Final

Engineering Evaluation/Cost Analysis for CC RVAAP-70 East Classification Yard Ravenna Army Ammunition Plant Restoration Program Portage and Trumbull Counties, Ohio

January 28, 2021

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Delivery Order: 0003

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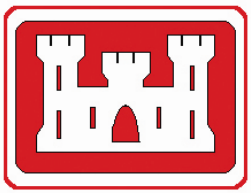

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None.

14. ABSTRACT

This Engineering Evaluation/Cost Analysis evaluates two alternatives for area of concern CC RVAAP-70 East Classification Yard where elevated concentrations of potential contaminants are present at unacceptable concentrations in soil. This Engineering Evaluation/Cost Analysis includes a Chemical Evaluation of Soil to fully assess each potential contaminant to identify the areas where potential contaminants need to be addressed to meet Land Use requirements and protect human health and environment. Excavation and off-site disposal of surface soil is recommended for DU03 Building 47-40 Round House Exterior to attain Unrestricted (Residential) Land Use for surface soil. No further action is necessary for subsurface soil.

15. SUBJECT TERMS

Compliance Restoration Site; East Classification Yard; Engineering Evaluation; Cost Analysis; Potential Contaminants; Chemical Evaluation of Soil; Removal Action

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Ohio Environmental Protection Agency

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

February 11, 2021

TRANSMITTED ELECTRONICALLY

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

RE: US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Project Records
Remedial Response
Portage County
ID # 267000859260

Subject: Approval of Final Engineering Evaluation/Cost Analysis for CC RVAAP-70 East Classification Yard

Dear Mr. Sedlak:

The Ohio Environmental Protection Agency (Ohio EPA), Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) has received and reviewed the document titled, "Final Engineering Evaluation/Cost Analysis for CC RVAAP-70 East Classification Yard." The document was prepared for the U.S. Army Corps of Engineers Louisville District, by Parsons, 600 Dr. Martin Luther King Jr. Place, Louisville, Kentucky 40202-2267.

Ohio EPA approves the document.

As a precautionary response to COVID-19, Ohio EPA is currently operating with most staff working remotely. During this time, we will not be issuing hard-copy mail. This letter is an official response from Ohio EPA that will be maintained as a public record.

If you have any questions concerning this letter, please contact Edward D'Amato at (330) 963-1170, or via email at ed.damato@epa.ohio.gov.

Sincerely,

Edward J D'Amato

Edward D'Amato
Site Coordinator
Division of Environmental Response and Revitalization

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CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

Parsons has completed the Final Engineering Evaluation/Cost Analysis for CC RVAAP-70 East Classification Yard at the Ravenna Army Ammunition Plant, Ravenna, 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 this 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 the level of data obtained; and the reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing United States Corps of Engineers policy.

Independent Technical Reviewer:

Dan Griffiths, C.P.G, P.G. _____ 19 October 2020

Technical Director (Signature) (Date)

Parsons

Report Preparer/Reviewer:

Edward Heyse, Ph.D., P.E. _____ 28 January 2021

Project Manager (Signature) (Date)

Parsons

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Final

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for the

Engineering Evaluation/Cost Analysis
for CC RVAAP-70 East Classification Yard

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Camp James A. Garfield, Ohio

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ARNG = Army National Guard
DERR = Division of Environmental Response and Revitalization
NEDO = Northeast District Office
OHARNG = Ohio Army National Guard
Ohio EPA = Ohio Environmental Protection Agency
RVAAP = Ravenna Army Ammunition Plant
REIMS = Ravenna Environmental Information Management System
SWDO = Southwest District Office
USACE = United States Army Corps of Engineers

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LIST OF ACRONYMS AND ABBREVIATIONS

AOC	area of concern
ARAR	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
BSV	Background Screening Value
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CES	Chemical Evaluation of Soil
CJAG	Camp James A. Garfield Joint Military Training Center Ravenna
DERR	Division of Environmental Response and Revitalization
DUs	decision units
ECC	Environmental Chemical Corporation
EE/CA	Engineering Evaluation/Cost Analysis
ELCR	Excess Lifetime Cancer Risk
FD	field duplicate
$feet^3$	cubic feet
FWCUGs	Facility-Wide Cleanup Goals
HQ	hazard quotient
HRR	Historical Records Review
ID	identification
ISM	incremental sampling methodology
J	estimated value
MDC	maximum detected concentration
mg/kg	milligrams per kilogram
NA	not available
NCP	National Oil and Hazardous Substances Contingency Plan
NEDO	Northeast District Office
No.	Number
OAC	Ohio Administrative Code
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
PAHs	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
RAOs	removal action objectives
REIMS	Ravenna Environmental Information Management System
RI	Remedial Investigation
RSLs	Regional Screening Levels
RVAAP	Ravenna Army Ammunition Plant
SAIC	Science Applications International Corporation
SI	Site Inspection
SRCs	site-related chemicals
SVOCs	semivolatile organic compounds
SWDO	Southwest District Office
TAL	target analyte list
TBC	to be considered
TCLP	Toxicity Characteristic Leaching Procedure
USEPA	U.S. Environmental Protection Agency

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

VOCs	volatile organic compounds
yds^3	cubic yards

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1. INTRODUCTION

This Engineering Evaluation/Cost Analysis (EE/CA) was prepared by Parsons under Contract No. W912QR-12-D-0002, Delivery Order No. 0003. This EE/CA identifies and assesses Alternatives to support the selection of appropriate remedial actions for the CC RVAAP-70 East Classification Yard area of concern (AOC) at the Camp James A. Garfield Joint Military Training Center (CJAG) (formerly the Ravenna Army Ammunition Plant [RVAAP]) in Portage and Trumbull counties, Ohio. The AOC is located at the former RVAAP in Ravenna, Ohio. The location of the former RVAAP is provided on Figure 1-1, and the location of CC RVAAP-70 East Classification Yard is shown on Figure 1-2. The current layout of AOC CC RVAAP-70 East Classification Yard is shown on Figure 1-3.

This EE/CA was prepared in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) guidance and regulations, the Ohio Environmental Protection Agency (Ohio EPA) Director's Final Findings and Orders (Ohio EPA, 2004), and the National Oil and Hazardous Substances Contingency Plan (NCP, USEPA, 1990). As per NCP 300.415(b)(4)(i), where a planning period of at least six months exists before any on-site activities must be initiated, and the lead agency has determined that a removal action is appropriate, an EE/CA must be prepared. This document was prepared in accordance with the *Submission Format Guidelines for the Ravenna Army Ammunition Plant Restoration Program, Version 21* (Vista Sciences Corporation, 2015).

The Site Inspection (SI) report (Parsons, 2018) recommended that CC RVAAP-70 East Classification Yard proceed to the Remedial Investigation (RI) phase of the CERCLA process. The RI was deemed necessary to further evaluate potential contaminants identified in surface and subsurface soil. The Army prepared a Draft RI Work Plan for CC RVAAP-70 (Parsons, 2019) in July 2019. Upon reviewing the Draft RI Work Plan, the Ohio EPA noted that most contaminant concentrations did not warrant remedial action and suggested that contaminants at the AOC might be addressed with a limited removal action (Ohio EPA, 2019). The Army agreed with the Ohio EPA evaluation and determined that the most efficient and cost-effective way to proceed with the CERCLA process is with an EE/CA. This EE/CA includes a Chemical Evaluation of Soil (CES) to fully assess each potential contaminant to identify the areas that need to be addressed to meet Land Use requirements and protect human health and environment.

The EE/CA is being done without an RI because the extent and nature of contamination is known at the CC RVAAP-70 East Classification Yard. This EE/CA streamlines the CERCLA process for the AOC and allows the CERCLA process to proceed in a defensible and cost-effective manner. The EE/CA process will ensure appropriate measures are taken to protect human health, the community, and the environment. This report was prepared in accordance with CERLCA (42 U. S. Code 9601 et seq.) requirements to develop and evaluate removal action alternatives. Following CERCLA guidance, this EE/CA identifies removal action objectives (RAOs), identifies potential removal action alternatives, and evaluates alternatives against criteria identified in U. S. Environmental Protection Agency (USEPA) *Guidance on Conducting Non-Time Critical Removal Actions under CERCLA* (USEPA, 1993).

1.1 SCOPE AND PURPOSE

The purpose of this EE/CA is to evaluate limited alternatives for the AOC for specific areas where elevated concentrations of potential contaminants are present at unacceptable concentrations.

Following CERCLA guidance, this EE/CA identifies RAOs, identifies potential removal action alternatives, and evaluates alternatives against criteria identified in *Guidance on Conducting Non-Time Critical Removal Actions under CERCLA* (USEPA, 1993). The final outcome of this EE/CA is to identify the most suitable alternative that ensures the AOC meets the requirements for Unrestricted (Residential) Land Use.

1.2 REPORT ORGANIZATION

The EE/CA report is organized into the following sections:

- Section 1 (Introduction) – Provides an overview of the purpose, scope, and organization of this EE/CA.
- Section 2 (Site Description and History) – Summarizes the facility description, site background and description, and previous investigations and results.
- Section 3 (Chemical Evaluation of Soil) – Evaluates chemicals in soil.
- Section 4 (Removal Action Objectives, Cleanup Goals, and Volume Calculations) – Summarizes the RAOs, cleanup goals, and volumes of soil requiring removal.
- Section 5 (Applicable or Relevant and Appropriate Requirements) – Identifies the chemical-, location-, and action-specific Applicable or Relevant and Appropriate Requirements (ARARs) for the site.
- Section 6 (Identification of Alternatives) – Presents the removal action alternatives.
- Section 7 (Analysis of Alternatives) – Presents the detailed analysis of alternatives using the evaluation criteria.
- Section 8 (Comparative Analysis of Alternatives) – Presents a comparative analysis of the two alternatives.
- Section 9 (Agency Coordination and Public Involvement) – Summarizes the agency coordination and public involvement activities.
- Section 10 (Recommended Alternative) – Presents the recommended action for CC RVAAP-70 East Classification Yard.
- Section 11 (References) – Provides references for all cited documents.

The appendices to this document contain the summarized investigation data, including:

- Appendix A – ARARs
- Appendix B – Costs

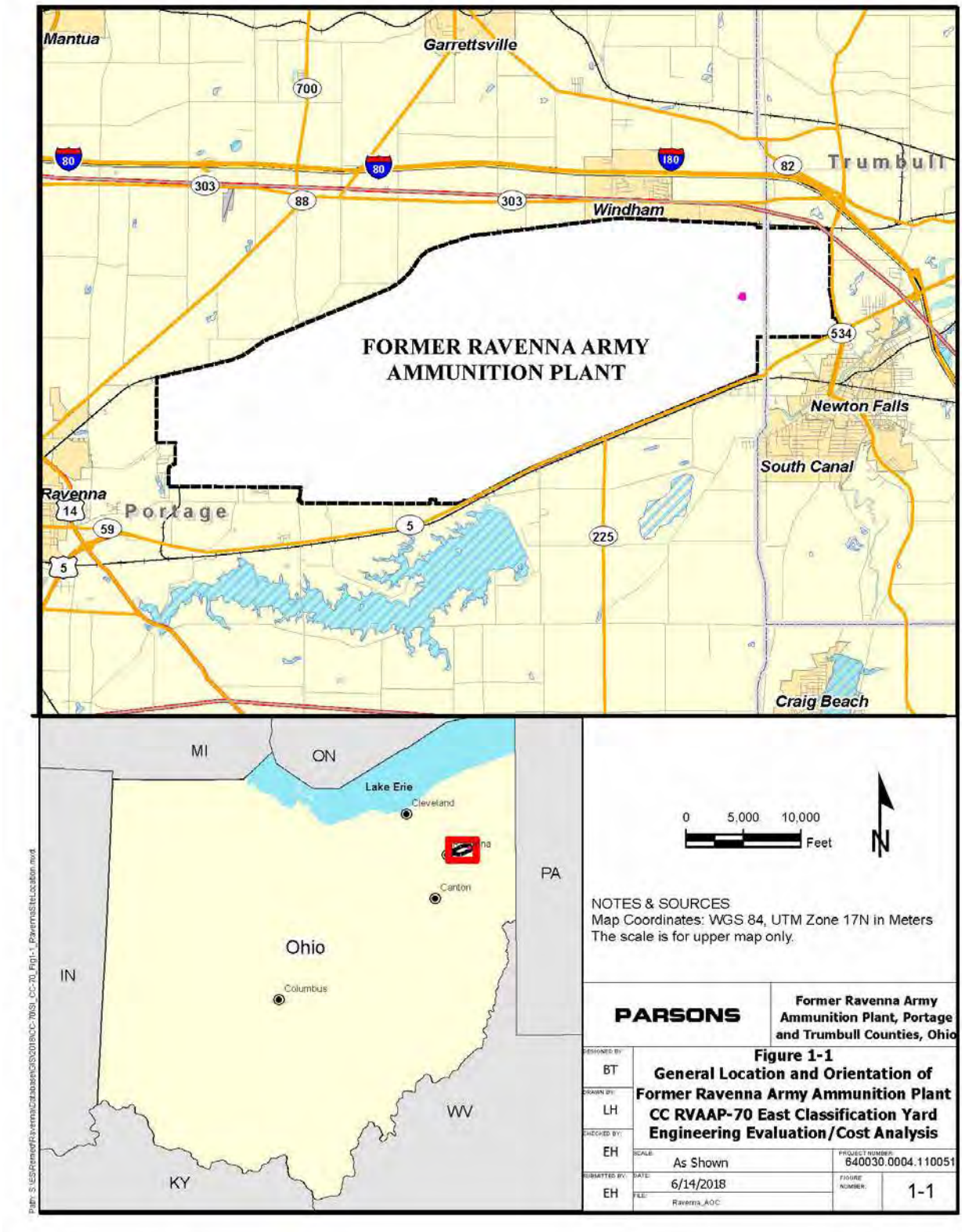

Figure 1-1 General Location and Orientation of Former Ravenna Army Ammunition Plant

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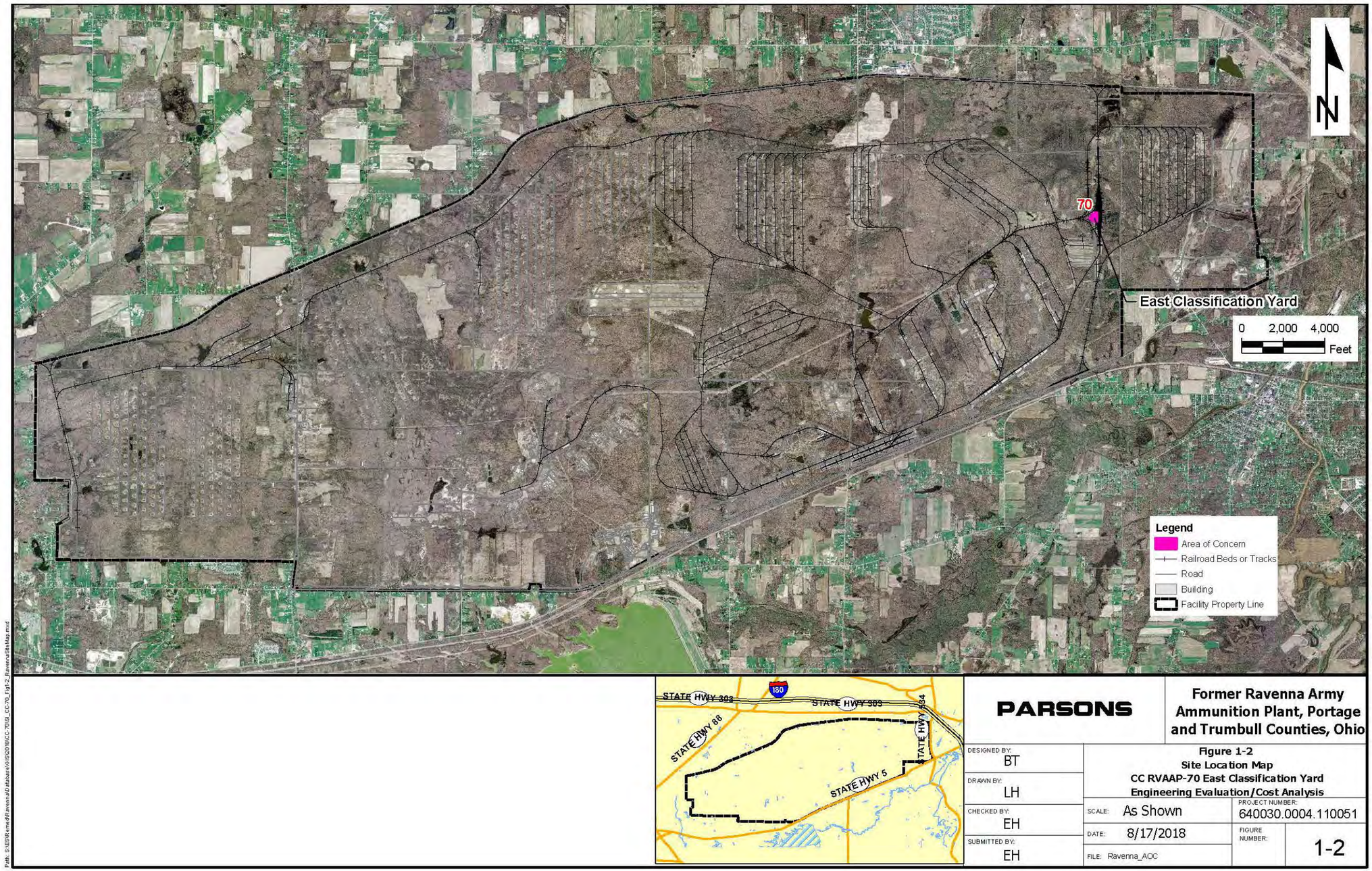

Figure 1-2 Site Location Map

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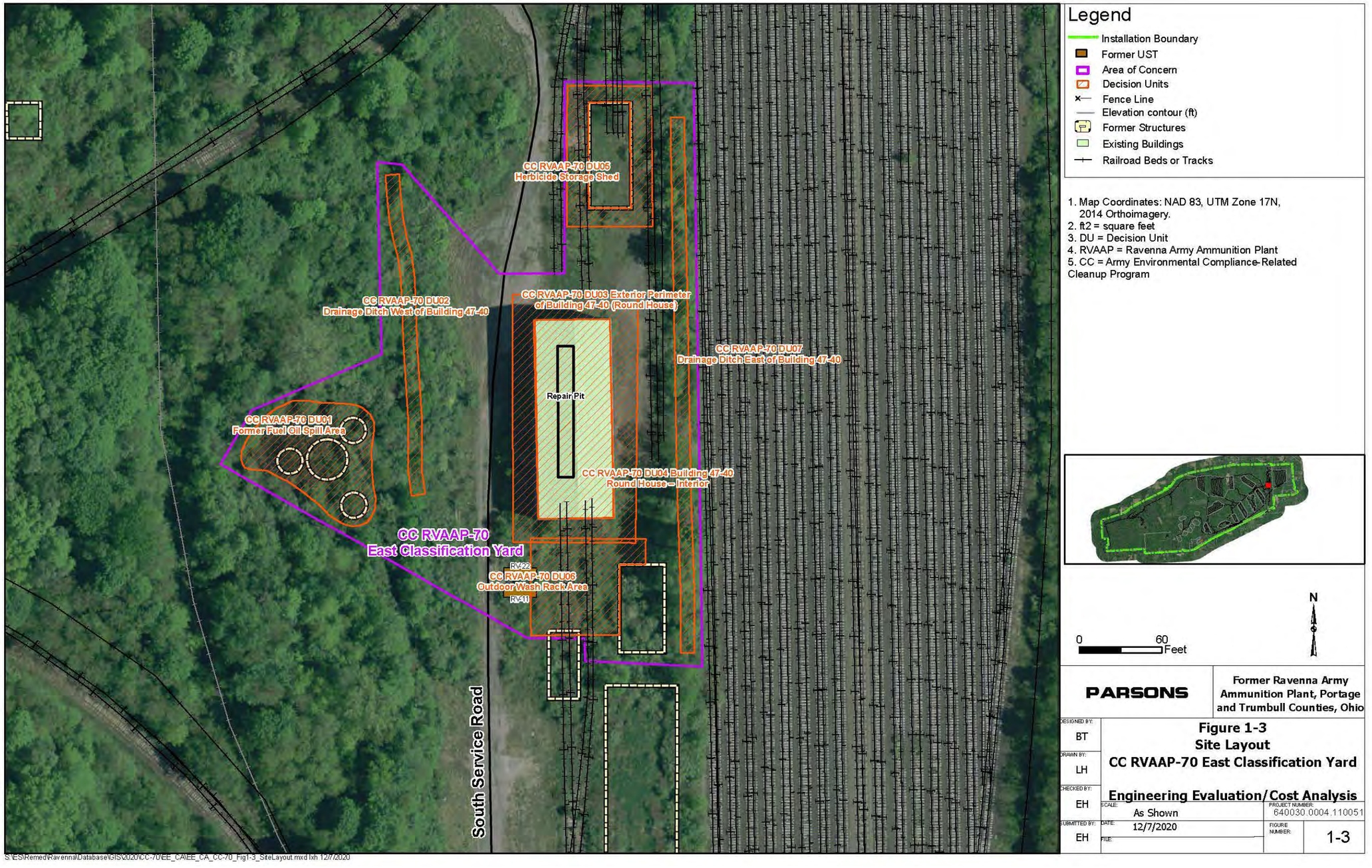

Figure 1-3 Site Layout

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2. SITE DESCRIPTION AND HISTORY

2.1 GENERAL FACILITY

The former RVAAP, now known as CJAG, is located in northeastern Ohio within Portage and Trumbull counties. CJAG is approximately three (3) miles east/northeast of the City of Ravenna and one (1) mile north/northwest of the City of Newton Falls (Figure 1-1). CJAG is federally owned and is approximately 11 miles long and 3.5 miles wide. CJAG is bounded by State Route 5, the Michael J. Kirwan Reservoir, and the CSX System Railroad to the south; Garret, McCormick, and Berry Roads to the west; the Norfolk Southern Railroad to the north; and State Route 534 to the east. In addition, CJAG is surrounded by the communities of Windham, Garrettsville, Charlestown, and Wayland.

As of September 2013, administrative accountability for the entire 21,683-acre facility has been transferred to the United States Property and Fiscal Officer for Ohio and the property subsequently licensed to the Ohio Army National Guard (OHARNG) for use as a military training site, CJAG. The RVAAP restoration program involves cleanup of former production/operational areas throughout CJAG related to former activities conducted under the RVAAP. The Ohio EPA is the regulatory agency for the investigation and remediation conducted by the U.S. Army under the U.S. Department of Defense Installation Restoration Program.

2.2 EAST CLASSIFICATION YARD DESCRIPTION

This section presents a summary of the East Classification Yard history, previous removal actions and investigations, and site-related chemicals (SRCs) in environmental media at the AOC.

2.2.1 Operational History

The former RVAAP was originally equipped with east and west classification yards during the facility's early operational years. CC RVAAP-70 East Classification Yard is located east of Load Line 1 and the Defense Logistics Agency former Main Ore Storage Area, and in close proximity to the intersection of Ramsdell Road and Irons Road (Figure 1-3). No documentation was found during the Historical Records Review (HRR) (SAIC, 2011) to define the specific years of operation of the AOC. The CC RVAAP-70 East Classification Yard AOC consists of Building 47-40 (the Round House still exists, but is not actively used), the former herbicide storage shed (former Building 47-60), the containment area for a former aboveground storage tank (documented spill of No. 5 fuel oil occurred within the containment area in 1986), and an outdoor open wash rack south of Building 47-40 (north of Butts-Kistler Road). A railroad track complex is located east of the AOC and is currently used by the OHARNG. Most of the other rail lines in the area have been removed. Two former 15,000-gallon diesel fuel underground storage tanks, RV-11 and RV-22, were located west of the wash rack, but were removed in February 1990 and received No Further Action determinations in April 1992 (SAIC, 2011).

The CC RVAAP-70 East Classification Yard was used for switching and maintaining railroad cars. Building 47-40 (Round House) was used for locomotive engine repairs and other maintenance activities (SAIC, 2011). The former herbicide storage shed was used to store a track-mounted herbicide sprayer and the herbicides used to control vegetation along the railroads at the former RVAAP. Interviewees for the HRR noted that an outdoor open wash rack was located to the south of Building 47-40 which was used to wash box cars. The wash rack was also reportedly used to wash train engines.

2.2.2 Historical Records Review

The following paragraphs summarize details for CC RVAAP-70 East Classification Yard presented in the *Final Historical Records Review Report for the 2010 Phase I Remedial Investigation Services at Compliance Restoration Sites (9 Areas of Concern), Ravenna Army Ammunition Plant, Ravenna, Ohio* (SAIC, 2011).

A spill report dated 11 August 1986 documents a leak of No. 5 fuel oil from an aboveground storage tank (Tank 65B) from the CC RVAAP-70 East Classification Yard. The spill report indicates that a broken valve caused the leak. The entire contents of the tank emptied into the bermed containment area. The report indicates the containment area was scarified and the contaminated soil was piled within the containment area. However, no quantities of contaminated soil were noted. The report indicates that approximately 16,632 gallons of fuel oil was salvaged from the containment area and approximately 120 gallons of oil mixed with dirt and straw were to be disposed per Ohio EPA instructions. The report indicates that straw was placed on oil in areas where the equipment could not reach, such as beneath the support structures and by piping. Samples of the contaminated soil were collected to determine if the contaminated soil could be incinerated in accordance with the regulations at that time, and the soil met the criteria for incineration. No final report regarding the cleanup was found during the HRR evaluation. The tanks had since been removed from the AOC and the area was overgrown with vegetation during the HRR site walks. The HRR recommended that surface and subsurface soil within, and in the vicinity of, the former tank containment area and surface soil and dry sediment within any nearby surface water conveyances be analyzed for semivolatile organic compounds (SVOCs) and volatile organic compounds (VOCs).

Building 47-40 (Round House) was used as a locomotive maintenance and repair building. Building 47-40 still exists but is no longer used for any purpose. Building 47-40 is a red brick building approximately 55 feet by 143.5 feet by 36 feet. The interior of the building contains a floor pit that was used by personnel to access the undersides of the engines for repair. No documented evidence related to spills or releases were found for the Round House building. Building 47-40 also contained at least two polychlorinated biphenyl (PCB) transformers. Service to the transformers is unknown. Interviewees indicated the transformer oil was tested for PCBs; however, no records of testing were discovered during the HRR evaluation. Staining from past operations was visible on the concrete floor within the building. No other visible evidence of impacts was noted during the property visit/perimeter survey. The HRR recommended that surface soil and dry sediment samples around doors and service bay entrances and in drainage ditches leading from the building to the storm sewer inlets located around the building be analyzed for target analyte list (TAL) metals, SVOCs, and PCBs. (Note, the HRR term “dry sediment” referred to soil that is only intermittently covered with surface water. “Dry sediment” is surface soil.)

A storage shed used to store herbicides and a track mounted sprayer was located in the CC RVAAP-70 East Classification Yard. Herbicide mixing operations may also have occurred at the building. The interviewees noted the herbicides may have been mixed with waste oil and applied for vegetation control. The HRR did not identify any documents relating to spills or releases from herbicide storage and mixing. No documentation was found, but some herbicide applications used petroleum products (e.g., oil, kerosene, diesel fuel) as carrier agents. No documentation was found pertaining to the amount of herbicides stored in the herbicide storage shed; however, one interviewee noted the amount stored was approximately 20 gallons. No visible signs that a spill or release had occurred (e.g., stained soil, stressed vegetation) were observed in the area of the

former herbicide storage shed. The HRR recommended that surface soil near the former shed and in any runoff conveyances be analyzed for herbicides and SVOCs.

Two interviewees noted the presence of an outdoor wash rack, assumed to be used to wash down the box cars and/or the train engines, on site. The wash rack was outdoors and open with no means of collecting wastewater. No documents related to the wash rack were discovered during the HRR. The wash rack was reportedly supplied with water from nearby Well House #15. One interviewee noted there were no controls in place to collect the wash water. Field personnel noted the potential location of the wash rack just south of Building 47-40 and north of Butts-Kistler Road. Concrete aboveground storage tank supports were discovered at the location along with old abandoned pipes and valves, assumed to be water pipes from the well house. No visual evidence of impacts (e.g., stained soil, stressed vegetation) from the tank or wash rack activities was observed. The HRR recommended that surface soil and dry sediment in the vicinity of the former wash rack and any runoff conveyances be analyzed for explosives, SVOCs, and PCBs.

2.2.3 Site Investigation

SI sampling and analyses plans were designed based on specific recommendations for each of the potential release areas within the AOC as outlined in the HRR (SAIC, 2011). Initial SI field work was detailed in a work plan (ECC, 2012) and sampling was conducted in November and December 2012 and April 2013. A follow-on work plan was developed for additional sampling (Parsons, 2017), which was conducted at CC RVAAP-70 East Classification Yard in January and February 2018.

An SI Report (Parsons, 2018) was completed to document the results of the field activities performed for RVAAP-70 East Classification Yard. As part of the SI, surface soil (0-1 foot below ground surface [bgs]) and subsurface soil (greater than 1 foot bgs) were sampled to determine the presence of SRCs and identify potential contaminants within the AOC. There are no perennial surface water streams, wetlands, or sediment in the immediate vicinity of CC RVAAP-70 East Classification Yard. The exposure pathway for surface water is incomplete because surface water is only intermittently present at the AOC. Ditches are located on the east and west sides of Building 47-40 and receive intermittent storm water runoff. Surface water and sediment were not present at this AOC during the SI field work in 2012 and 2018, but surface water was observed in drainage ditches in April 2015 following a rain event. Groundwater is being evaluated on a facility-wide basis (RVAAP-66 Facility-Wide Groundwater). Therefore, samples were not collected from surface water, sediment (i.e., from a perennial surface water body), or groundwater during the SI.

The AOC was divided into decision units (DUs) based on potential release areas for investigation:

- Former Fuel Oil Spill Area – DU01
- Drainage Ditch West of Building 47-40 – DU02
- Building 47-40 (Round House)
  - Building 47-40 Round House – Exterior – DU03
  - Building 47-40 Round House – Interior– DU04
- Former Herbicide Storage Shed – DU05
- Outdoor Wash Rack Area – DU06

- Drainage Ditch East of Building 47-40 – DU07

Data generated during the CC RVAAP-70 East Classification Yard SI were screened to identify SRCs and included incremental sampling methodology (ISM) surface soil, discrete surface soil, and subsurface soil samples (Figure 2-1).

Sample analytical results were assessed to evaluate the presence or absence of contamination. Essential minerals and metals present within background levels were eliminated as potential contaminants. The maximum detected concentration (MDC) of each SRC identified by the SI at each DU was compared to its most stringent Facility-Wide Cleanup Goals (FWCUGs) established for the Resident Receptor (SAIC, 2010) at the former RVAAP in surface or subsurface soils. Concentrations were compared to USEPA Residential Receptor Regional Screening Levels (RSLs) (USEPA, 2018) at cancer risk of 1×10^{-6} or a hazard quotient (HQ) of 0.1 for those analytes without established FWCUGs, and for polycyclic aromatic hydrocarbons (PAHs) because USEPA updated the toxicity of these compounds after FWCUGs were developed. The potential for contamination to migrate and contact receptors was also evaluated.

The SI recommended further evaluation in an RI for CC RVAAP-70 East Classification Yard due to potential contaminants in surface soil (Figure 2-2) and subsurface soil (Figure 2-3):

<u>DU01 Former Fuel Oil Spill Area</u>

- Surface soil: benzo(a)pyrene
- Subsurface soil: benzo(a)pyrene and benzo(a)anthracene

<u>DU02 Drainage Ditch West of Building 47-40</u>

- Surface soil: benzo(a)pyrene

<u>DU03 Building 47-40 Round House - Exterior</u>

- Surface soil: benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene

<u>DU05 Former Herbicide Storage Shed</u>

- Surface soil: benzo(a)pyrene

<u>DU06 Outdoor Wash Rack Area</u>

- Surface soil: benzo(a)pyrene

<u>DU07 Drainage Ditch East of Building 47-40</u>

- Surface soil: arsenic, aroclor-1242, and benzo(a)pyrene.

No further investigation was recommended for subsurface soil at DU03 Building 47-40 Round House - Exterior, DU04 Building 47-40 Round House – Interior, DU05 Former Herbicide Storage Shed, and DU06 Outdoor Wash Rack Area as no potential contaminants were identified.

2.2.4 Post Site Investigation Evaluation

After the SI Report was finalized, the Army prepared a Draft RI Work Plan (Parsons, 2019). The draft work plan proposed additional soil sampling for contaminant delineation and risk assessment.

Ohio EPA reviewed the draft work plan (Ohio EPA, 2019) and noted that the screening values used in the SI and the draft RI work plan were one-tenth of the acceptable unrestricted (residential)

cleanup goal, and that contaminant concentrations for many of the DUs within the AOC were sufficiently low as to not require remedial action. Ohio EPA further noted that the standard remedial approach of the USEPA and NCP is to accomplish an RI/FS only if remedial action is warranted. Ohio EPA questioned whether the SI recommendation of an RI/FS was justified or if the AOC could be resolved using another mechanism such as a limited removal action.

Ohio EPA (Ohio EPA, 2019) also included an assessment of each potential contaminant at each DU as identified in the SI:

DU01 Former Fuel Oil Spill Area

- Surface soil: benzo(a)pyrene concentration is below the standard for unrestricted land use.
- Subsurface soil: benzo(a)pyrene and benzo(a)anthracene concentrations exceeded screening values in only two of ten subsurface samples. Only one value marginally exceeds the unrestricted residential standard. Subsurface soils will likely meet unrestricted residential standards.

DU02 Drainage Ditch West of Building 47-40

- Surface soil: benzo(a)pyrene concentration is below the standard for unrestricted land use.

DU03 Building 47-40 Round House - Exterior

- Surface soil: - This is the only DU that has notable contamination (benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene). The DU as currently defined could be remediated by excavating the surface soil and replacing it with clean fill.

DU05 Former Herbicide Storage Shed

- Surface soil: benzo(a)pyrene concentration is below the standard for unrestricted land use.

DU06 Outdoor Wash Rack Area

- Surface soil: benzo(a)pyrene concentration is below the standard for unrestricted land use.

DU07 Drainage Ditch East of Building 47-40

- Surface soil: arsenic concentrations are typical of background and therefore do not constitute a release. Aroclor-1242 and benzo(a)pyrene concentrations are below the standards for unrestricted land use.

Upon review of the Ohio EPA (2019) evaluation, the Army agreed that an RI was not warranted for the CC RVAAP-70 East Classification Yard, and to pursue a removal action for surface soil contaminants at DU03. The Army determined that it would be more efficient and cost-effective to proceed with the CERCLA process with an EE/CA to address CC RVAAP-70 contamination.

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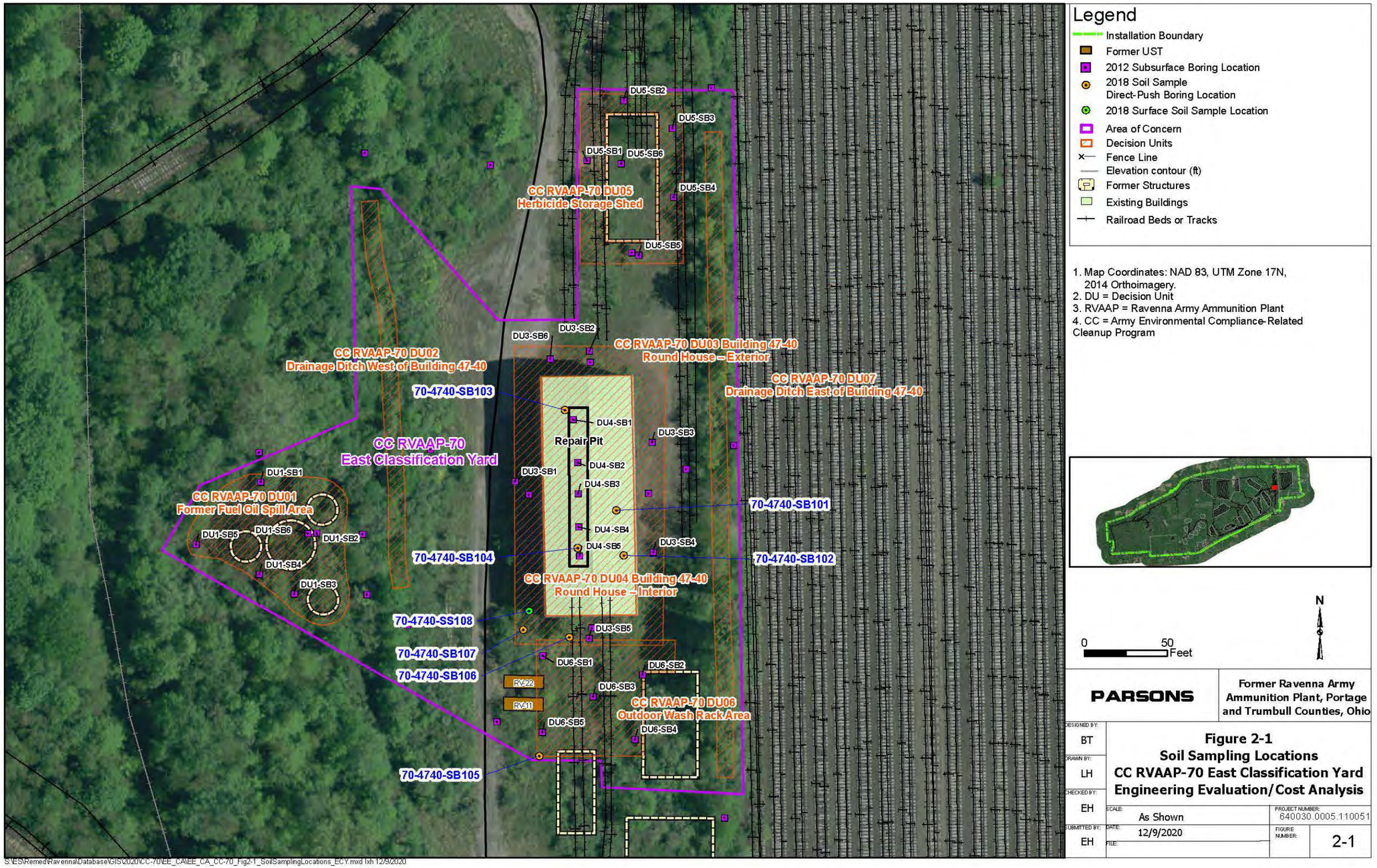

Figure 2-1 Soil Sampling Locations

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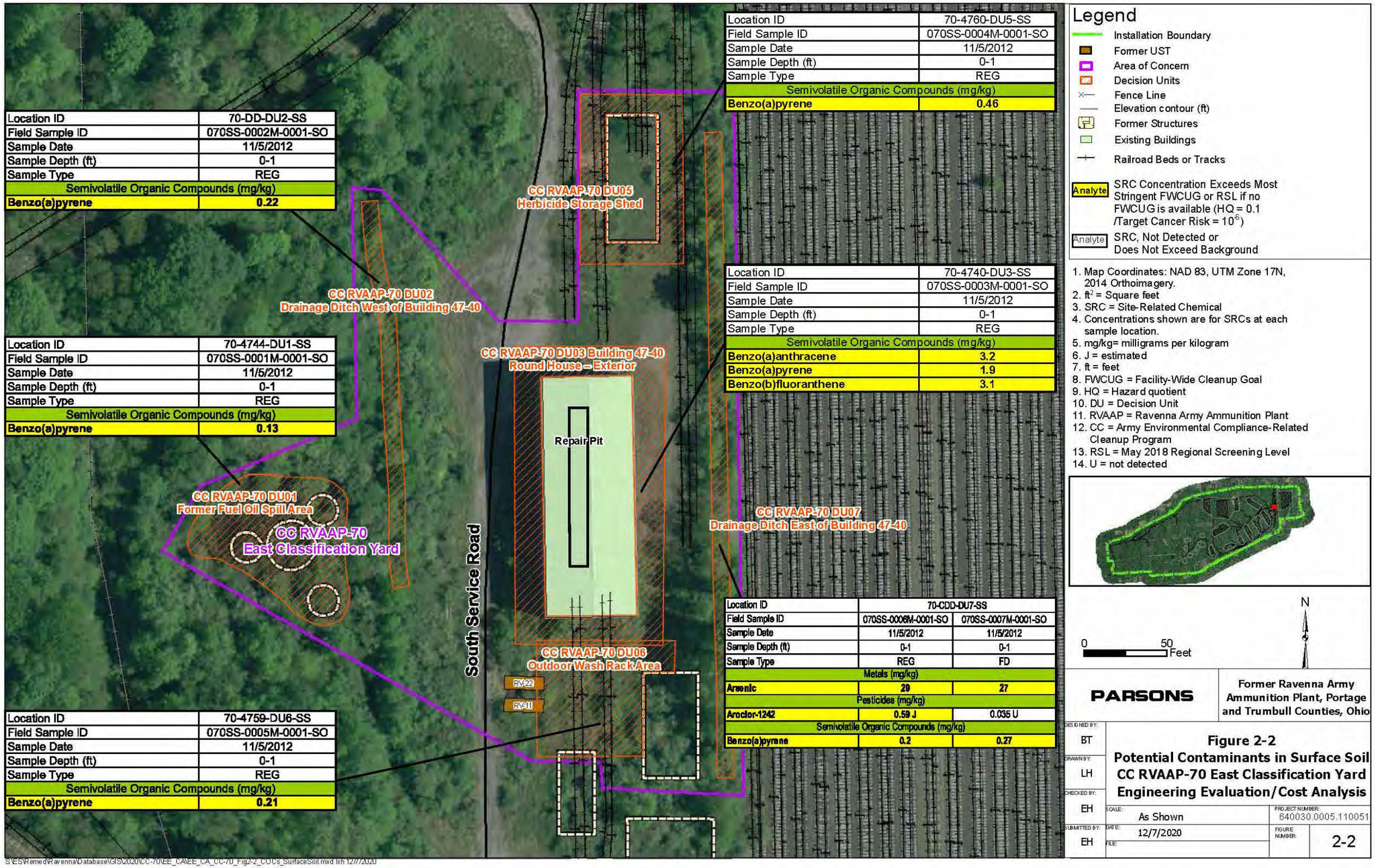

Figure 2-2 Potential Contaminants in Surface Soil

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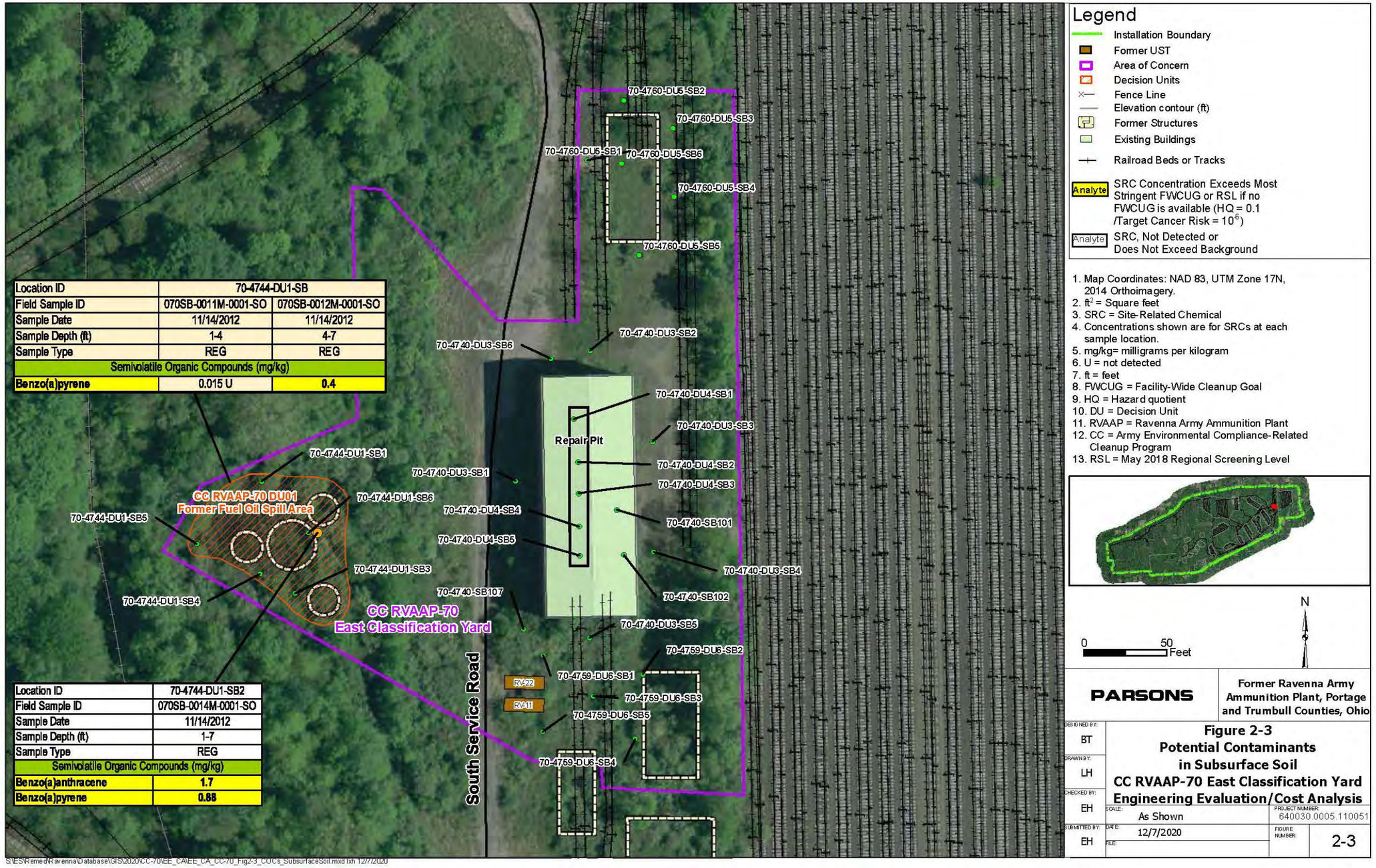

Location ID	70-4744-DU1-SB	
Field Sample ID	070SB-0011M-0001-SO	070SB-0012M-0001-SO
Sample Date	11/14/2012	11/14/2012
Sample Depth (ft)	1-4	4-7
Sample Type	REG	REG
Semivolatile Organic Compounds (mg/kg)		
Benzo(a)pyrene	0.015 U	0.4

Location ID	70-4744-DU1-SB2
Field Sample ID	070SB-0014M-0001-SO
Sample Date	11/14/2012
Sample Depth (ft)	1-7
Sample Type	REG
Semivolatile Organic Compounds (mg/kg)	
Benzo(a)anthracene	1.7
Benzo(a)pyrene	0.88

Legend

- Installation Boundary
- Former UST
- Area of Concern
- Decision Units
- Fence Line
- Elevation contour (ft)
- Former Structures
- Existing Buildings
- Railroad Beds or Tracks
- Analyte — SRC Concentration Exceeds Most Stringent FWCUG or RSL if no FWCUG is available (HQ = 0.1 /Target Cancer Risk = 10^{-6})
- Analyte — SRC, Not Detected or Does Not Exceed Background

1. Map Coordinates: NAD 83, UTM Zone 17N, 2014 Orthoimagery.
2. ft^2 = Square feet
3. SRC = Site-Related Chemical
4. Concentrations shown are for SRCs at each sample location.
5. mg/kg= milligrams per kilogram
6. U = not detected
7. ft = feet
8. FWCUG = Facility-Wide Cleanup Goal
9. HQ = Hazard quotient
10. DU = Decision Unit
11. RVAAP = Ravenna Army Ammunition Plant
12. CC = Army Environmental Compliance-Related Cleanup Program
13. RSL = May 2018 Regional Screening Level

N

0 50 Feet

PARSONS

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

DESIGNED BY: BT	Figure 2-3 Potential Contaminants in Subsurface Soil CC RVAAP-70 East Classification Yard Engineering Evaluation/Cost Analysis
DRAWN BY: LH	
CHECKED BY: EH	SCALE: As Shown; PROJECT NUMBER: 640030.0005.110051
SUBMITTED BY: EH	DATE: 12/7/2020; FIGURE NUMBER: 2-3; FILE:

S:\ES\Remed\Ravenna\Database\GIS\2020\CC-70\EE_CA\EE_CA_CC-70_Fig2-3_COCs_SubsurfaceSoil.mxd lxh 12/7/2020

Figure 2-3 Potential Contaminants in Subsurface Soil

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3. CHEMICAL EVALUATION OF SOIL

This section presents the evaluation of the concentrations of chemicals in soil (CES) to assess whether chemicals that were identified as potential contamination in the soil in 2018 SI using the FWCUGs for the Resident Receptor for Unrestricted (Residential) Land Use need further evaluation. The representative receptor for this Land Use is the Resident Receptor (adult and child). Since the chemicals were only assessed in the SI to determine if they were potential contamination, the CES will reassess the concentration of these chemicals to determine if they are hazardous and require additional remedial actions. At the time of this EE/CA, the FWCUGs have not yet been updated; therefore, the USEPA Residential RSLs for soil were used as the primary decision criteria in this CES. The information gained in the CES will be used for the development of RAOs to ensure that the soil is remediated. This CES is a re-evaluation of the chemicals identified as potential contaminants in the 2018 SI for the Unrestricted (Residential) Land Use in surface soil (0-1 foot bgs) and subsurface soil (greater than 1 foot bgs). The CES will determine if additional actions such as soil removal may be required to address chemical contamination in the soil.

3.1 ASSESSMENT PROCESS

The chemicals that were identified as potential contamination in surface and subsurface soil at each of the DUs were re-assessed in this CES. The SI identified potential contaminants by comparing chemical concentrations to a HQ of 0.1 and a cancer risk of 1×10^{-6}. In order to determine if potential contaminants require remediation or removal, concentrations were compared to a HQ of 1.0 and a cancer risk of 1×10^{-5}. The evaluation process completed in the CES involved the following:

- Re-evaluate each metal to compare the concentration detected in each DU to background concentrations. A Weight-of-Evidence (WOE) was completed for each metal that was considered potential contamination in the 2018 SI.
- Determine if the concentration of potential contaminants identified in each DU in the SI are great enough to require remediation. Concentrations were compared to adjusted USEPA RSLs. USEPA RSLs at cancer risk of 1×10^{-6} and HQ of 0.1 were adjusted to 1×10^{-5} or an HQ of 1.0.

3.2 EVALUATION OF POTENTIAL CHEMICAL CONTAMINANTS IDENTIFIED IN THE SI

3.2.1 Surface Soil

Five potential contaminants (arsenic, aroclor-1242, benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene) were identified in surface soil (0-1 foot bgs) in the SI. These potential contaminants are presented in Table 3-1. To determine if any of the potential contaminants require removal, the concentration of potential contaminants in each surface soil DU was compared to the most recent November 2020 USEPA RSLs (risk = 1×10^{-5} and HQ = 1.0), and arsenic was compared to the Background Screening Value (BSV, SAIC, 2010).

Detected concentrations of arsenic at DU07 were evaluated to determine if arsenic could be attributed to background. The concentration of arsenic at DU07 (29 milligrams per kilogram [mg/kg[) was less than twice the RVAAP BSV (15.4 mg/kg), arsenic was not identified as a potential contaminant at any other DU at CC RVAAP-70 East Classification Yard, and arsenic is not attributed to past activities at CC RVAAP-70 East Classification Yard. In addition, arsenic concentrations were compared to the range of Ohio background values (Cox and Colvin, 1996) and the range of Eastern U.S. background values (Shacklette and Boerngen, 1984). The arsenic MDC (29 mg/kg) is within

the range of Ohio and Eastern U.S. background values (0.5 to 56 mg/kg and <0.1 to 73 mg/kg, respectively). Therefore, arsenic at DU07 is attributed to background by WOE.

The concentrations of the remainder of chemicals in surface soil that were determined to be potential contamination in the SI, were less than their individual Residential USEPA RSLs, except for benzo(a)pyrene (Table 3-1). The USEPA RSL for benzo(a)pyrene is 1.1 mg/kg and the concentration of benzo(a)pyrene in surface soil at DU03 was 1.9 mg/kg (Figure 3-1). Therefore, DU03 is recommended for removal action in this EE/CA. Surface soil removal is not required at DU01, DU02, DU05, DU06, or DU07 to achieve Unrestricted Residential Land Use.

3.2.2 Subsurface Soil

Only two potential contaminants (benzo(a)anthracene and benzo(a)pyrene) were identified in subsurface soil (greater than 1 foot bgs) at DU01 in the SI. These potential contaminants are presented on Table 3-2.

To determine if any of the potential contaminants require removal, the concentration of potential contaminants in each subsurface soil DU was compared to the most recent November 2020 USEPA RSLs (risk = 1×10^{-5} and HQ = 1.0). The concentrations of the chemicals in subsurface soil that were determined to be potential contamination in the SI, were less than their individual Residential USEPA RSLs (Table 3-2). Therefore, no further action is necessary for subsurface soil to achieve Unrestricted Residential Land Use.

3.2.3 CES Conclusions

This CES demonstrates that the concentrations of chemicals identified as potential contaminants in the surface soil at DU01, DU02, DU05, DU06, and DU07 and the subsurface soil at DU01 and DU04 were not great enough to be of concern and do not require removal. The CES showed that only the surface soil at DU03 requires removal to achieve Unrestricted (Residential) Land Use.

Table 3-1 Evaluation of Potential Contaminants in Surface Soil

Decision Unit:			DU01	DU02	DU03	DU05	DU06	DU07		DU Requiring Removal
Location ID:	Risk Screening Level	Screening Level Source	70-4744-DU1-SS	70-DD-DU2-SS	70-4740-DU3-SS	70-4760-DU5-SS	70-4759-DU6-SS	70-CDD-DU7-SS		
Field Sample ID:			070SS-0001M-0001-SO	070SS-0002M-0001-SO	070SS-0003M-0001-SO	070SS-0004M-0001-SO	070SS-0005M-0001-SO	070SS-0006M-0001-SO	070SS-0007M-0001-SO	
Lab Sample ID:			240-17230-1	240-17230-2	240-17230-3	240-17230-4	240-17230-5	240-17230-6	240-17230-7	
Sample Date:			11/5/2012	11/5/2012	11/5/2012	11/5/2012	11/5/2012	11/5/2012	11/5/2012	
Sample Depth:			0-1	0-1	0-1	0-1	0-1	0-1	0-1	
Sample Type:			REG	REG	REG	REG	REG	REG	FD	
Semivolatile Organic Compounds (SVOCs) (mg/kg)										
Benzo(a)anthracene	11	Residential RSL [a]	--	--	3.2	--	--	--	--	none
Benzo(a)pyrene	1.1	Residential RSL [a]	0.13	0.22	**1.9**	0.46	0.21	0.2	0.27	**DU03**
Benzo(b)fluoranthene	11	Residential RSL [a]	--	--	3.1	--	--	--	--	none
TAL Metals (mg/kg)										
Arsenic	15.4	BSV [b]	--	--	--	--	--	29 [c]	27 [c]	none
Polychlorinated Biphenyls (PCBs) (mg/kg)										
Aroclor-1242	2.3	Residential RSL [a]	--	--	--	--	--	0.59 J	--	none

Notes:

a - November 2020, USEPA Residential RSL, lower of HQ=1.0 and ELCR=1 x 10^{-5} (USEPA, 2020).
b - Background Screening Value for arsenic in surface soil (SAIC, 2010).
c - Arsenic concentration is attributed to background based on WOE.
Bold highlight indicates concentration is greater than the Residential RSL or BSV.
"--" = not a potential contaminant
BSV = background screening value
ELCR = Excess Lifetime Cancer Risk
FD = field duplicate
ID = identification
J = Estimated value
mg/kg = milligrams per kilogram
NA = not available
RSL = Regional Screening Level

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Table 3-2 Evaluation of Potential Contaminants in Subsurface Soil

Location ID:	Risk Screening Level	Screening Level Source	70-4744-DU1-SB	70-4744-DU1-SB2	DU Requiring Removal
Field Sample ID:			070SB-0012M-0001-SO	070SB-0014M-0001-SO	
Lab Sample ID:			240-17768-2	240-17768-4	
Sample Date:			11/14/2012	11/14/2012	
Sample Depth:			4-7	1-7	
Sample Type:			REG	REG	
Semivolatile Organic Compounds (SVOCs) mg/kg					
Benzo(a)anthracene	11	Residential RSL [(a)]	--	1.7	none
Benzo(a)pyrene	1.1	Residential RSL [(a)]	0.4	0.88	none

Notes:

a - November 2020, USEPA Residential RSL, lower of HQ=1.0 and ELCR=1 x 10^{-5} (USEPA, 2020).

Bold highlight indicates concentration is greater than the Residential RSL.

"--" = not a potential contaminant

ELCR = Excess Lifetime Cancer Risk

ID = identification

mg/kg = milligrams per kilogram

RSL = Regional Screening Level

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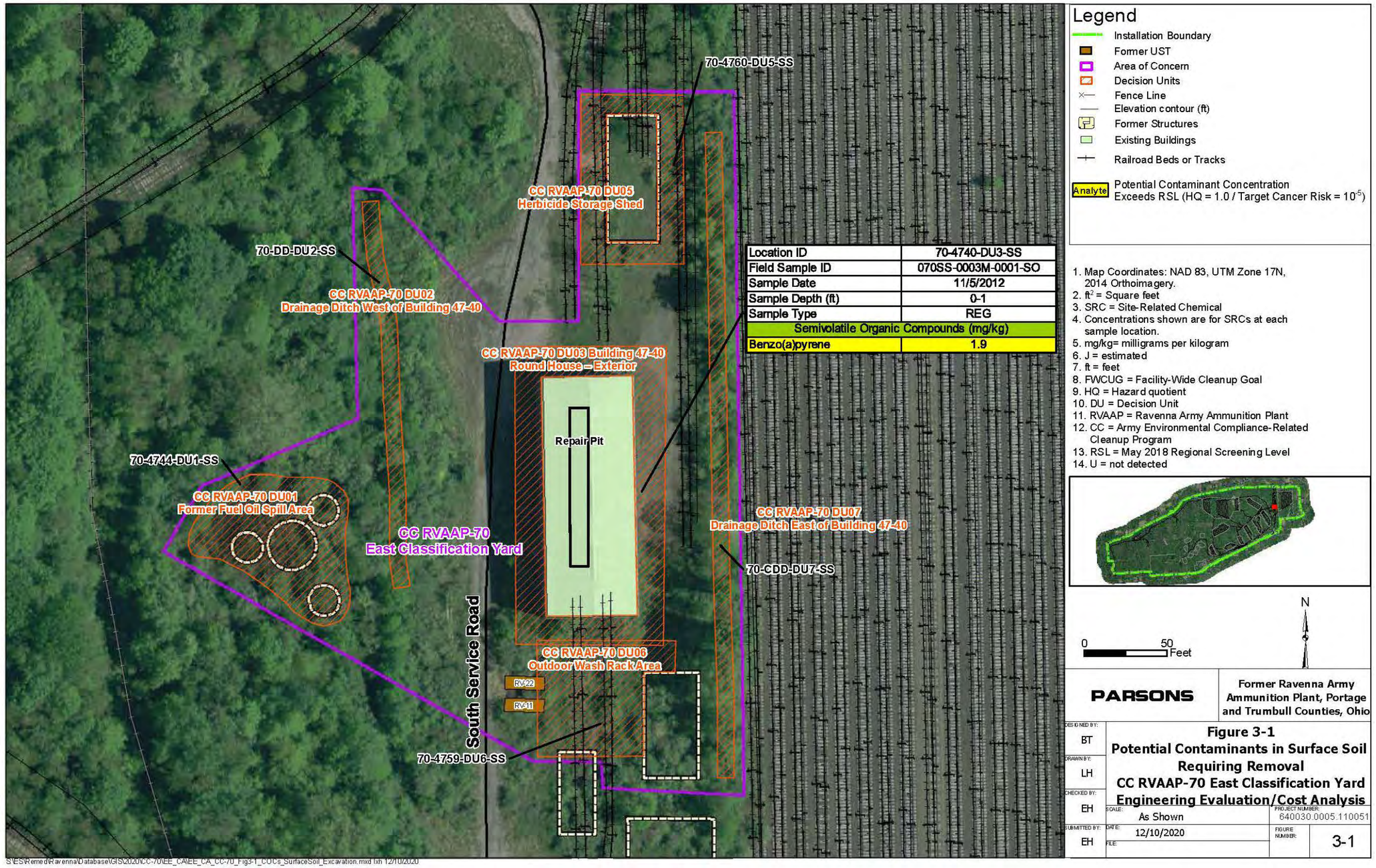

Figure 3-1 Potential Contaminants in Surface Soil Requiring Removal

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4. REMOVAL ACTION OBJECTIVES, CLEANUP GOALS, AND VOLUME CALCULATIONS

The scope, objectives, cleanup goals, and estimates of volume of soil requiring remediation are presented in this section.

4.1 SCOPE AND PURPOSE

The East Classification Yard AOC was characterized in the SI (Parsons, 2018), and is described in Section 2.2.3.

The recommended path forward in the SI was to proceed to the RI phase of the CERCLA process. The Army prepared a Draft RI Work Plan for CC RVAAP-70 (Parsons, 2019) in July 2019. Upon reviewing the Draft RI Work Plan, the Ohio EPA noted that most contaminant concentrations did not warrant remedial action and suggested that contaminants at the AOC might be addressed with a limited removal action (Ohio EPA, 2019). The Army agreed with the Ohio EPA evaluation and determined that the most efficient and cost-effective way to proceed with the CERCLA process is with an EE/CA. The purpose of this EE/CA is to evaluate removal alternatives to address the contamination in surface soil (0-1 foot bgs) only. The determination of which surface soil DUs need to be removed to meet RAOs was presented in the CES (Section 3). No removal actions are warranted for subsurface soil at the East Classification Yard AOC.

4.2 REMOVAL ACTION OBJECTIVES

The main objective for the EE/CA is to evaluate the removal action alternatives for the East Classification Yard AOC. Following CERCLA guidance, this EE/CA identifies RAOs, identifies potential removal action alternatives, and evaluates alternatives using criteria identified in *Guidance for Conducting Non-Time Critical Removal Actions under CERCLA* (USEPA, 1993).

The RAOs are to remove the soil from locations identified in the CES (Section 3) to the extent that the AOC meets the Unrestricted (Residential) Land Use requirements. The removal action will prevent residential receptors from contacting unsafe concentrations of benzo(a)pyrene at 70-4740-DU3-SS.

The RAOs specify requirements the selected Alternative must fulfill to protect human health and the environment from contaminants and to meet the evaluation criteria.

4.3 REMOVAL ACTION CLEANUP GOALS

The removal action cleanup goal represents the media (surface soil) and chemical-specific criteria below which remedial action is not required. The goal of the removal action for the surface soil is to remove all ISM sample locations where the concentrations of contaminants are greater than the selected criteria, in this case, the USEPA's RSLs for PAHs.

As demonstrated in Section 3, one contaminant (benzo(a)pyrene) was identified in the surface soil at the AOC. The removal action cleanup goal for benzo(a)pyrene is 1.1 mg/kg (November 2020 USEPA Residential RSL of 1.1 mg/kg at risk = 1×10^{-5} and HQ = 1.0).

4.4 VOLUMES OF SOIL REQUIRING REMOVAL

Table 4-1 presents the calculations and values used to estimate the amount of soil that needs to be excavated and disposed off-site. An estimated total volume of 370 cubic yards (yds^3) is identified for excavation and off-site disposal of surface soil (0-1 foot bgs). Based on the results in Section

3, the surface soil DU defined by ISM sample location 70-4740-DU3-SS (for benzo(a)pyrene) is recommended for removal action in this EE/CA to eliminate this chemical in the surface soil (0-1 foot bgs). Figure 4-1 presents the area for excavation.

Table 4-1 Volumes of Soil Requiring Removal

Decision Unit	Sample Location	Area ($feet^2$)	Depth (feet bgs)	Volume ($feet^3$)	Volume (yd^3) [(a)]
DU03 [(b)]	70-4740-DU3-SS	8,321	1	8,321	370
			Total	**8,321**	**370**

Notes:

a - includes 20% swell factor
b - DU03 was established as a 15-foot zone surrounding the exterior perimeter of Building 47-40. The 15-foot perimeter of Building 47-40 will be excavated to a depth of 1 foot bgs.
bgs = below ground surface
$feet^3$ = cubic feet
yd^3 = cubic yard

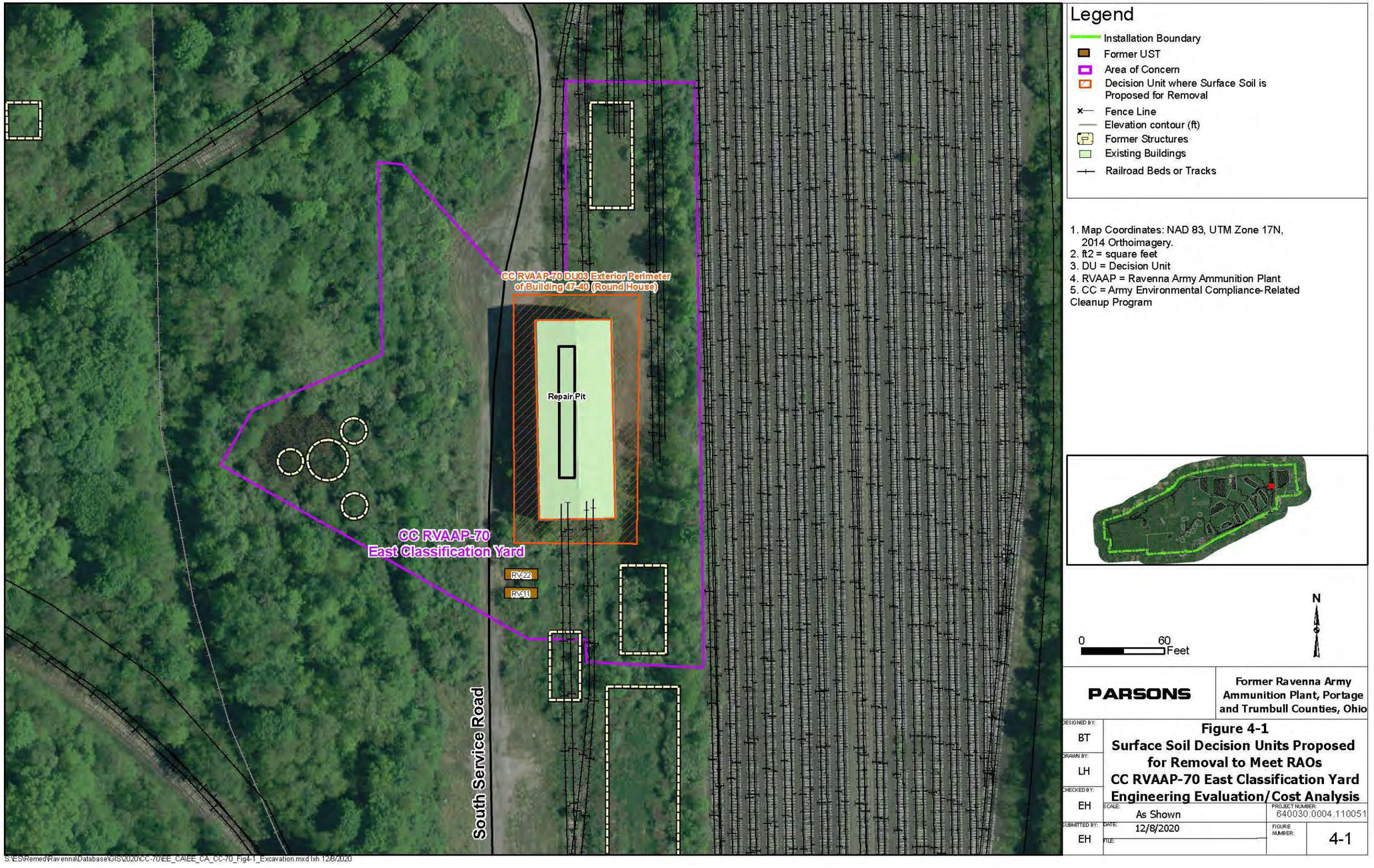

Figure 4-1 Surface Soil Decision Units Proposed for Removal to Meet RAOs

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5. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The NCP (USEPA, 1990) established a general requirement that response actions comply with ARARs, based on site-specific conditions. Applicable requirements are promulgated environmental cleanup standards, standards of control, and other substantive requirements, criteria, or limitations that specifically address a hazardous substance, remedial action, location, or other circumstances found at a release site. Relevant and appropriate requirements are promulgated environmental cleanup standards, standards of control, and other substantive requirements, criteria, or limitations that, while not legally "applicable" to the site conditions, address problems or situations sufficiently similar to those encountered at the site that their use is well suited for the site. Other "to be considered" (TBC) criteria, such as nonpromulgated policy and guidance documents, may also be useful in directing a response action at a site. All ARARs and TBC criteria are identified on the basis of site-specific information about the contaminant present, site features, and response actions being considered. Action-specific criteria and other information to be considered evaluated for CC RVAAP-70 East Classification Yard are presented in Appendix A. No chemical- or location-specific ARARs were identified.

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6. IDENTIFICATION OF ALTERNATIVES

This section describes the removal action alternatives developed for the AOC and the individual analysis of each.

6.1 INTRODUCTION

Removal action alternatives should assure adequate protection of human health and the environment, achieve RAOs, meet ARARs, and if applicable, permanently, and significantly reduce the volume, toxicity, and/or mobility of contaminants.

The two Alternatives considered in this EE/CA are:

- Alternative 1 – no action
- Alternative 2 – excavation with off-site disposal for surface soil with benzo(a)pyrene to attain Unrestricted (Residential) Land Use

6.2 ALTERNATIVE 1: NO ACTION

The no action alternative is required for evaluation under the NCP (USEPA, 1990). This alternative is the baseline to which other alternatives are compared. This alternative assumes all current actions (e.g., access restrictions and environmental monitoring) are discontinued and assumes no future actions will take place to protect human receptors, ecological receptors, or the environment. Impacted media at the AOC would not be removed or treated.

6.3 ALTERNATIVE 2: EXCAVATION AND OFF-SITE DISPOSAL FOR SURFACE SOIL

Alternative 2 involves the excavation and off-site disposal of surface soil at DU03 (for benzo(a)pyrene in surface soil surrounding Building 47-40) for the surface soil from 0 to 1 foot bgs. Implementing this remedial technology will meet the criteria for Unrestricted (Residential) Land Use.

This remedial alternative requires coordinating remediation activities with Ohio EPA, OHARNG, and the Army. Coordinating with stakeholders during implementation of the excavation will minimize health and safety risks to on-site personnel and potential disruptions of CJAG activities. The time period to complete this remedial action is relatively short and will not include an operations and maintenance period, as an Unrestricted (Residential) Land Use scenario will be achieved. Components of this remedial alternative include:

- Removal action work plan,
- Brush removal,
- Waste characterization sampling,
- Soil excavation and off-site disposal at DU03 (0 to 1 foot bgs) for benzo(a)pyrene,
- Confirmation soil sampling and surveying, and
- Restoration.

Excavating specific locations where the concentrations of contaminants were identified in the CES (Section 3) as requiring removal in order for the AOC to meet Unrestricted (Residential) Land Use. These locations assessed in the SI (Parsons, 2018) were from ISM sample locations in surface soil (Figure 4-1).

6.3.1 Removal Action Work Plan

A Removal Action Work Plan will be developed prior to initiating removal actions. The Removal Action Work Plan will include an outline of construction requirements; site preparation activities (e.g., staging and equipment storage areas, truck routes, and storm water controls); sampling; the extent of soil removal; the sequence of excavation activities; decontamination; and segregation, transportation, and disposal of the waste. Erosion controls and health and safety controls will be developed as part of the Removal Action Work Plan to ensure protection of remediation workers and the environment. Waste characterization sampling will be completed in accordance with disposal facility requirements.

6.3.2 Brush Removal

It will be necessary to remove brush from around the exterior of Building 47-40 to access sampling and excavation locations. Brush cutting will be limited to areas necessary to access the sample and excavation locations. Brush cutting details will be included in the Removal Action Work Plan and will be coordinated with the CJAG Natural Resource Manager.

6.3.3 Waste Characterization Sampling

A sampling plan will be included in the Removal Action Work Plan. Surface soil samples will be analyzed for analytes to aid in waste characterization. Waste characterization analysis would be completed to confirm the excavated material is non-hazardous. Prior to excavation, soil would be sampled and analyzed for Toxicity Characteristic Leaching Procedure (TCLP) metals and mercury, 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 would be disposed of at a RCRA Subtitle D permitted landfill.

6.3.4 Excavation and Off-site Disposal of Soil

Site preparation would include clearing any obstacles, surface structures, or vegetation (section 6.3.2) that would interfere with excavation, identifying utilities (no utilities are anticipated), and setting up temporary decontamination facilities. In addition, sediment and erosion control measures will be installed as needed to control runoff from the work area. Dust generation will be minimized during excavation activities by keeping equipment movement areas and excavation areas misted with water. The health and safety of remediation workers, on-site CJAG employees, and the general public will be detailed in a site-specific health and safety plan.

To achieve a scenario in which the AOC is protective for Unrestricted (Residential) Land Use under CERCLA, surface soil will be removed from the proposed excavation locations shown on Figure 4-1. Approximately 370 yds^3 will be removed from the excavation site for disposal.

The excavated surface soil at DU03 (0 to 1 foot bgs) will be directly loaded onto trucks for off-site disposal at a licensed and permitted disposal facility.

Soil removal will be accomplished using conventional construction equipment such as backhoes, bulldozers, front-end loaders, and scrapers. Oversize debris will be crushed or otherwise processed to meet disposal facility requirements.

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.

Residual solid waste will be managed under the waste management plan and any solid waste identified during excavation will be removed and properly disposed. Excavated soil will be disposed at an existing off-site facility licensed and permitted to accept the characterized waste stream. The selection of an appropriate facility considers the type of waste, location, transportation options, and cost. Waste streams with different constituents and/or characteristics may be generated. Disposal cost savings can be made possible by utilizing specific disposal facilities for different waste streams.

6.3.5 Confirmation Sampling

Upon completing the excavations at the AOC, confirmatory samples will be collected to ensure contaminated soils have been successfully removed. Once the laboratory analysis determines concentrations are below removal action cleanup goals, the AOC will meet requirements for Unrestricted (Residential) Land Use.

6.3.6 Surveying and Mapping

Upon completion of the surface work, a surveyor (licensed in State of Ohio) will survey the excavation extents. The surveyor will record a northing, easting, elevation, and brief description for each surveyed location, including control points for each corner of each excavation. Horizontal coordinates will be referenced to the Ohio State Plan Coordinate System and will be surveyed with an accuracy of at least 1 foot. Vertical measurements will be referenced to the National Geodetic Vertical Datum of 1929 and surveyed with an accuracy of at least 0.01 feet.

6.3.7 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 be sampled by the removal action contractor to ensure it is not contaminated. 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 Removal Action Work Plan.

6.3.8 Reporting

Upon completion of all field activities, a Removal Action Completion Report will be prepared that includes excavation details and sampling data from the removal action.

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7. ANALYSIS OF ALTERNATIVES

7.1 EVALUATION CRITERIA

Section 300.430(e) of the NCP (USEPA, 1990) lists nine criteria by which each remedial alternative must be assessed. The acceptability and performance of each alternative relative to the criteria are evaluated individually so that relative strengths and weaknesses can be identified. However, in an EE/CA a streamlined version of evaluation criteria is considered. Each Alternative is evaluated using the short-and long-term aspects of three broad criteria: effectiveness, implementability, and cost. Additionally, each of the three broad criteria have sub-criteria that are also considered under each criteria. Consistent with the *Guidance for Conducting Non-Time Critical Removal Actions under CERCLA* EPA/540-R-93-057 (USEPA, 1993), the two Alternatives were evaluated against the following three broad criteria and associated sub-criteria:

- Effectiveness:
    - Overall protection of human health and the environment,
    - Complies with ARARS,
    - Long-term effectiveness and permanence,
    - Reduction of toxicity, mobility, or volume through treatment, and
    - Short-term effectiveness.
- Implementability:
    - Technical Feasibility,
    - Administrative Feasibility,
    - Availability of services and materials,
    - State (support agency) acceptance, and
    - Community acceptance.
- Cost:
    - Capital costs (including present worth and post removal site control), and
    - No operation and maintenance costs and fees are needed.

7.1.1 Effectiveness

The effectiveness criterion assesses the ability of a remedial technology to protect human health and the environment by reducing the toxicity, mobility, or volume of contaminants. Each alternative is evaluated for its ability to achieve RAOs, potential impacts to human health and the environment during construction and implementation, and overall reliability of the approach.

Long-term effectiveness and permanence evaluate the magnitude of residual risk (risk remaining after implementing the alternative) and the adequacy and reliability of controls used to manage the remaining waste (untreated waste and treatment residuals) over the long term. Alternatives that provide the highest degree of long-term effectiveness and permanence leave little or no untreated waste at the AOC, make long-term maintenance and monitoring unnecessary, and minimize the need for land use controls.

Reduction of toxicity, mobility, or volume through treatment evaluates the ability of the alternative to reduce the toxicity, mobility, or volume of waste. The irreversibility of the treatment process and the type and quantity of residuals remaining after treatment are also assessed.

Short-term effectiveness addresses the protection of workers and the community during the removal action, the environmental effects of implementing the action, and the time required to achieve media-specific cleanup levels.

7.1.2 Implementability

Implementability addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during implementation. Technical feasibility assesses the ability to construct and operate a technology, the reliability of the technology, the ease in undertaking additional remedial actions, and the ability to monitor the effectiveness of the alternative. Administrative feasibility is addressed in terms of the ability to obtain approval from federal, state, and local agencies, and likelihood of obtaining a favorable community response.

7.1.3 Cost

The cost criterion evaluates each remedial process in terms of relative capital. Costs for each technology are rated qualitatively, on the basis of engineering judgment, in terms of cost effectiveness. Therefore, a low-cost remedial technology is rated as highly cost effective, while a costly technology is evaluated as being of low-cost effectiveness. Actual costs could be higher than estimated due to unexpected conditions or potential delays.

7.2 EVALUATION OF ALTERNATIVES

The two Alternatives were evaluated against the CERCLA criteria in the following sections.

7.2.1 Alternative 1: No Action

This alternative would involve no further CERCLA response action at the AOC except to document the decision. The NCP (USEPA, 1990) requires that the no action alternative be evaluated to establish a baseline for comparison with other alternatives, especially in terms of cost and protection to human health and the environment. There would be no overall protection of human health and the environment. Removal goals would not be achieved. This alternative does not provide long-term effectiveness and permanence. This alternative has no removal or treatment; therefore, there is no reduction in toxicity, mobility, or volume. There would be no additional risks posed to the community, workers, or the environment as a result of implementing this alternative. The total estimated cost (present worth) of the no action alternative is $0.

7.2.2 Alternative 2: Excavation and Off-site Disposal

Alternative 2 involves the excavation and off-site disposal of surface soil from 0 to 1 foot bgs around the exterior of Building 47-40 (DU03 (or benzo(a)pyrene) to meet the criteria for Unrestricted (Residential) Land Use.

Alternative 2 achieves the RAOs by effectively removing contaminated surface soil from the AOC and would result in a permanent reduction in risks at the AOC. The contaminated soil would be removed and placed in a permanent disposal facility. Therefore, this alternative protects human health and the environment by reducing the toxicity, mobility, and volume of contaminants. As a result, long-term management and CERCLA five-year reviews would not be required. Short-term risks during implementation will be mitigated through use of proper controls such as requiring workers to follow a health and safety plan and wear appropriate personal protective equipment to minimize exposures during

site activities. Implementing mitigation measures such as erosion and dust control during construction would be included in Alternative 2. Other controls such as inspecting vehicles transporting soils before and after use, and limiting the distance waste is transported in vehicles would be considered.

This alternative is implementable. Resources such as standard excavation and construction equipment would be used and are readily available. Excavating soil, constructing temporary roads for truck transport, and waste handling are conventional, straightforward construction activities. Soil borrow sites and permitted waste disposal facilities are available within a reasonable distance. Alternative 2 will be implementable after developing a Removal Action Work Plan that is approved by stakeholders, and completing all appropriate coordination with CJAG and OHARNG. The Removal Action Work Plan will identify access routes to the AOC for heavy equipment and steps to minimize potential hazards to on-site personnel. Developing the Removal Action Work Plan and coordinating with local, state, and federal agencies will increase the implementability of Alternative 2. This alternative is likely to be accepted by the community.

The present value cost to complete Alternative 2 is approximately $130,291 (in base year 2020 dollars). Costs include sampling, implementing the removal, off-site disposal, and site restoration. See Appendix B for a detailed description of Alternative 2 costs.

Alternative 2 would be an effective method of removing and disposing contaminated surface soil at the AOC. Excavation and off-site disposal are conventional technologies which can be readily implemented. This alternative would also be effective for eliminating PAHs in soil. This alternative protects human health and the environment, and once implemented, the AOC would meet Unrestricted (Residential) Land Use.

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8. COMPARATIVE ANALYSIS OF ALTERNATIVES

The comparative analysis provides a means by which remedial alternatives can be directly compared to one another with respect to common criteria. Table 8-1 provides a comparative analysis of the alternatives evaluated.

Both Alternatives are implementable. There are no costs associated with Alternative 1, but it does not meet the effectiveness criteria. Alternative 2 meets all of the requirements under the effectiveness criteria and has an estimated cost of $130,291.

Table 8-1 Comparative Analysis of Alternatives

Alternative	Evaluation Criteria		
	Effectiveness	**Implementability**	**Costs**
Alternative 1: No Action	RAOs not achieved. No protection of human health and the environment. No long-term effectiveness and permanence. No reduction in toxicity, mobility, or volume	Easily implementable.	$0
Alternative 2: Excavation and Off-site Disposal	Overall effective.	Readily implementable.	$130,291

RAOs – Removal Action Objectives

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9. AGENCY COORDINATION AND PUBLIC INVOLVEMENT

This EE/CA is coordinated with the Ohio EPA for review and concurrence. The Ohio EPA concurrence letter is included in this report.

The EE/CA will be made available for public review. The availability of the EE/CA for public review will be made in local newspapers and on the RVAAP Restoration Program website. The document will be made available in information repositories and the RVAAP Restoration Program website.

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10. RECOMMENDED ALTERNATIVE

The recommended Alternative for CC RVAAP-70 East Classification Yard is Alternative 2: Excavation with Off-site Disposal. This alternative will attain Unrestricted (Residential) Land Use for the AOC. Surface soil contaminated with benzo(a)pyrene will be removed from the AOC, hauled to a licensed and permitted disposal facility, and appropriately disposed. The removal areas will be restored with clean fill material.

No long-term monitoring or five-year reviews would be required under CERCLA. Any solid waste identified during excavation will be removed and properly disposed. Approximately 370 yds^3 of contaminated soil will be removed from the AOC for off-site disposal. This removal will be conducted as a Non-Time Critical Removal Action and will achieve quick, protective results at the AOC and was determined to be cost effective (estimated $130,291). Figure 4-1 provides the locations of the area that required removal. Appendix B includes breakdown of the costs and other information used to make this estimate.

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11. REFERENCES

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Appendix A: Applicable or Relevant and Appropriate Requirements

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Table A-1. Potential Action-Specific ARARs

ACTION	REGULATORY AUTHORITY	REQUIREMENT	STATUS	DESCRIPTION
Soil Excavation	State	OAC Section 3745-15-07	Applicable	These rules prohibit a release of nuisance air pollution that endanger health, safety, or welfare of the public or cause personal injury or property damage.
Soil Excavation	Federal	40 CFR Part 450	Not Applicable	Storm water requirements at construction sites. These rules require that storm water controls be employed at construction sites that exceed 1 acre. The area of excavation is anticipated to be less than 1 acre.
Soil Excavation	State	OAC Section 3745-52-11	Potentially Applicable	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 hazardous waste. Excavated soil is not expected to be hazardous.
Management	State	OAC Sections 3745-52-30 through 3745-54-34	Potentially Applicable	Management of contaminated waste material that is or contains a hazardous waste generated from on-site activities. All hazardous waste must be accumulated in a complaint manner that includes proper packaging, labeling, marking, and placarding in accordance with the specified regulations. This includes inspecting containers or container areas where hazardous waste is accumulated on site. Excavated soil is not expected to be hazardous.
Offsite Land Disposal	State	OAC Sections 3745-52-20 through 3745-52-33	Potentially Applicable	Requires the acquisition and use of a unform hazardous waste manifest for hazardous waste shipments to off-site treatment, storage, or disposal facilities. Excavated soil is not expected to be hazardous.
Offsite Land Disposal	State	OAC 3745-27-05	Applicable	Establishes standard for disposal of non-hazardous solid wastes in the state of Ohio. Applies to solid waste material that is contaminated but not a hazardous waste for disposal. Establishes allowable methods of solid waste disposal and prohibits management by open burning or dumping.

Notes:

ARAR – Applicable or Relevant and Appropriate Requirements; CFR – Code of Federal Regulations; OAC – Ohio Administrative Code; RCRA – Resource Conservation and Recovery Act

Table A-2 Other Information To Be Considered (TBC)

REGULATORY AUTHORITY	MEDIA	REQUIREMENT	STATUS	SYNOPSIS OF REQUIREMENT
Federal	Soil	USEPA RSLs	TBC	USEPA RSLs are risk-based screening tools for evaluating contaminated sites. They are not enforceable standards. RVAAP Restoration Program FWCUGs are based on RSLs. The cleanup goal for benzo(a)pyrene of 1.1 mg/kg is based on the Residential RSL.

Notes:
ARARs – Applicable or Relevant and Appropriate Requirements
FWCUGs—Facility-Wide Cleanup Goals
RSLs – Regional Screening Levels
RVAAP – Ravenna Army Ammunition Plant
TBC – to be considered

Appendix B: Costs

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Table B-1: Summary of Costs for Remedial Alternatives

	Alternative	Duration	Non-Discounted Cost	
			Capital Cost	Total Cost
1	No Action	0	$0	$0
2	Excavation/removal	<1 year	$118,446	$130,291

Notes:
The base year of comparison and cost is CY2020.
Costs were estimated for comparison purposes only and are believed to be accurate within a range of -30% to +50%. Use of these costs for other purposes, including but not limited to budgeting or construction cost estimating is not appropriate.

Table B-2: Summary of AOC Areas and Volumes

Alternative	Media	Treatment Interval (feet bgs)	Surface Area ($feet^2$)	Volume[1] (acre)	Volume[1] (yd^3)	Weight[2] (ton)
2 Excavation/removal	Surface Soil	0-1	8,321	0.19	370	462

Notes:

1. Includes 20% swell factor.
2. Assuming 1 yd^3 wet soil weighs 1.25 tons.

Table B-3: Capital and Fixed Costs

Item	Quantity	Units	Unit Cost	Present Worth
Removal Action Work Plan				
Labor	160	hours	$ 150	$ 24,000
Pre-Excavation Waste Characterization Sampling				
Sampling Labor	8	hours	$ 100	$ 800
Analytical Cost - Waste Characterization	2	Samples	$ 559	$ 1,118
Construction Cost				
Mobilization, Site Preparation, and Submittals	1	LS	$ 12,000	$ 12,000
Non-Haz Soil Excavation	462	Ton	$ 5.00	$ 2,311
Transportation of Impacted Soil	462	Ton	$ 25.70	$ 11,881
Disposal of Impacted Soil	462	Ton	$ 38.10	$ 17,613
Backfill and Compaction	462	Ton	$ 15.00	$ 6,934
Site Restoration	0.19	Acre	$ 7,000	$ 1,337
Demobilization	1	LS	$ 10,000	$ 10,000
Confirmation Sampling				
Sampling Labor	8	hours	$ 100	$ 800
Analytical Cost - Confirmation DU03	12	Samples	$ 196	$ 2,352
Construction Oversite				
Construction Oversite	1	Week	$ 4,800	$ 4,800
Surveying	1	LS	$ 1,500	$ 1,500
Construction Management Support	1	Week	$ 1,000	$ 1,000
Removal Action Completion Report	1	LS	$ 20,000	$ 20,000
Capital and Fixed Cost Subtotal				$ 118,446
Undeveloped Details/Contingency	10%			$ 11,845
			Total Cost	$ 130,291

Notes and Assumptions:

1. All material and waste removed is assumed to be non-hazardous and can be disposed at a RCRA Subtitle D permitted landfill.

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