt Load Building
CB-4A-VP1	Vacuum Pump House
CB-4A-WN	Washout Annex
CB-4A-WS	Washout Annex
CB-10	Drilling and Assembly Building/Boostering Building
CB-10-VP1, -VP2, -VP3	Vacuum Pump House
CB-13	Packing and Shipping Building
CA-14	Propellant Charge Building
CA-17	Propellant Charge Receiving/Smokeless Powder Building
CB-3	Shell Receiving and Painting Building
CB-2	Paint and Oil Storage Building
CB-801	Inert Storage Building
Non-Production Buildings:	
CA-21	TNT Box Building
CA-16	Primer Service Building
CA-5	Ammonium Nitrate Service Building
CA-7	TNT Service Area
CB-11	Fuse Service Building
CB-13-A	Car Barricade
CB-13-B	Shipping Warehouse Annex
CB-19	Electric Locomotive Service Building
CB-20	Small Tool Storage Building
CB-25	Shell Carrier Washout Building
CB-4B	Conveyor Drive Building
CB-9	Booster Service Building
CC-1	Power House
SD-2	Sewage Ejector Station
T-4801	Boiler House
WH-26,-86, -87	Well House (Note: WH-25,-27,-88 are SE of AOC)
WW-1	Pump and Filter Station
WW-1A	Filtered Water Reservoir
WW-21	Elevated Water Tank
I-51	Clock Alley
I-51-A	Load Line Office
CB-8,-12,-15,-22, -23	Change Houses

NOTE: ALL ABOVE GROUND STRUCTURES ARE DEMOLISHED

Figure 3. Load Line 1 Site Features



Building ID	Former Building Use and Description
Production Buildings:	
DA-6, -6A	Explosive Preparation Building
DB-10	Drilling and Assembly Building
DB-10-VP1, -VP2	Vacuum Pump House
DB-13	Packing and Shipping Building
DB-13A	Shell Storage Building/Assembling and Shipping Building
DB-13B	Shipping Warehouse Annex
DB-25	Shell Carrier Washout Building
DB-26	Radiographic Building
DB-27, -27A	Cyclic Heat Building No. 2, No. 1
DB-27B	Boiler Plant
DB-27C	Shipping Building
DB-3	Shell Receiving and Painting Building
DB-4	Melt Load Building and SPCC
DB-4A	Melt Loading Building
DB-4-A-VP1	Vacuum Pump House
DB-4A-WN, -WS	Washout Annex
DB-4-VP1	Vacuum Pump House
DB-4-WN, -WS	Washout Annex
DB-802	Inert Storage Building
DB-9, -9A	Booster Service Building
DA-28, -28A	Elevator Machine House
Non-Production Buildings:	
DC-1	Power House No. 2
CTank1, Tank2	Concrete Settling Tank
WST-1, -2	Wooden Settling Tank
DB-2	Paint and Oil Storage Building
DA-5	Ammonium Nitrate Service Building
DA-7	TNT Service Building
DB-11	Fuse Service Building
DB-19	Electric Locomotive Service Building
DB-20A	Metrology Laboratory/Line Office
DB-8, -8A, -22	Change House
DA-21	TNT Box Building
DB-29	Elevator Machine House
2-51	Clock Alley
2-51A	Load Line Office
950-D	Gate House

NOTE: ALL ABOVE GROUND STRUCTURES ARE DEMOLISHED

Figure 4. Load Line 2 Site Features

Building ID	Former Building Use and Description
Production Buildings:	
EA-6, -6A	Explosive Preparation Building
EA-28, -28A	Elevator Machine House
EB-4, -4A	Melt Load Building
EB-4A-WN, -WS EB-4-WN, -WS	Washout Annex
EB-4-VP1, EB-4A-VP1 EB-10-VP1, -VP2	Vacuum Pump House
EB-10	Drilling and Assembly Building
EB-10A	Radiographic Building
EB-13	Packing and Shipping Building
EB-13A	Shell Storage Building/Assembling and Shipping Building
EB-13B	Shipping Warehouse Annex
EB-25	Shell Carrier Washout Building
Non-Production Buildings:	
EA-7	TNT Service Building
EB-11	Fuse Service Building
EB-19	Electric Locomotive Service Building
EB-2	Paint and Oil Storage Building
EB-3	Shell Receiving and Painting Building
EB-803	Inert Storage Building
EB-9, -9A	Service Building
LL3-CST-1, CST-2	Concrete Settling Tanks
EA-21	TNT Box Building
EA-5	AN Service Building
EB-22, -8, -8A	Change House
3-51A	Load Line Office
3-51	Clock Alley
EB-20	Line Office

NOTE: ALL ABOVE GROUND STRUCTURES ARE DEMOLISHED

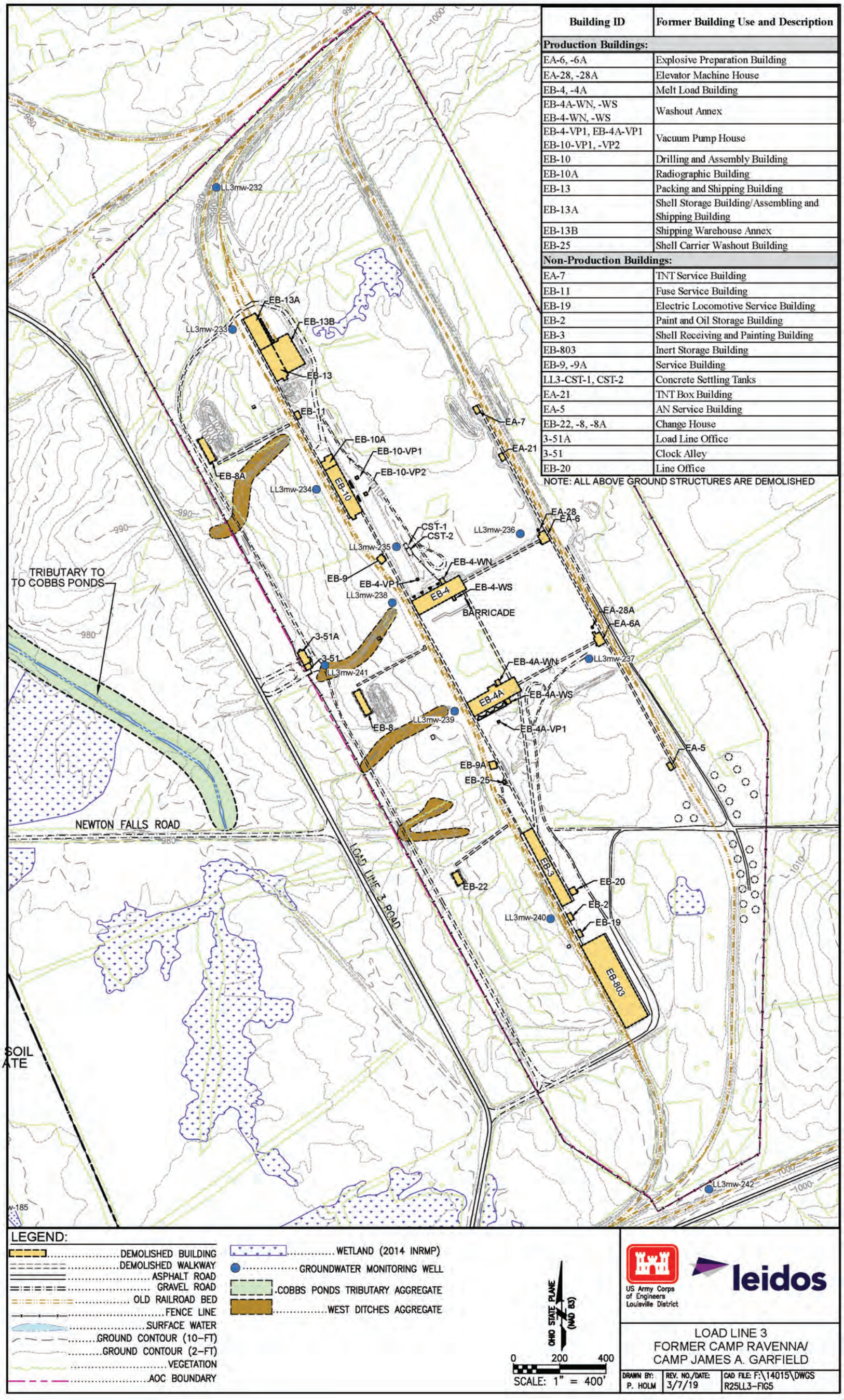


Figure 5. Load Line 3 Site Features

THIS PAGE INTENTIONALLY LEFT BLANK.

Building ID	Former Building Use and Description
Production Buildings:	
G-11	Magazine/AN Service Building
G-12, -12A	Explosive Cooling Building
G-13	Funnel Removal and Face Off
G-13A	X-Ray
G-15	Explosive Prep Building/TNT Screening Building
G-16	TNT Receiving
G-18	Paint Storage/Component Service Building
G-19	Packing and Shipping Building
G-19A	Shipping Building
G-8	Melt Pour Building
Non-Production Buildings:	
CC-1	Construction Camp Fire House
CC-2	Hunkin Conkey Construction
CC-3	Workmen's Sheds
CC-4	Garage
CC-5	Stock Rooms
CC-6	Communications Unit
G-2	Paint Storage
G-3	Shell Preparation and Painting Building
G-4	Power House No. 7
G-5	Line Office
G-6, -6A	Change House
G-7	Booster Service Building
SD-5	Sewage Ejector Station
T-5201	Guard Post
G-20	Gate House
WW-23	Elevated Water Tank
G-9	Explosive Screening Building
G-1	Material Receiving/Inert Storage Warehouse
G-1A	Material Receiving/Truck Repair Shop
G-14	Booster Service Building
G-17	Supplementary Charges Magazine

NOTE: ALL ABOVE GROUND STRUCTURES ARE DEMOLISHED

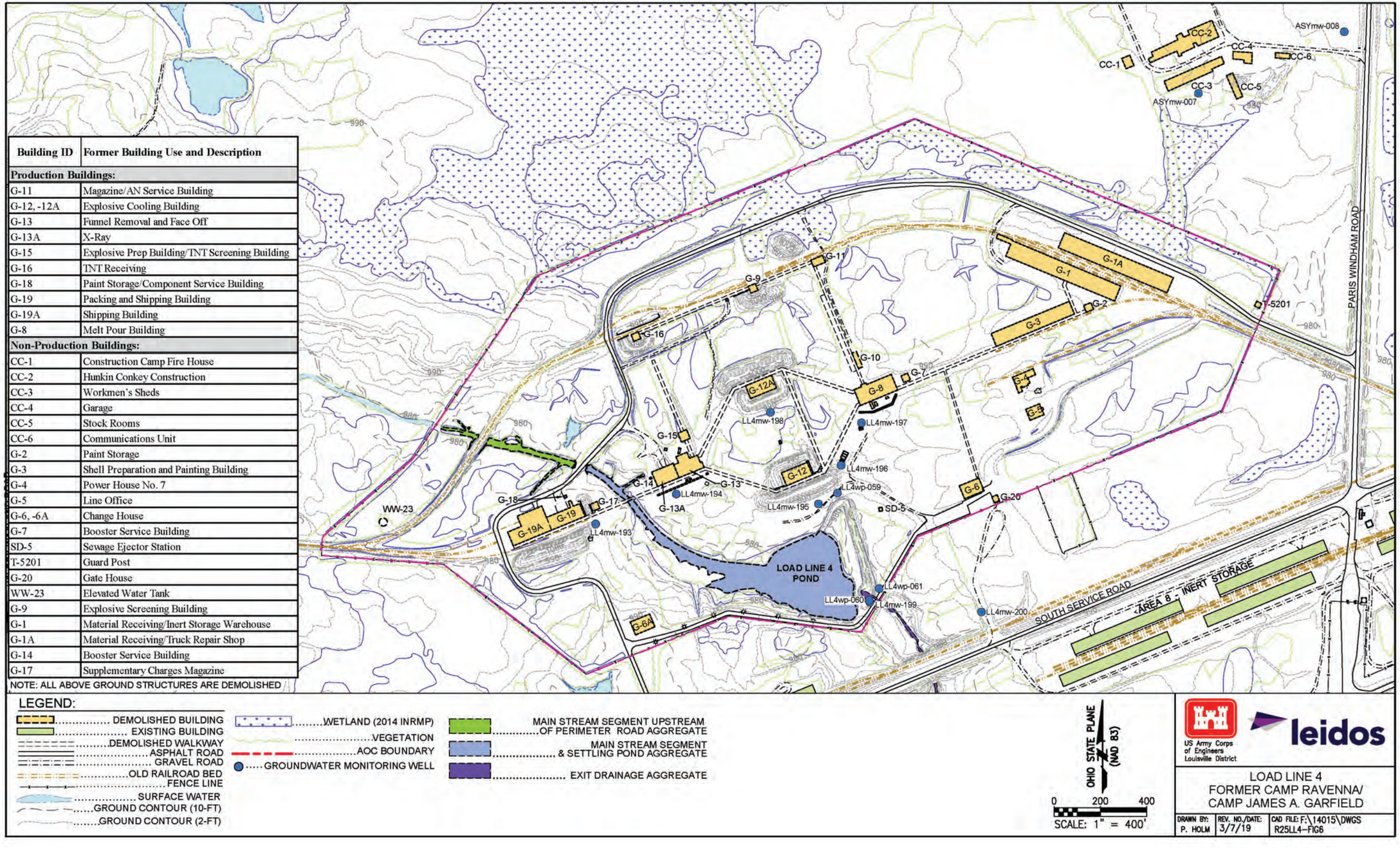
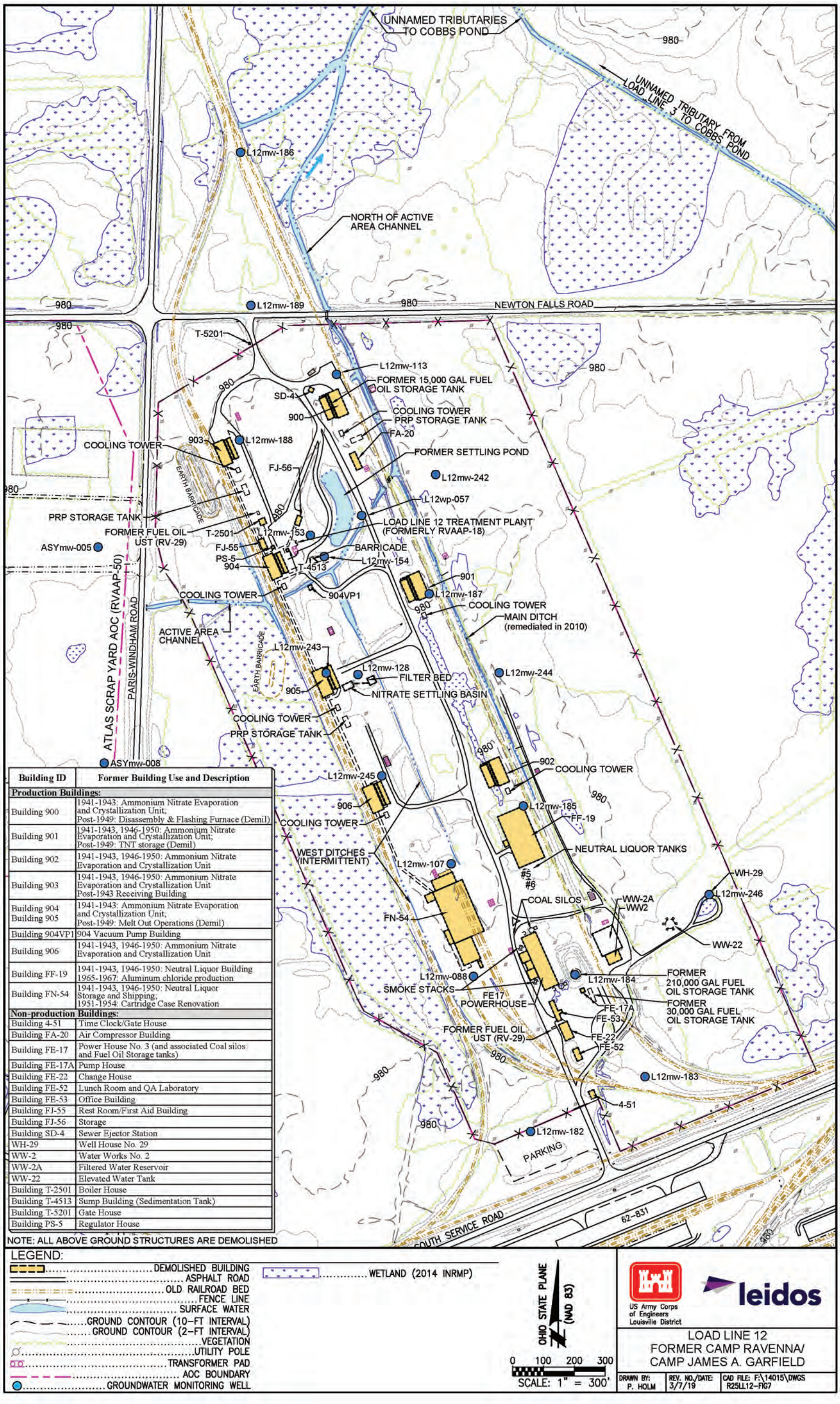


Figure 6. Load Line 4 Site Features

THIS PAGE INTENTIONALLY LEFT BLANK.



Building ID	Former Building Use and Description
Production Buildings:	
Building 900	1941-1943: Ammonium Nitrate Evaporation and Crystallization Unit; Post-1949: Disassembly & Flashing Furnace (Demil)
Building 901	1941-1943, 1946-1950: Ammonium Nitrate Evaporation and Crystallization Unit; Post-1949: TNT storage (Demil)
Building 902	1941-1943, 1946-1950: Ammonium Nitrate Evaporation and Crystallization Unit
Building 903	1941-1943, 1946-1950: Ammonium Nitrate Evaporation and Crystallization Unit Post-1943 Receiving Building
Building 904 Building 905	1941-1943: Ammonium Nitrate Evaporation and Crystallization Unit; Post-1949: Melt Out Operations (Demil)
Building 904VP1	904 Vacuum Pump Building
Building 906	1941-1943, 1946-1950: Ammonium Nitrate Evaporation and Crystallization Unit
Building FF-19	1941-1943, 1946-1950: Neutral Liquor Building 1965-1967: Aluminum chloride production
Building FN-54	1941-1943, 1946-1950: Neutral Liquor Storage and Shipping; 1951-1954: Cartridge Case Renovation
Non-production Buildings:	
Building 4-51	Time Clock/Gate House
Building FA-20	Air Compressor Building
Building FE-17	Power House No. 3 (and associated Coal silos and Fuel Oil Storage tanks)
Building FE-17A	Pump House
Building FE-22	Change House
Building FE-52	Lunch Room and QA Laboratory
Building FE-53	Office Building
Building FJ-55	Rest Room/First Aid Building
Building FJ-56	Storage
Building SD-4	Sewer Ejector Station
WH-29	Well House No. 29
WW-2	Water Works No. 2
WW-2A	Filtered Water Reservoir
WW-22	Elevated Water Tank
Building T-2501	Boiler House
Building T-4513	Sump Building (Sedimentation Tank)
Building T-5201	Gate House
Building PS-5	Regulator House

Figure 7. Load Line 12 Site Features

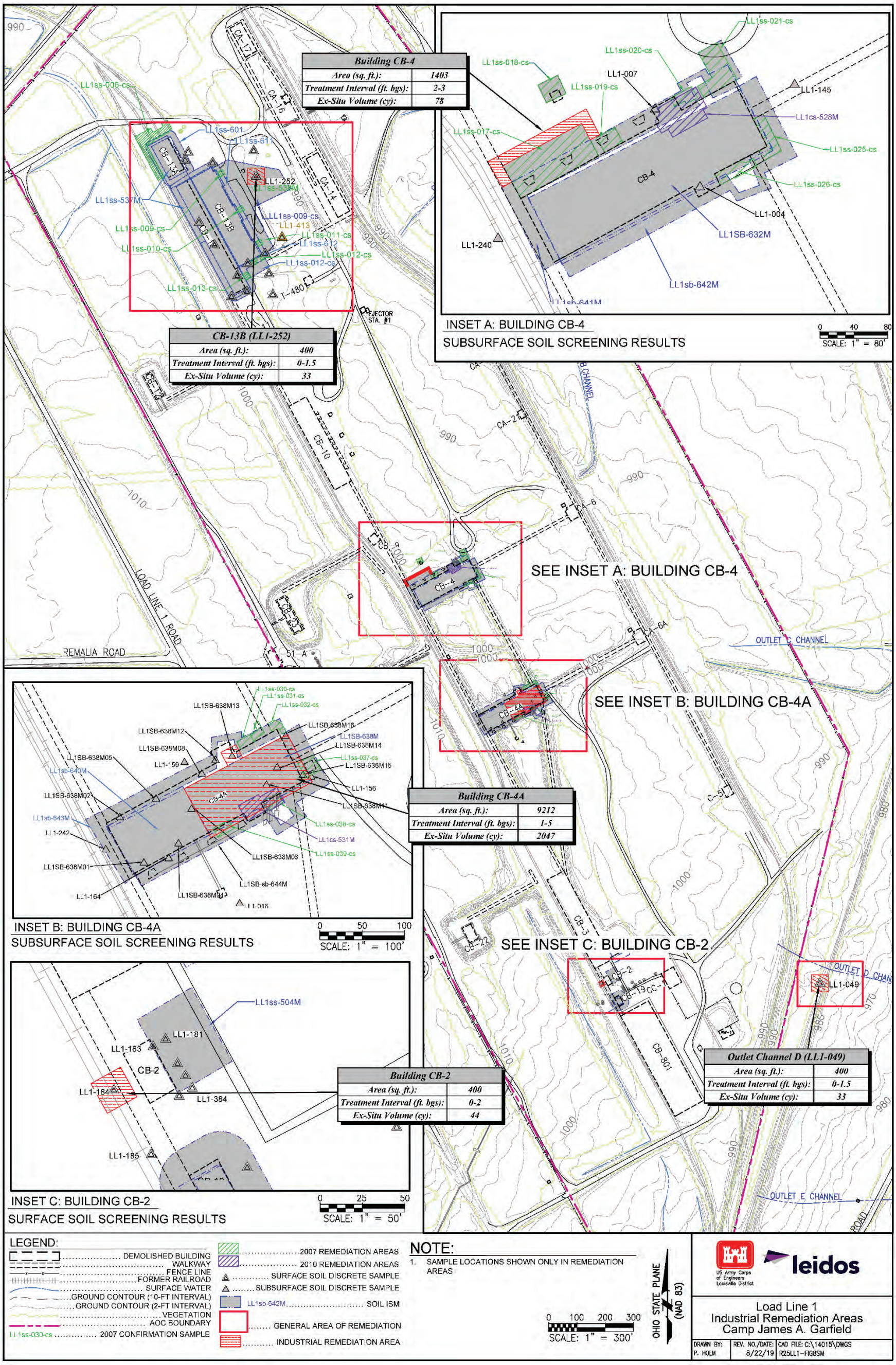


Figure 8. Load Line 1 Industrial Remediation Areas

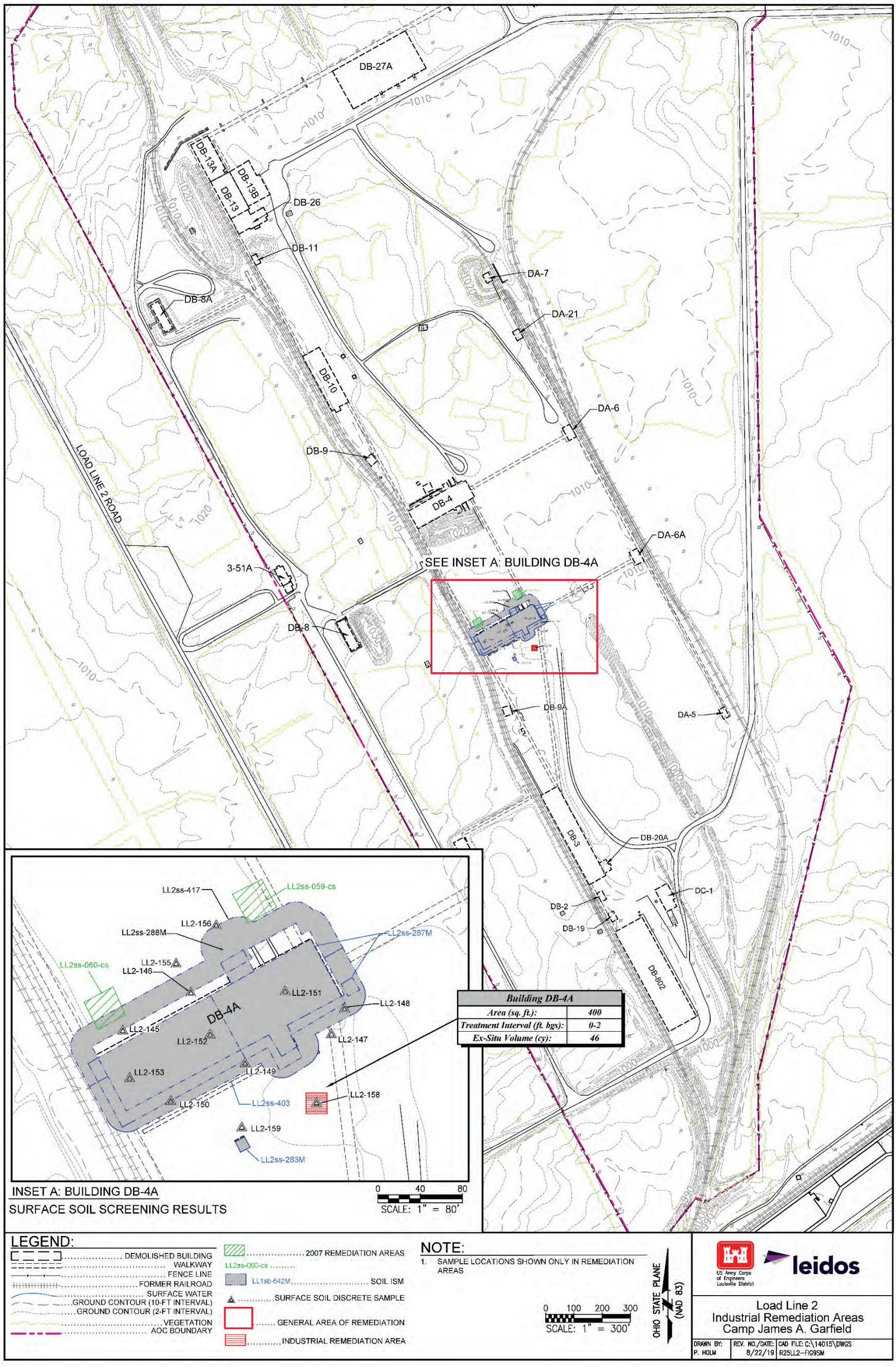


Figure 9. Load Line 2 Industrial Remediation Areas

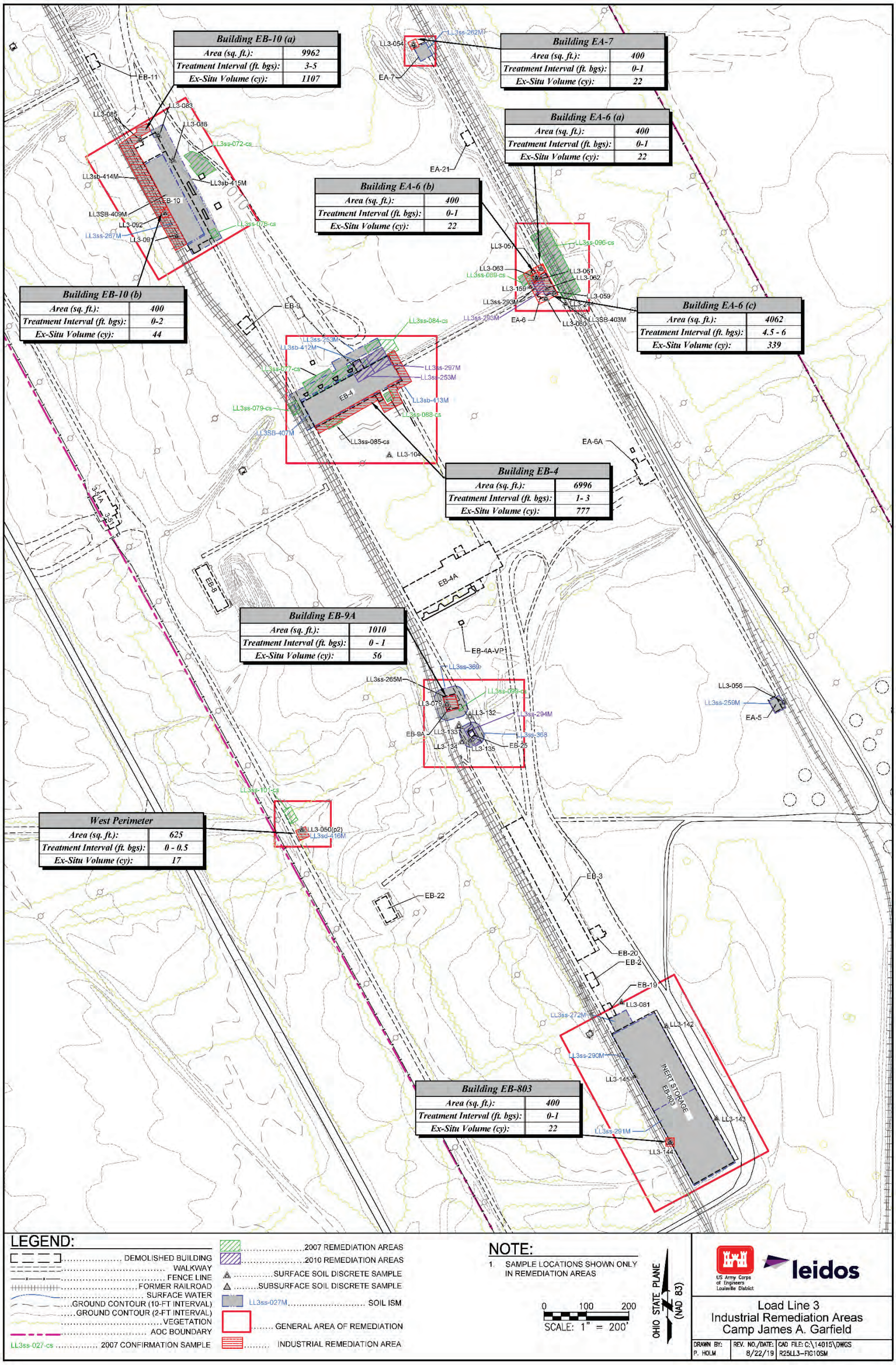


Figure 10. Load Line 3 Industrial Remediation Areas

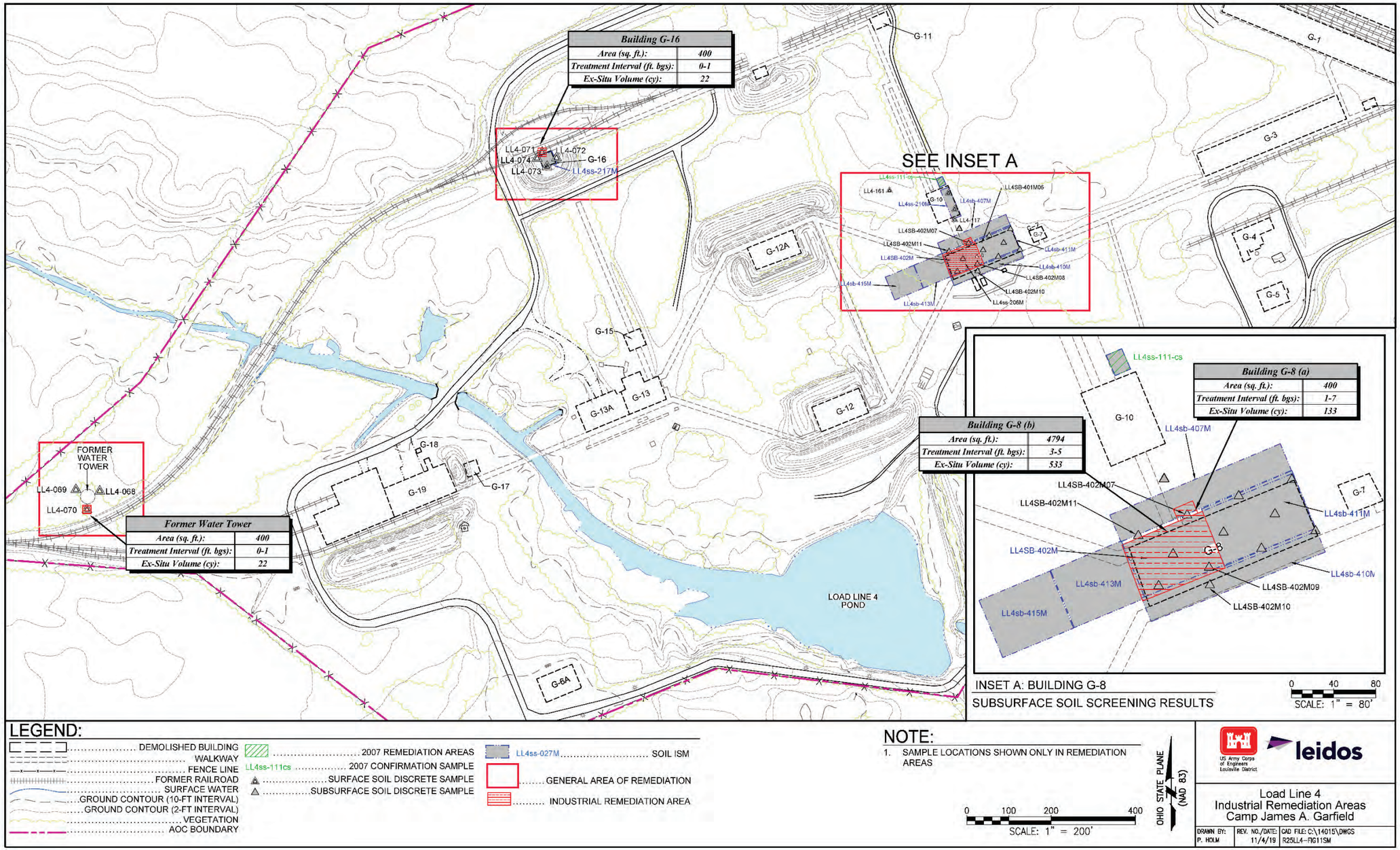


Figure 11. Load Line 4 Industrial Remediation Areas

THIS PAGE INTENTIONALLY LEFT BLANK.

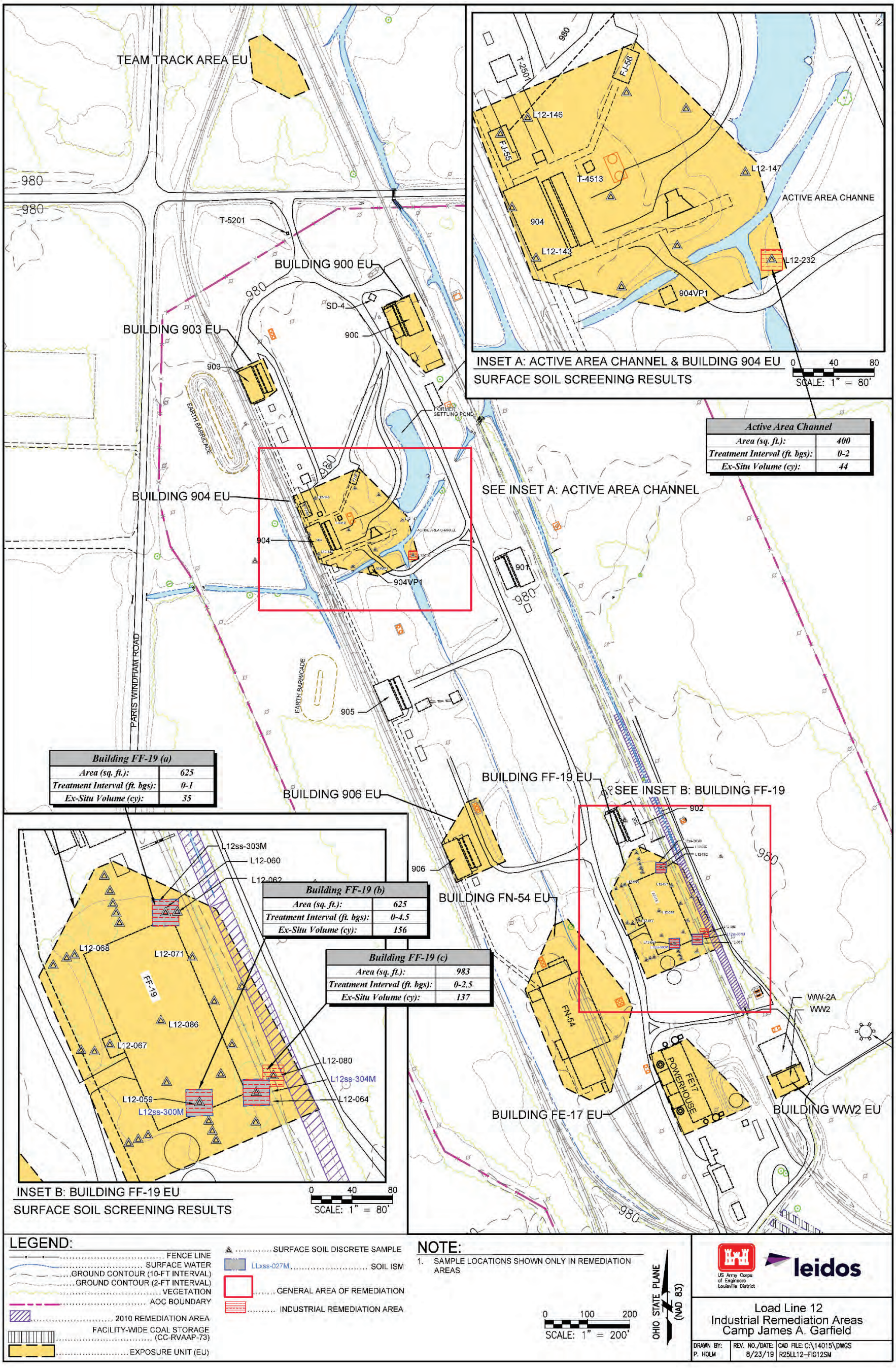


Figure 12. Load Line 12 Industrial Remediation Areas

THIS PAGE INTENTIONALLY LEFT BLANK.

APPENDIX A

Applicable or Relevant and Appropriate Requirements (ARARs)

THIS PAGE INTENTIONALLY LEFT BLANK.

Table A-1. Potential Action-specific ARARs

Media and Citation	Description of Requirement	Potential ARAR Status	Standard
Prohibition of air pollution nuisances (e.g., fugitive dust) OAC Section 3745-15-07	These rules prohibit releasing nuisance air pollution that endangers health, safety, or welfare of the public or cause personal injury or property damage.	Applies to any activity that could result in the release of a nuisance air pollutant. This would include dust from excavation or soil management processes.	Any person undertaking an activity is prohibited from emitting nuisance air pollution.
Storm water requirements at construction sites 40 CFR Part 450	These rules require that storm water controls be employed at construction sites that exceed 1 acre.	Applies to any construction activity that exceeds 1 acre.	Persons undertaking construction activities (including grubbing and land clearing) at an AOC where the construction footprint is more than 1 acre must design and implement erosion and runoff controls.
Hazardous Waste Determination OAC Section 3745-52-11	These rules require that a generator determine whether a material generated is a hazardous waste.	Applies to any material that is or contains a solid waste. Must be characterized to determine whether the material is or contains a hazardous waste.	Any person that generates a waste as defined must use prescribed methods to determine if waste is considered characteristically hazardous using the prescribed methods.
Temporary on-site storage of remediation waste in staging piles OAC Section 3745-57-74	These rules require hazardous wastes to be staged in a pile that is designed to facilitate a reliable, effective, and protective remedy; and be designed to prevent or minimize releases of hazardous wastes and constituents into the environment, and minimize or adequately control cross-media transfer as necessary to protect human health and the environment (e.g., use of liners, covers, runoff/run-on controls as appropriate).	Applies to the accumulation of non-flowing hazardous remediation waste.	In setting the standards and design criteria, the director must consider the following factors: • Length of time pile will be in operation; • Volumes of waste you intend to store in the pile; • Physical and chemical characteristics of the wastes to be stored in the unit; • Potential for releases from the unit; • Hydrogeological and other relevant environmental conditions at the facility that may influence the migration of any potential releases; and • Potential for human and environmental exposure to potential releases from the unit.

Table A-1. Potential Action-specific ARARs (continued)

Media and Citation	Description of Requirement	Potential ARAR Status	Standard
			At closure, a staging pile must be closed by removing or decontaminating all remediation waste, contaminated containment system components, and structures and equipment contaminated with waste and leachate. Any contaminated subsoil in a previously contaminated area must be decontaminated in a manner the director determines will protect human health and the environment. In uncontaminated areas, contaminated subsoil must be decontaminated or removed. If they cannot be practicably removed, post closure care must be provided.
Management of contaminated soil or debris that is or contains a hazardous waste OAC Sections 3745-52-30 through 3745-52-34	These rules require that hazardous waste be properly packaged, labeled, marked, and accumulated on site pending on- or off-site disposal.	Applies to any hazardous waste, or media containing a hazardous waste that is generated from on-site activities.	All hazardous waste must be accumulated in a compliant manner that includes proper marking, labeling, and packaging in accordance with the specified regulations. This includes inspecting containers or container areas where hazardous waste is accumulated on site.
Soil contaminated with RCRA hazardous waste OAC Section 3745-270-49 OAC Section 3745-270-48 UTS	These rules prohibit land disposal of RCRA hazardous wastes subject to them, unless the waste is treated to meet certain standards that are protective of human health and the environment. Standards for treating hazardous waste-contaminated soil prior to disposal are set forth in the two cited rules. Using the greater of either technology-based standards or UTS is prescribed.	LDRs apply only to RCRA hazardous waste. This rule is considered for ARAR status only upon generating a RCRA hazardous waste. If any soil is determined to be RCRA hazardous waste, and if it will be disposed of on site, this rule is potentially applicable to disposal of the soil.	All soil subject to treatment must be treated as follows: (1) For non-metals except carbon disulfide, cyclohexanone, and methanol, treatment must achieve 90% reduction in total constituent concentration (primary constituent for which the waste is characteristically hazardous as well as for any organic or inorganic UHC), subject to item 3 below.

Table A-1. Potential Action-specific ARARs (continued)

Media and Citation	Description of Requirement	Potential ARAR Status	Standard
			(2) For the inorganic chemicals and carbon disulfide, cyclohexanone, and methanol, treatment must achieve 90% reduction in constituent concentrations as measured in leachate from the treated media (tested according to the TCLP) or 90% reduction in total constituent concentrations (when a metal removal treatment technology is used), subject to item 3 below. (3) When treating any constituent subject to achieve a 90% reduction standard would result in a concentration less than 10 times the UTS for that constituent, treatment to achieve constituent concentrations less than 10 times the UTS is not required. This is commonly referred to as "90% capped by 10x UTS."
Soil/debris contaminated with RCRA hazardous waste – variance OAC Section 3745-270-44	The Ohio EPA Director will recognize a variance approved by USEPA from the alternative treatment standards for hazardous contaminated soil or for hazardous debris.	Potentially applicable to RCRA hazardous soil or debris that is generated and placed back into a unit and that will be disposed of on site.	A site-specific variance from the soil treatment standards that can be used when treatment to concentrations of hazardous constituents higher than those specified in the soil treatment standards and minimizes short- and long-term threats to human health and the environment. In this way, on a case-by-case basis, risk-based LDR treatment standards approved through a variance process could supersede the soil treatment standards.

Table A-1. Potential Action-specific ARARs (continued)

Media and Citation	Description of Requirement	Potential ARAR Status	Standard
Treatment of hazardous waste in a miscellaneous treatment unit OAC Section 3745-57-91	These standards address the management and treatment of hazardous wastes when such activities do not fall under the descriptions or prerequisites of other hazardous waste units covered in the regulations.	Potentially applicable to the thermal treatment of RCRA hazardous waste.	Unit must be located, designed, constructed, operated and maintained, and closed in a manner that will ensure protection of human health and the environment. Protection of human health and the environment includes, but is not limited to, prevention of any release that may have adverse effects on human health or the environment due to migration of waste constituents in the air, considering the factors listed in OAC Section 3745-57-91.
Reuse of treated soil as fill ORC 3734.02	Ohio considers the soil that will be excavated and treated to be a solid waste. The transportation, temporary storage, and treatment of the soil are not directly regulated; however, the treated soil is still considered a solid waste after treatment and its ultimate disposal is regulated by our Division of Materials and Waste Management Solid Waste program. An exemption in this case, would exempt the treated soil from solid waste disposal and closure requirements, thus allowing its unrestricted use or placement on the facility.	Applies to treated soil reused as fill at the facility	The director, by order, may exempt any person generating, collecting, storing, treating, disposing of, or transporting solid wastes, in such quantities or under such circumstances that, in the determination of the director, are unlikely to adversely affect the public health or safety or the environment from any solid waste requirement.

AOC = Area of Concern.
ARAR = Applicable or Relevant and Appropriate Requirement.
CFR = Code of Federal Regulations.
LDR = Land Disposal Restriction.
OAC = Ohio Administrative Code.
Ohio EPA = Ohio Environmental Protection Agency.
RCRA = Resource Conservation and Recovery Act.
TCLP = Toxicity Characteristic Leaching Procedure.
UHC = Underlying Hazardous Constituent.
USEPA = U.S. Environmental Protection Agency.
UTS = Universal Treatment Standards.

APPENDIX B

Affidavits

THIS PAGE INTENTIONALLY LEFT BLANK.

NOTICE OF DOCUMENT AVAILABILITY

Proposed Plan for Load Line 1, Load Line 2, Load Line 3, Load Line 4 at the Former Ravenna Army Ammunition Plant (RVAAP)

The Proposed Plan for Load Line 1, Load Line 2, Load Line 3, Load Line 4 and Load Line 12 presents a recommendation of Ex-situ Thermal Treatment of Soil and Administrative Land Use Controls (LUCs) and provides the rationale for this recommendation. The Proposed Plan is now available for public review from June 10, 2019 to July 10, 2019.

The Proposed Plans are available at:

Newton Falls Public Library 204 South Canal Street Newton Falls, Ohio 44444	Reed Memorial Library 167 East Main Street Ravenna, Ohio 44266

The Proposed Plans are also available at www.rvaap.org

Please join us for an OPEN HOUSE and PUBLIC MEETING.

The Army National Guard will host an informational open house and a public meeting to explain the recommendation in the Proposed Plan. Oral and written comments will be accepted at the meeting. Written comments may also be mailed to the Camp James A. Garfield Environmental Office, 1438 State Route 534 SW, Newton Falls, OH 44444. Comments will be accepted during the public comment period from June 10, 2019 to July 10, 2019.

The public meeting is scheduled for:

Thursday, June 20, 2019 6:00 pm Open House 6:30 pm Public Meeting	at: Sheaser Community Center (Paris Township Hall) 9355 Newton Falls Road Ravenna, OH 44266

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

#161-1T-June 10, 2019 #4142

PROOF OF PUBLICATION

STATE OF OHIO
TRUMBULL COUNTY SS CONNIE PACEK

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

THAT THE ATTACHED ADVERTISEMENT WAS PUBLISHED IN THE TRIBUNE CHRONICLE EVERY Monday FOR ONE CONSECUTIVE WEEKS AND THAT THE FIRST INSERTION WAS ON Monday THE 10th DAY OF June 2019

SWORN TO BEFORE ME AND SUBSCRIBED IN MY PRESENCE ON THIS 11TH DAY OF JUNE 2019

NOTARY PUBLIC

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

SEAL

ADVERTISING COST $ 274.19

Affidavit of Publication, Tribune Chronicle, June 10, 2019

Affidavit of Publication, Record Courier, June 10, 2019

31193993

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

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

30 Record-Courier a newspaper printed and published in the city of Kent, and of General circulation in the County of Portage, State of Ohio, and personal knowledge of the facts herein stated and that the notice hereto annexed was Published in said newspapers for 1 insertions on the same day of the week from and after the 10th day of June, 2019 and that the fees charged are legal.

Name of Account: Leidos
Ad Number: 12566890
No. of Lines: 28

Day(s) Published: 06/10.
Printers Fee: $115.20

Sworn to and subscribed before this 10th day of June, 2019.

Elizabeth McDaniel
Notary Public
Commission Expires June 19, 2021

Notice of Document Availability

Proposed Plan for Load Line 1, Load Line 2, Load Line 3, Load Line 4, and Load Line 12 at the Former Ravenna Army Ammunition Plant (RVAAP)

The Proposed Plan for Load Line 1, Load Line 2, Load Line 3, Load Line 4, and Load Line 12 presents a recommendation of Ex-situ Thermal Treatment of Soil and Administrative Land Use Controls (LUCs) and provides the rationale for this recommendation. The Proposed Plan is now available for public review from June 10, 2019 to July 10, 2019.

The Proposed Plans are available at:

Newton Falls Public Library
204 South Canal Street
Newton Falls, Ohio 44444

Reed Memorial Library
187 East Main Street
Ravenna, Ohio 44266

The Proposed Plan is also available at: www.rvaap.org

Please join us for an OPEN HOUSE and PUBLIC MEETING.

The Army National Guard will host an informational open house and a public meeting to explain the recommendation in the Proposed Plan. Oral and written comments will be accepted at the meeting. Written comments may also be mailed to the Camp James A. Garfield Environmental Office; 1438 State Route 534 SW, Newton Falls, OH 44444. Comments will be accepted during the public comment period from June 10, 2019 to July 10, 2019.

The public meeting is scheduled for:

Thursday June 20, 2019
6:00 pm Open House
6:30 pm Public Meeting

at:

Shearer Community Center (Paris Township Hall)
9355 Newton Falls Road
Ravenna, OH 44266

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