United States Army Corps of Engineers
New England District

Final Debris Removal Activities Summary Report

Area of Contamination 57, 74, and 50

Former Fort Devens, Massachusetts

Contract No. W912WJ-19-D-0014

Contract Delivery Order No. W912WJ-20-F-0022

May 2022

Final Debris Removal Activities Summary Report

Areas of Contamination 57, 74, and 50
Former Fort Devens, Massachusetts
May 2022

Prepared By:
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Prepared For:
United States Army Corps of Engineers,
New England District

CERTIFICATION

I hereby certify that the enclosed Report, shown and marked in this submittal, is that proposed to be incorporated with Contract Number W912WJ-19-D-0014. This document was prepared in accordance with the U.S. Army Corps of Engineers (USACE) Scope of Work and is hereby submitted for Government approval.

Reviewed By:

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Penelope Reddy
U.S. Army Corps of Engineers Project Manager

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Acronyms and Abbreviations

AOC	area of contamination
BCT	Base Realignment & Closure Team
Army	United States Army
DoD	Department of Defense
ELAP	Environmental Laboratory Accreditation Program
EMI	electromagnetic induction
EPH	extractable petroleum hydrocarbon
GPR	ground penetrating radar
GPS	Global Positioning System
HRGS	HRGS Geoscience, Inc.
IDW	investigation derived waste
KGS	KOMAN Government Solutions, LLC
MassDEP	Massachusetts Department of Environmental Protection
PCBs	polychlorinated biphenyl
RCRA	Resource Conservation and Recovery Act
PFAS	per- and polyfluoroalkyl substances
PID	photoionization detector
PPE	personal protective equipment
QAPP	Quality Assurance Project Plan
QSM	Quality System Manual
RTC	Response to Comments
S-A JV	SERES-Arcadis 8(a) JV 2, LLC
Tantara	Tantara Corporation
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
VPH	volatile petroleum hydrocarbon

1 Introduction

The SERES-Arcadis 8(a) JV 2, LLC (hereafter referred to as the S-A JV) is submitting this Debris Removal Activities Summary Report (Summary Report) to document the removal of surficial debris previously identified at Area of Contamination (AOC) 57 (Building 3713 Fuel Oil Spill), AOC 74 (Barnum Road Firefighting Exercise Site), and AOC 50 (Former Moore Army Airfield). This work was conducted in accordance with the Final Debris Removal Work Plan submitted by S-A JV on behalf of the U.S. Army Corps of Engineers – New England District (USACE) and the U.S. Army (Army) (S-A JV 2021) (Work Plan). The S-A JV has prepared this Summary Report on behalf of USACE under Contract Number W912WJ-19-D-0014.

2 Background

A background summary and description of debris observed at each AOC is provided below. The locations of the AOCs are shown on **Figure 1**.

2.1 AOC 57

On March 18, 2019, while conducting temperature profiling along Cold Spring Brook, the United States Environmental Protection Agency (USEPA) identified areas of surface debris between AOC 57 Areas 2 and 3, in a wooded area between the walking trail and wetlands associated with Cold Spring Brook (**Figure 2**). These areas were discussed during the March 25, 2019, Base Realignment & Closure Team (BCT) meeting. On March 26, 2019, KOMAN Government Solutions LLC (KGS) conducted a field reconnaissance in this area to confirm and classify the suspected disposal areas. A supplemental field reconnaissance event was completed on March 20, 2020. The debris areas were characterized mostly as a deteriorated vehicle and associated parts (metal debris, tires, and bumpers), smaller piles of scrap metal (empty drums and containers), and some large concrete slabs (likely from former building foundations). The majority of the metal debris was rusted and located on the ground surface. Containers and drums found partially buried or at ground surface ranged in size from approximately 1-gallon to 55-gallons. The former contents of many of the drums and containers is unknown; however, some of the drum labels were legible enough to identify former bulk contents, with some labeled as containing antifreeze and gasoline. Additionally, some were noted to contain organic matter (i.e., soil, leaf matter).

2.2 AOC 74

Field reconnaissance was conducted at AOC 74 on June 4, 2020, in the vicinity of the walking trail and in wooded areas to the west and east of the footbridge (**Figure 3**). The scattered surface debris was characterized mostly as rusted metal (empty drums and cans). A pile of eight metal cans of various sizes was discovered scattered in a 5-foot by 15-foot area. The former contents of many of the drums and containers are unknown; however, some cans were identified as paint cans.

2.3 AOC 50

On March 30, 2020, two previously identified debris areas in AOC 50 (known herein as “Debris Pile A” and “Debris Pile B” were inspected (**Figure 4**). Both areas were observed to contain assorted empty metal drums,

containers, and paint cans. Some of the drum labels were legible enough to identify the former contents as gasoline and antifreeze. Debris identified in both areas was located on semi-steep slopes away from roadway access, potentially limiting future access by heavy equipment.

3 Field Activities

The following tasks were performed to investigate and remove the identified debris areas:

1. Clearing vegetation as necessary to conduct the work
2. Removing debris identified at the ground surface
3. Performing confirmatory geophysical survey
4. Investigation-derived waste management

In accordance with the provisions of the Work Plan, the work was performed in compliance with an approved Accident Prevention Plan (APP) and Site Safety and Health Plan (SSHP) with site-specific activity hazard analyses. The S-A JV followed the Standard Operating Procedures (SOPs) provided in the Final Debris Removal Work Plan.

3.1 Initial Site Walk

Representatives of the S-A JV mobilized to the site on November 9, 2021, along with representatives of Tantara Corporation (Tantara) of Marlboro, Massachusetts, to conduct a site walk of the AOC 57, AOC 74, and AOC 50 debris removal areas. The objectives of the site walk were to locate the surficial debris and to evaluate the equipment required to remove the debris. During the site walk, several additional debris locations were identified, and the points were marked with a Trimble Geo 7x Global Positioning System (GPS) unit. The debris locations are depicted on **Figures 2, 3, and 4**.

3.2 Debris Removal Activities

Debris removal activities were conducted from November 29, 2021 through December 1, 2021. No indications of contamination, including no evidence of staining, odors, or vegetation stress, were observed during the debris removal activities – this included the debris itself, as well as the soil around and beneath the removed debris.

3.2.1 Debris Staging Area

A debris staging area was established adjacent to AOC 74 in the northern parking lot of the property located at 112 Barnum Road in Devens, Massachusetts (see **Figure 3**). Due to a delay in delivery of the roll-off container, debris collected on November 29, 2021, was placed on polyethylene sheeting and covered at the end of the workday. The debris placed in the staging area was dry and free of liquids; therefore, the sheeting was not required to be bermed to prevent migration of liquids. A traffic barricade was placed between the stockpile and the travel lanes. The roll-off container was delivered on November 30, 2021, and the stockpiled debris was transferred to the container. Photographs of the staging area are attached as **Appendix A.** A summary of the debris removed is provided in **Table 1**.

3.2.2 AOC 57

Debris removal in AOC 57 was conducted between November 29, 2021, and December 1, 2021. Surficial and partially buried material identified during previous inspections and/or visible at the time of the work, were manually placed in a wheelbarrow or pickup truck and transferred to the staging area.

Partially-buried debris, which could not be removed by hand, was excavated using shovels and pick-axes. Some material exposed at the surface, such as wire cable located in Metal Debris Pile 3 (MP-3), was buried too deep to be excavated by hand. Material that could not be excavated by hand was cut approximately 6 inches below the surface using a non-sparking portable bandsaw connected to a portable gasoline generator. During cutting operations, a fire extinguisher was placed in the work area and a fire watch monitored for sparks.

Scrap metal, which was not sealed (broken metal pieces, wire, rebar, etc.), was transferred to the roll-off container in the staging area located in the north parking lot at 112 Barnum Road. Scrap metal, which was enclosed on more than one side (cans, drums, containers, etc.), was screened for total volatile organic compounds with a photoionization detector (PID). Debris with no detectable VOCs was disposed of in the roll-off container.

Non-metallic debris (tires, small asphalt pieces, small concrete pieces, etc.) identified during the March 2020 supplemental field reconnaissance event was removed and placed in the roll-off container for disposal. Large asphalt and concrete slabs were observed during the field reconnaissance event. It was not feasible to remove this material without heavy machinery and significant vegetation clearing. Therefore, in accordance with the provisions of the Work Plan, it was determined that this large debris would be left in-place. No evidence of hazardous material associated with the large debris was observed.

Except for one location, debris identified during initial reconnaissance activities in 2020 (and logged with GPS coordinates) were removed, to the extent feasible. One drum (D-4) at the southernmost portion of the AOC 57 work area could not be located. The area around the GPS marker for D-4 was walked in transects using the metal detector survey; however, the drum could not be located. The AOC 57 debris locations are depicted on **Figure 2** and photographs of the debris removal in this area are presented in **Appendix A**.

At the completion of AOC 57 debris removal, a metal detector was used to screen the area for additional metal debris. Locations of potential metal debris noted by metal detector were flagged for further investigation during geophysical survey activities.

3.2.3 AOC 74

Debris removal in AOC 74 was conducted on November 29, 2021. Debris designated for disposal was limited to what could be visually observed at the surface or just below the soil.

Debris in this area primarily consisted of small metal containers (1-gallon or less) located on the northern side of the wetland area. One 55-gallon drum was located on the southern side of the wetland area. Intact or partially intact containers were screened with the PID and transferred to the staging area. VOCs were not detected in any of the screened containers or drum. The AOC 74 debris locations are depicted on **Figure 3** and photographs of the debris removal in this area are presented in **Appendix A**.

At the completion of the AOC 74 debris removal, a metal detector was used to screen the area for metal debris. The metal detector alerted audible tones of possible buried metal on the northern side of the wetland in Metal Debris Areas 1, 2, and 3 shown as MD-1, MD-2, and MD-3, respectively, in **Figure 3**. This area was identified as a location for further investigation during the geophysical survey.

3.2.4 AOC 50

Debris removal in AOC 50 was conducted on December 1, 2021. Debris was observed on the slope and toe of slope south of the airfield (Debris Pile A). North of the airfield, debris was observed at the top of the southern bank of the Nashua River and on the slope to the river (Debris Pile B). Due to the steepness of the slope along the Nashua River, only debris which could be retrieved in a safe manner was collected.

Debris Pile A, located south of the airfield, consisted primarily of small metal containers and cans (1-gallon or less). Intact or partially intact containers were screened with the PID, placed in a wheelbarrow, and transferred to the staging area. VOCs were not detected in any of the screened containers.

Debris Pile B, located north of the airfield, consisted primarily of small metal containers and cans (1-gallon or less). Intact or partially intact containers were screened with the PID, placed in a wheelbarrow, and transferred to the staging area. VOCs were not detected in any of the screened containers or drum.

At the completion of the AOC 50 debris removal, a metal detector was used to screen the area for metal debris. The metal detector showed some detections of buried metals debris within the grid area boundaries. The AOC 50 debris locations are depicted on **Figure 4** and photographs of the debris removal in this area are presented in **Appendix A**.

3.2.5 Site Restoration

After the removal of surficial debris was completed in AOC 57, AOC 74, and AOC 50, depressions caused by removal activities, which were determined to pose a safety hazard, were graded with native material and manually compacted.

3.3 Geophysical Survey

Geophysical survey activities were conducted by HRGS Geoscience, Inc. (HRGS) of Salem, New Hampshire, from December 6, 2021, to December 10, 2021. The objective of the geophysical survey was to identify potential buried debris remaining after the surficial debris removal. The survey methods included ground penetrating radar (GPR) and electromagnetic induction (EMI) techniques. The geophysical survey report is included in **Appendix B**.

3.3.1 Vegetation Clearing

The survey boundaries were identified based on observations made during debris removal activities. Prior to conducting the survey, grid boundaries were flagged indicating the approximate extent of the geophysical survey. Limited vegetation clearing within the geophysical survey boundaries was performed as necessary to provide a clear working area and minimize health and safety hazards. Branches approximately 1 inch or less were cut using hand tools. Cut vegetation and fallen branches were removed from the work area and left onsite.

3.3.2 Geophysical Survey

The survey consisted of GPR to identify potential subsurface metallic and non-metallic anomalies, electromagnetic induction (EMI) to identify shallow subsurface metallic objects, and magnetometry to identify ferrous metal up to 25 feet below grade surface. HRGS utilized a GSSI UtilityScan DF GPR system, a Geometrics G858-G magnetometer, and a Geonics EM61-MK2 time domain metal detector. Photographs of the equipment are presented in **Appendix A**.

The geophysical survey boundaries were identified as GS Grid 1 through GS Grid 7. In AOC 57, the geophysical survey was conducted at four locations (GS Grid 1 through GS Grid 4). The geophysical survey was conducted in one location at AOC 74 (GS Grid 5) and two locations in AOC 50 (GS Grid 6 and GS Grid 7). The geophysical grid locations are identified on **Figures 1, 2, and 3**.

Within each geophysical survey grid, GPR, EMI, and magnetometry were conducted in approximately 5-foot by 5-foot transects. The transects were marked in the grid using pink pin flags. Potential buried debris identified from the geophysical survey results were marked in the field with blue pin flags and the locations were recorded with a Trimble Geo7X GPS unit for potential future disposal. The survey locations are depicted on **Figures 1, 2, and 3**. The results of the survey are presented in **Appendix B**

3.4 Additional Debris Area

During the geophysical survey, surficial debris was observed south of the Debris Pile B area at AOC 50. The debris consisted of 55-gallon drums, containers, building debris, and automotive parts. The location was identified as Debris Pile C. The debris pile location was marked in the field and is depicted on **Figure 4**. Surficial debris from this area was not removed during this mobilization. The USEPA and Massachusetts Department of Environmental Protection (MassDEP) were notified of the discovery of additional debris by email on December 14, 2021.

3.5 Investigation-Derived Waste Management

Based upon field screening, the surficial material collected during site activity was determined to be non-hazardous and suitable for disposal at a regulated facility accepting non-hazardous waste. On December 6, 2021, the Army contacted Mr. Conor O'Brien, the USEPA Region 1 Off-Site Rule Contact, via email to confirm that, since the debris did not contain contaminants or hazardous substances, it was not subject to the CERCLA Off-Site Rule. Mr. O'Brien confirmed that the debris was not subject to the Off-Site Rule via email on December 7, 2021. Accordingly, on December 22, 2021, approximately 1.84 tons of debris and two tires were transported by Tantara to the Devens Recycling Center in Devens, Massachusetts, for recycling. A copy of the recycling center weight slip is attached as **Appendix C**.

4 References

KGS 2020. Quality Assurance Project Plan, Former Fort Devens Army Installation, Devens, MA, Contract No. W912WJ-18-C-0011. 2020

S-A JV 2021. Final Debris Removal Work Plan, Area of Contamination 50, 57, and 74, Former Fort Devens Army Installation, Devens, MA, Contract No. W912WJ-19-D-0014. August 2021.

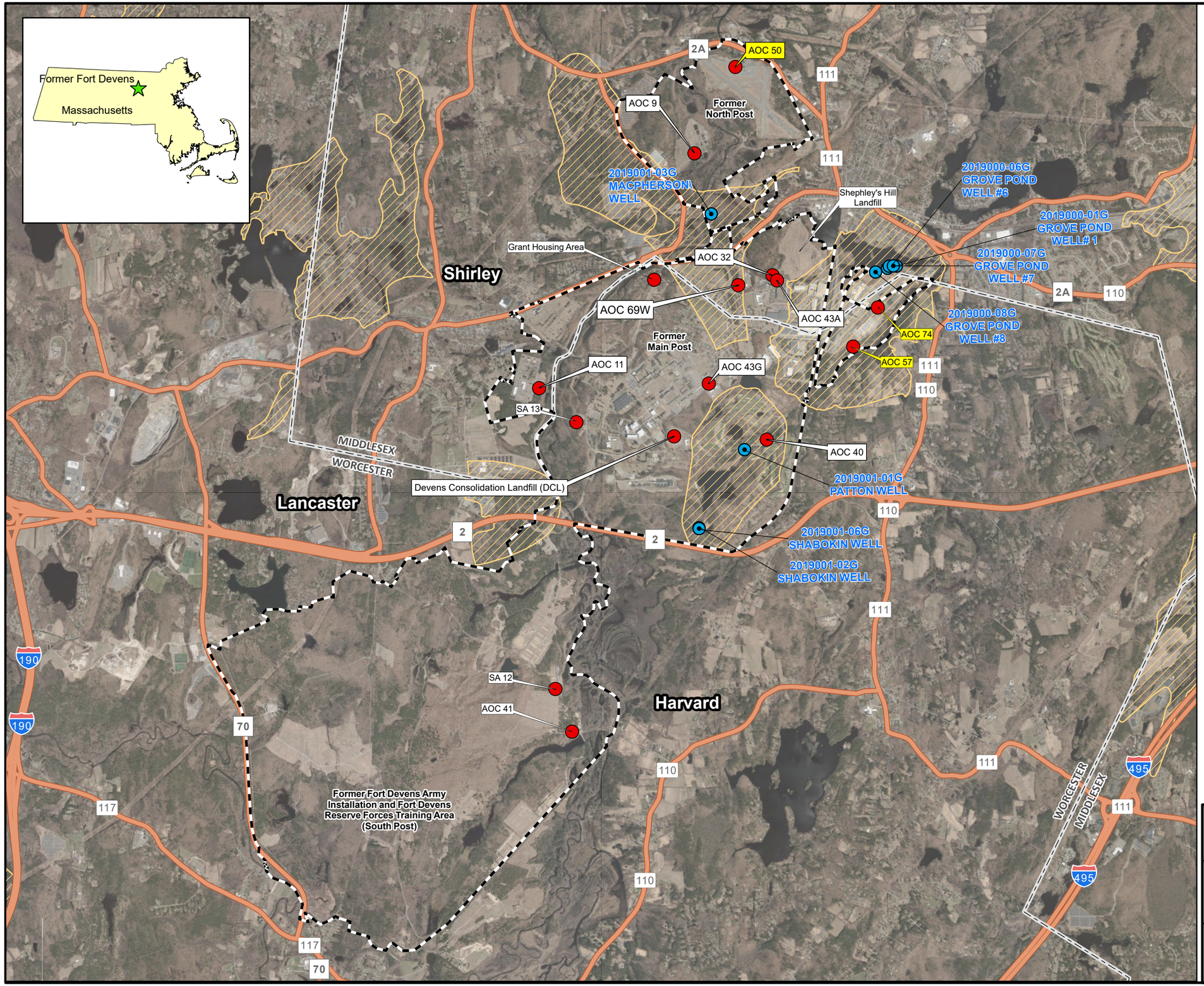
Tables

Table 1
Type and Location of Identified Debris
Debris Removal Activities Summary Report
Former Fort Devens Army Installation, Devens, MA

Point ID	Type	Quantity	Northing	Easting	Description	Debris Removed (Yes/No)?
AOC 57						
BD-1	Building Debris	unknown	3022937.30	633187.91	Cement slabs	No; the debris removal activities were limited to the disposal of materials which may have contained potentially hazardous substances.
BD-2		unknown	3022870.57	633070.45		
BD-3		1	3022750.68	632935.63		
BD-4*		unknown	3022795.60	633004.68		
BD-5*		unknown	3022795.84	632968.20		
BD-6*		unknown	3022652.11	632746.94		
BD-7*		unknown	3023312.64	633563.18		
BD-8*		unknown	3022905.37	633305.04		
C-1	Containers	1	3022932.46	633139.50	Container	Yes
C-2		4	3022938.83	633112.23	Cans spaced approximately 9-10 ft apart	Yes
D-1	Drum	1	3022932.12	633082.48	Drum	Yes
DP-1		7	3022737.58	632906.69	5-gallon drums	Yes
D-2		1	3022869.90	633056.40	Drum lid	Yes
D-3		1	3022657.84	632812.16		Yes
D-4		1	3022575.19	632675.81		No; could not be located
T-1	Tires	1	3022852.39	633048.58	Tires	Yes
T-2		1	3022808.64	633022.50		Yes
T-3 and T-4		2	3022716.36	632871.01	T-3&4 are located within 4 feet of each other	Yes
DB-1	Buried Drum	1	3022853.64	633049.74	Partially buried drum, potentially 55-gallon size	Yes
DB-2		1	3022852.47	633039.35		
DB-3		1	3022849.28	633032.73		
DB-4		1	3022836.86	633023.80		
DB-5		1	3022772.71	632943.28		
DB-6		1	3022671.59	632808.58		
CP-1	Vehicle and Parts	1	3022843.51	633050.98	Tires, fender, bumper, top half of a vehicle above ground	Yes
CP-2		1	3022833.13	633027.18		
M-1	Metal Piles	unknown	3022948.10	633091.50	Toolbox, metal sheet, and potential automobile	Yes
MP-2		unknown	3022758.48	632919.96		Yes
MP-3		unknown	3022651.00	632737.26	Metal pile with construction debris	Yes
MP-4*		unknown	3023321.69	633615.77		Yes
MD-1	Metal Debris	unknown	3022875.38	633044.79		Yes
MD-2		unknown	3022707.35	632837.98		Yes
MD-3		unknown	3023297.08	633633.17		Yes
MD-4		unknown	3033558.50	626897.77		Yes
MD-5*		unknown	3022852.39	633048.58		Yes
AOC 74						
D-1	Drum	1	3023894.60	634005.27		Yes
MD-1	Metal Debris	3	3024026.07	633956.78	Metal cans and concrete slabs present in area 10-ft x 10-ft	Yes
MD-2		1	3023994.07	633990.44	5-gallon can	Yes
MD-3		8	3023990.46	633993.93	Various sizes in debris field present in an area 5-ft wide x 15-ft long	Yes
MD-4		unknown	3023905.87	634035.08		Yes
MD-5		unknown	3023898.98	634003.28		Yes
MD-6		unknown	3024039.63	633996.11		Yes
MD-7		unknown	3024007.69	633967.25		Yes
MD-8		unknown	3024017.67	633939.85		Yes
AOC 50						
Debris Pile A	Debris Pile A	unknown	3033542.34	626970.24	Many paint cans (1-2-gal) and 1 tire. Debris observed along steep hill.	Yes; to the extent practical (see notes)
Debris Pile B	Debris Pile B	unknown	3035624.47	626644.29	Metal cans (one identified as a gas can)	Yes; to the extent practical (see notes)
Debris Pile C**	Debris Pile C	unknown	3035291.23	626384.93	55-gallon drums, containers, building debris, and automotive parts	No; USEPA and MassDEP notified of the discovery of additional debris, which will be removed in a separate mobilization.
CP-1	Containers	35	3033546.40	626985.77	Metal cans, glass bottles present in an area 20-30-ft wide x 70-100-ft long	Yes
CP-2		unknown	3033536.03	627071.66	Metal cans present in an area 10 -ft wide x 15-feet long	Yes
CP-3		7	3033536.95	627079.09	Metal cans, metal piping present in an area 10-ft wide x 15-feet long	Yes
MP-1	Metal Debris	4	3033558.91	627080.23	Metal pile present in an area 10-feet wide x 15-feet long	Yes

Notes:
1. * Previously undocumented item; observed during November 2021 site visit
2. ** Previously undocumented area of debris; observed during December 2021 geophysical survey
3. Due to the steepness of the ground surface along the Nashua River near Debris Pile A and B in AOC 50, only debris which could be retrieved in a same manner was collected in these areas.

Figures



LEGEND:

- FORMER FORT DEVENS BOUNDARY
- AREA OF CONTAMINATION (AOC)
- WATER SUPPLY WELL
- COUNTY LINE
- MAJOR ROADS AND HIGHWAYS
- MASSDEP ZONE II WELLHEAD PROTECTION AREA

MassDEP = Massachusetts Department of Environmental Protection

0.5 0 0.5 1 1.5 MILE

GRAPHIC SCALE

NOTES:

1. SITE FEATURES ARE APPROXIMATE
2. AERIAL SOURCE: MASSACHUSETTS 2019 USGS COLOR ORTHO IMAGERY

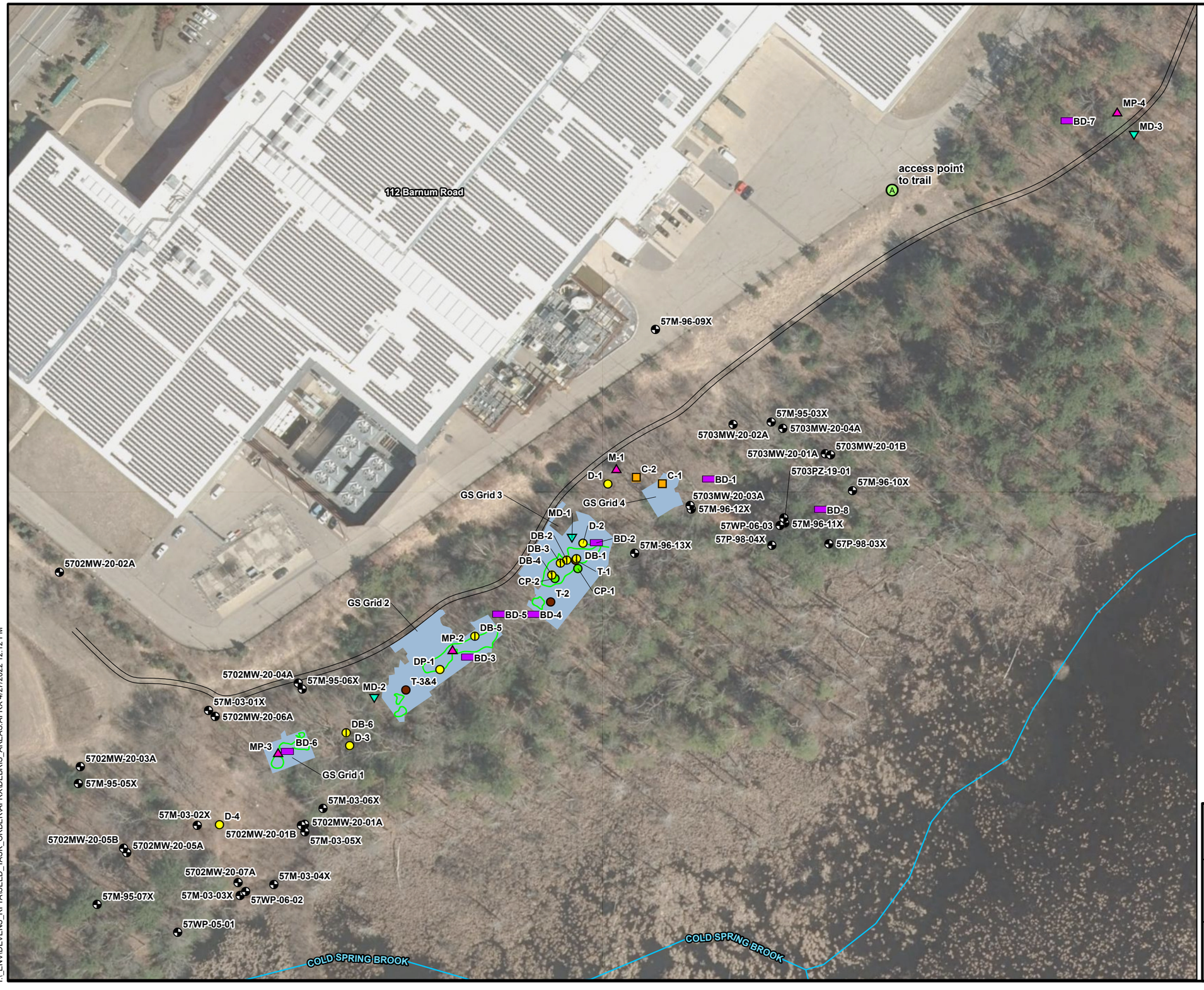
UNITED STATES ARMY CORPS OF ENGINEERS
FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS
DEBRIS REMOVAL SUMMARY REPORT

SITE MAP

SERES Engineering & Services, LLC
ARCADIS a joint venture

FIGURE 1

CITY: EAST GREENWHICH., RI DIV/GROUP: ENV CREATED BY: AFINKELMAN LAST SAVED BY: AFINKELMAN
PROJECT: 30098061
C:\USERS\AFINKELMAN\ONEDRIVE - ARCADIS\DOCUMENTS\ARCGIS\PROJECTS\DEVENS\DEVENS.APRX 1/28/2022 2:30 PM



LEGEND:

- MONITORING WELL
- BUILDING DEBRIS
- BURIED DRUM
- CAR PARTS
- CONTAINERS
- DRUMS
- METAL DEBRIS
- METAL PILES
- TIRES
- WALKING TRAIL
- POSSIBLE BURIED METAL
- GEOPHYSICAL SURVEY BOUNDARIES

40 0 40 80 120 160 200 FEET

GRAPHIC SCALE

NOTES:

1. SITE FEATURES ARE APPROXIMATE

UNITED STATES ARMY CORPS OF ENGINEERS
FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS
DEBRIS REMOVAL SUMMARY REPORT

AOC 57 DEBRIS AREAS

SERES Engineering & Services, LLC
ARCADIS a joint venture

FIGURE **2**

CITY: EAST GREENWHICH, RI DIV/GROUP: ENV CREATED BY: SHARMAYH4948 LAST SAVED BY: SHARMAYH4948
PROJECT: 30098081
T:_ENV\DEVENS_RFTA\SEED_TASK_ORDER\APRX\DEBRIS_AREAS.APRX 4/27/2022 12:12 PM

LEGEND:

- MONITORING WELL
- DRUMS
- METAL DEBRIS
- STAGING AREA
- WALKING TRAIL
- POSSIBLE BURIED METAL
- GEOPHYSICAL SURVEY BOUNDARIES

25 0 25 50 75 100 125 FEET

GRAPHIC SCALE

NOTES:

1. SITE FEATURES ARE APPROXIMATE

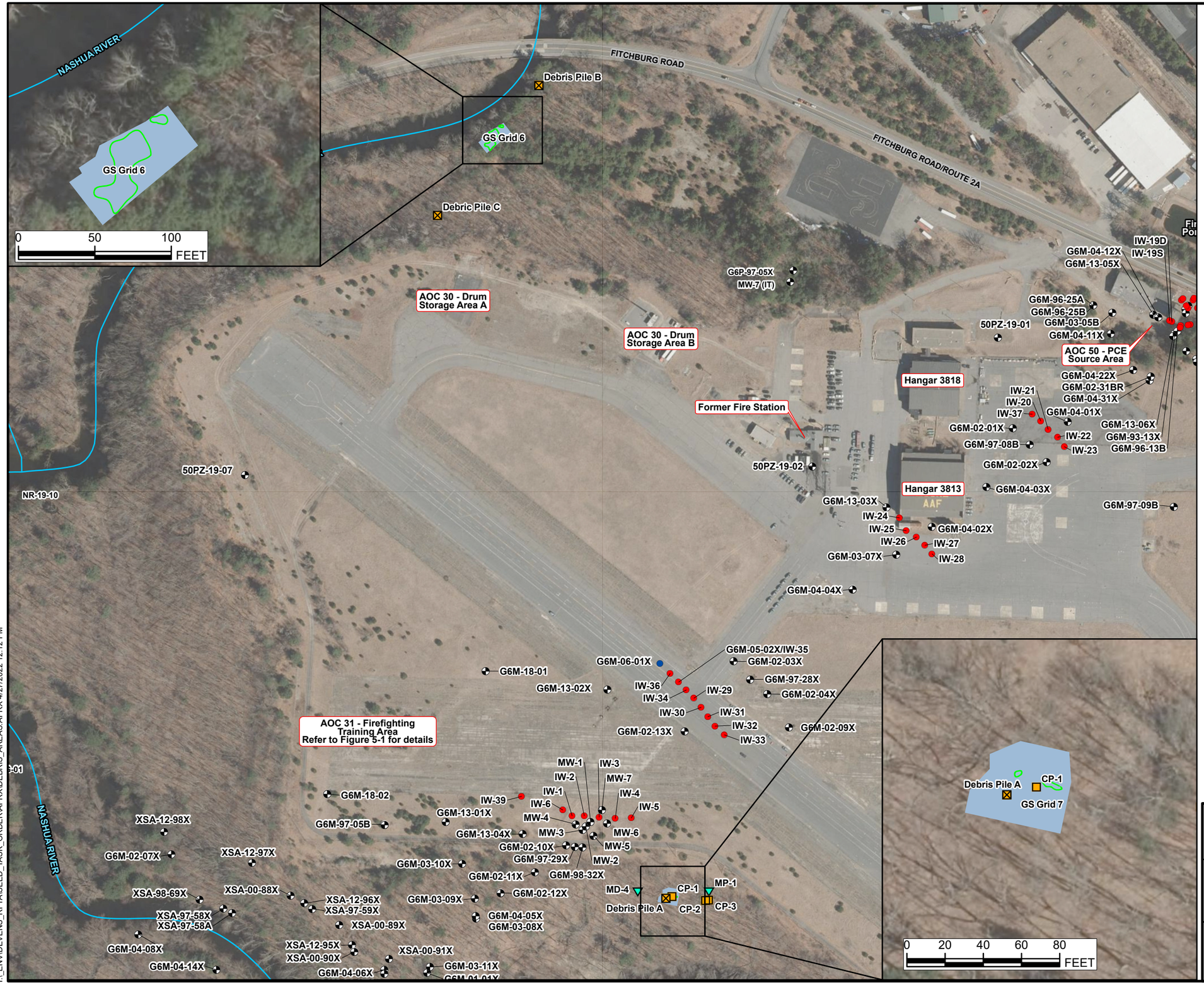
UNITED STATES ARMY CORPS OF ENGINEERS
FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS
DEBRIS REMOVAL SUMMARY REPORT

AOC 74 DEBRIS AREAS

SERES Engineering & Services, LLC
ARCADIS a joint venture

FIGURE **3**

CITY: EAST GREENWHICH, RI DIV/GROUP: ENV CREATED BY: SHARMAYH4948 LAST SAVED BY: SHARMAYH4948
PROJECT: 30098081
T:_ENV\DEVENS_RFTA\SEED_TASK_ORDER\APRX\DEBRIS_AREAS.APRX 4/27/2022 12:12 PM



LEGEND:

- MONITORING WELL/PIEZOMETER
- DEBRIS AREA
- CONTAINERS
- METAL DEBRIS
- INJECTION WELL
- MONITORING WELL CONVERTED TO INJECTION WELL
- POSSIBLE BURIED METAL
- GEOPHYSICAL SURVEY BOUNDARIES

100 0 100 200 300 400 500 FEET

GRAPHIC SCALE

ACCRONYMS AND ABBREVIATIONS:

AOC = AREA OF CONCERN

PCE = TETRACHLOROETHYLENE

NOTES:

1. SITE FEATURES ARE APPROXIMATE

UNITED STATES ARMY CORPS OF ENGINEERS
FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS
DEBRIS REMOVAL SUMMARY REPORT

AOC 50 DEBRIS AREAS

SERES Engineering & Services, LLC
ARCADIS a joint venture

FIGURE **4**

CITY: EAST GREENWHICH, RI DIV/GROUP: ENV CREATED BY: SHARMAYH4948 LAST SAVED BY: SHARMAYH4948
PROJECT: 30098087 T:_ENV\DEVENS_RFTA\SEED_TASK_ORDER\APRX\DEBRIS_AREAS.APRX 4/27/2022 12:12 PM

Appendix A

Photograph Log

Photograph Log

United States Army Corps of Engineers
Debris Removal Activities Summary Report
Former Fort Devens, Massachusetts

Photograph: 1

Description:

Scrap metal at MP-4.

Location:
AOC 57

Date: 11/29/2021

Photograph: 2

Description:

MP-4 after metal was removed.

Location:
AOC 57

Date: 11/29/2021

Photograph Log

United States Army Corps of Engineers
Debris Removal Activities Summary Report
Former Fort Devens, Massachusetts

Photograph: 3

Description:

MD-3: Metal debris after exposed.

Location:
AOC 57

Date: 11/29/2021

Photograph: 4

Description:

BD-8: Concrete after exposed.

Location:
AOC 57

Date: 11/29/2021

Photograph Log

United States Army Corps of Engineers
Debris Removal Activities Summary Report
Former Fort Devens, Massachusetts

Photograph: 5

Description:

C-2: Metal containers in pile for disposal.

Location:
AOC 57

Date: 11/29/2021

Photograph: 6

Description:

D-1: Drum prior to disposal.

Location:
AOC 57

Date: 11/29/2021

Photograph Log

United States Army Corps of Engineers
Debris Removal Activities Summary Report
Former Fort Devens, Massachusetts

Photograph: 7

Description:

D-1: Drum after exposed. No observed soil staining.

Location:
AOC 57

Date: 11/29/2021

Photograph: 8

Description:

T-2: Tire and metal debris ready for disposal.

Location:
AOC 57

Date: 11/29/2021

Photograph Log

United States Army Corps of Engineers
Debris Removal Activities Summary Report
Former Fort Devens, Massachusetts

Photograph: 9

Description:

MD-2: Area prior to debris removal.

Location:
AOC 57

Date: 11/29/2021

Photograph: 10

Description:

BD-6: Asphalt left in place.

Location:
AOC 57

Date: 11/30/2021

Photograph Log

United States Army Corps of Engineers
Debris Removal Activities Summary Report
Former Fort Devens, Massachusetts

Photograph: 11

Description:
DB-3: Removal of metal debris using bandsaw to cut approximately 6 inches below grade.

Location:
AOC 57

Date: 11/30/2021

Photograph: 12

Description:
BD-3: Concrete slab left in place.

Location:
AOC 57

Date: 11/30/2021

Photograph Log

United States Army Corps of Engineers
Debris Removal Activities Summary Report
Former Fort Devens, Massachusetts

Photograph: 13

Description:

Buried metal uncovered when removing drum in DB-3. Left in place and backfilled.

Location:
AOC 57

Date: 11/30/2021

Photograph: 14

Description:

Debris staging area prior to the arrival of the roll-off container.

Location:
112 Barnum Road
Devens, MA

Date: 11/29/2021

Photograph Log

United States Army Corps of Engineers
Debris Removal Activities Summary Report
Former Fort Devens, Massachusetts

Photograph: 15

Description:

Debris staging area at the completion of the workday.

Location:
112 Barnum Road
Devens, MA

Date: 11/29/2021

Photograph: 16

Description:

Debris placed in roll-off container. Swing-door closed after debris was transferred.

Location:
112 Barnum Road
Devens, MA

Date: 11/29/2021

Photograph Log

United States Army Corps of Engineers
Debris Removal Activities Summary Report
Former Fort Devens, Massachusetts

Photograph: 17

Description:
GSSI UtilityScan DF GPR.

Location:
112 Barnum Road
Devens, MA

Date 12/7/2021

Photograph: 18

Description:
Geometrics G858-G magnetometer.

Location:
112 Barnum Road
Devens, MA

Date 12/8/2021

Photograph Log

United States Army Corps of Engineers
Debris Removal Activities Summary Report
Former Fort Devens, Massachusetts

Photograph: 19

Description:
Geonics EM61-MK2 and time domain metal detector.

Location:
112 Barnum Road
Devens, MA

Date 12/7/2021

Photograph: 20

Description:

GS Grid 1 boundary marked by pink pin flags.

Location:
AOC 57

Date: 12/7/2021

Photograph Log

United States Army Corps of Engineers
Debris Removal Activities Summary Report
Former Fort Devens, Massachusetts

Photograph: 21

Description:

GS Grid 1 buried debris pin flags (blue) and boundary pin flags (pink).

Location:
AOC 57

Date: 12/8/2021

Photograph: 22

Description:

Conducting GPR in GS Grid 5. Grid boundary marked with pink pin flags.

Location:
AOC 74

Date: 12/8/2021

Photograph Log

United States Army Corps of Engineers
Debris Removal Activities Summary Report
Former Fort Devens, Massachusetts

Photograph: 23

Description:

GS Grid 6 pin flags. Grid boundary marked with pink pin flags.

Location:
AOC 50

Date: 12/8/2021

Photograph: 24

Description:

GS Grid 6 boundary marked with pink pin flags.

Location:
AOC 50

Date: 12/6/2021

Photograph Log

United States Army Corps of Engineers
Debris Removal Activities Summary Report
Former Fort Devens, Massachusetts

Photograph: 25

Description:

Debris Area C: Metal building/structural debris.

Location:
AOC 50

Date: 12/9/2021

Photograph: 26

Description:

Debris Area C: Streel drums observed on slope.

Location:
AOC 50

Date: 12/10/2021

Appendix B

Geophysical Survey Report

HAGER-RICHTER
GEOSCIENCE, INC.

GEOPHYSICAL SURVEY
AOC57, AOC50, AND AOC74
DEBRIS PILE REMOVAL WORK PLAN
DEVENS, MASSACHUSETTS

Prepared for:

Arcadis
One Executive Drive, Suite 303
Chelmsford, Massachusetts 01824

Prepared by:

Hager-Richter Geoscience, Inc.
8 Industrial Way - D10
Salem, New Hampshire 03079

File 21SG06
January, 2022

HAGER-RICHTER
GEOSCIENCE, INC.

GEOPHYSICS FOR THE ENGINEERING COMMUNITY
SALEM, NEW HAMPSHIRE
Tel: 603.893.9944
FORDS, NEW JERSEY
Tel: 732.661.0555

January 17, 2022
File 21SG06

Ian A. Martz, P.G.
Senior Geologist
Arcadis
One Executive Drive, Suite 303
Chelmsford, Massachusetts 01824

Tel: 978-322-4526
Mob: 717-645-6179
Email: ian.martz@arcadis.com

RE: Geophysical Survey
AOC57, AOC50, and AOC74
Debris Pile Removal Work Plan
Devens, Massachusetts

Dear Mr. Martz:

In this report, we summarize the results of a geophysical survey conducted by Hager-Richter Geoscience, Inc. (HRGS) at the above referenced site in Devens, Massachusetts, for Arcadis in December 2021. The scope of the project and areas of interest were specified by Arcadis.

INTRODUCTION

The site is a portion of former Fort Devens military complex. The general location of the site is shown in Figure 1. As a part of a recent environmental investigation of the site by Arcadis, surface debris, including drums, paint cans, vehicles and parts, tires, and other metal objects were observed in areas of concern (AOCs) located south of Great Road (AOC50 North and AOC50 South)) and southeast of Barnum Road (AOC57 and AOC74) at Devens, Massachusetts. Arcadis has requested a geophysical survey, including the electromagnetics, magnetics, and ground penetrating radar methods, to determine the extent of buried debris, if present, associated with the surface metal observed in AOC50 North, AOC50 South, AOC57, and AOC74. Arcadis specified that detected areas of buried metal are to be marked in the field and their locations recorded by GPS.

The approximate limits of the AOIs are shown in Figure 2 for AOC57, Figure 4 for AOC50 North and AOC50 South, and Figure 7 for AOC74. The AOIs are all located within moderate woods.

OBJECTIVE

The objective of the geophysical survey was to detect, and if detected, determine the extents of buried metal at the specified Point ID locations in areas of concern (AOCs) at the site.

THE SURVEY

Steven Grant, P.G., Vanja Dezelic, Ph.D., and Bryan Carnahan of HRGS conducted the geophysical survey on December 6 - 10, 2021. The project was coordinated with Mr. Ian A. Martz, P.G. of Arcadis. Mr. Evan Green and Mr. Desmond Bedard, also of Arcadis, were present during the survey and coordinated with Mr. Brent Smith of United States Army Corps of Engineers (USACE). The area of interest were specified in the field by Arcadis and USACE.

Surface metal objects had been removed from the AOCs prior to the geophysical survey. In some cases, especially in AOC57, indentations on the ground surface from the removed objects could be observed. The areas of interest were lightly wooded with some brush. Arcadis, USACE, and HRGS personnel cleared significant brush, branches, and logs from the areas of interest where possible. Several of the areas of interest had steep slopes, such as AOC57 South and AOC74. Photograph 1 shows typical conditions at the site.

Photograph 1. Using EM61 in area AOC74. All AOI's were wooded. Pink flags represent the local grid set up for each area.

The geophysical survey of the specified areas of interest was conducted using three (3) methods: time domain electromagnetic induction metal detection (EM); magnetics (Mag), and ground penetrating radar (GPR). The EM data were acquired at approximately 8-inch intervals along lines spaced 5 feet apart across the accessible portions of the specified areas of interest. The EM survey detects buried metal. However, the EM method cannot provide information on the type of objects causing an EM anomaly.

The Mag data were acquired at approximately 1.5-foot intervals along parallel lines spaced no more than 5 feet apart across the accessible portions of the AOIs. The Mag method is sensitive to ferrous metal to a depth of approximately 20 feet.

GPR data were acquired along traverses oriented in two mutually perpendicular directions, with lines spaced 5 feet apart across the accessible portions of the areas of interest. The GPR method is capable of detecting both metal and nonmetal objects.

The EM and Mag data were reviewed in the field, and the areas of the most significant buried metal were marked in the field with blue pin flags. Because significant buried metal appeared likely to extend beyond the originally specified extents of the two larger sub-areas of AOC57, HRGS and Arcadis cleared additional brush and logs from the north and west sides of such areas in order to extend the geophysical survey. Note that while some of the extents of the buried metal were better delimited, significant portions of buried metal still appear to extend northward from the sub-area of AOC57 located second from north. There was not sufficient time or equipment to continue clearing the areas further.

A local survey grid was established for each of the AOIs for the acquisition of the geophysical data. The survey grids and other site features were georeferenced using a Trimble Geo7X CM GPS system utilizing a Zephyr-2 external antenna. Where observed, the locations of recently removed surface metal and small metal objects uncovered during the geophysical survey were georeferenced with the GPS system. The results of the survey are presented relative to the Massachusetts State Plane System, NAD 1983.

EQUIPMENT

EM61. The EM survey was conducted using a Geonics EM61-MK2 time domain electromagnetic induction metal detector. The EM61-MK2 instrument was designed specifically for detecting buried metal objects such as utilities, underground storage tanks (USTs), and drums. An air-cored transmitter coil generates a pulsed primary magnetic field in the earth, thereby inducing eddy currents in nearby metal objects. The eddy current produces a secondary magnetic field that is sensed by two receiver coils, one coincident with the transmitter and one positioned 40 cm above the main coil. By measuring the secondary magnetic field after the current in the ground has dissipated but before the current in metal objects has dissipated, the instrument responds only to the secondary magnetic field produced by metal objects. Four channels of secondary response are measured in mV and are recorded on a digital data logger. The system is generally operated by pushing the coils configured as a wagon with an odometer mounted on the axle to trigger the data logger automatically at approximately 8-inch intervals.

Magnetics. The magnetic survey was conducted using a Geometrics Model G858-G Cesium Vapor Magnetometer. The G-858-G uses two sensors with a vertical separation of 2.5 feet. The total magnetic field is measured at both sensors and the vertical magnetic gradient is calculated from those measurements. The G858-G can record data at 0.2 second cycle rates with a 0.05 gamma sensitivity. Magnetic data are most commonly presented as contour maps.

As indicated above, magnetic data were acquired at approximately 1.5 - foot intervals along lines spaced 5 feet apart across the accessible portions of the area of interest. The magnetic survey

detects buried ferrous metal. However, the magnetic method cannot provide information on the type of objects causing the anomaly.

GPR. The GPR survey was conducted using a GSSI UtilityScan Dual Frequency digital subsurface imaging radar system. The system includes a survey wheel that triggers the recording of the data at fixed intervals, thereby ensuring the accuracy of the features detected along the survey lines. The system was used with 800 MHz and 300 MHz antennae. Data were recorded using 35 and 65 ns[1] time windows for the 800 MHz antenna and 300 MHz antenna, respectively.

GPR uses a high-frequency electromagnetic pulse (referred to herein as "radar signal") transmitted from a radar antenna to probe the subsurface. The transmitted radar signals are reflected from subsurface interfaces of materials with contrasting electrical properties. Travel times of the radar signal can be converted to approximate depth below the surface by correlation with targets of known depths and by a curve matching routine. We monitor the acquisition of GPR data in the field and record the GPR data digitally for subsequent processing.

Data from the GPR survey were processed using RADAN 7.4 GPR processing software from Geophysical Survey Systems, Inc. We reviewed profile images of the GPR data. Interpretation of the records is based on the nature and intensity of the reflected signals and on the resulting patterns.

LIMITATIONS OF THE METHODS

> HRGS MAKES NO GUARANTEE THAT ALL TARGETS OF INTEREST WERE DETECTED IN THIS SURVEY. HRGS IS NOT RESPONSIBLE FOR DETECTING TARGETS THAT CANNOT BE DETECTED BY THE METHODS EMPLOYED OR BECAUSE OF SITE CONDITIONS. GPR SIGNAL PENETRATION MIGHT NOT BE SUFFICIENT TO DETECT ALL TARGETS.

EM61. The EM61 cannot detect non-metallic objects. The data from an EM61 survey are adversely affected by surface metal. The EM61 has a depth sensitivity limited to about 12 feet. The instrument is relatively cumbersome and works best where the transmit and receive coils can be hand pushed in a small wagon.

Detection and identification should be clearly differentiated. Detection is the recognition of the presence of a metal object, and the electromagnetic method is excellent for such purposes. Identification, on the other hand, is determination of the nature of the causative body (i.e., what is the body -- a cache of drums, UST, automobile, white goods, etc.?). Although the EM data cannot be used to identify all buried metal objects, they provide excellent guides to the

[1] ns, abbreviation for nanosecond, 1/1,000,000,000 second. Light and the GPR signal require about 1 ns to travel 1 ft in air. The GPR signal requires about 3.5 ns to travel 1 ft in unsaturated sandy soil.

identification of some objects. For example, buried metal utilities produce anomalies with lengths many times their widths.

Mag. The data recorded in magnetic surveys are affected by all ferrous metal objects. In particular, steel objects above ground, such as trailers, fences, and buildings, can so influence the magnetic field that the effects of buried metal objects, if any, at the same location are "masked." Thus, where magnetic anomalies can be attributed to surface objects, the presence or absence of buried metal objects cannot be determined from the magnetic data alone.

Detection and identification should be clearly differentiated. Detection is the recognition of the presence of a magnetic object, and the magnetic method is excellent for such purposes. Identification, on the other hand, is determination of the nature of the causative body (i.e., what is the body -- a cache of drums, UST, automobile, white goods, etc.?), and the magnetic method cannot identify the buried metal object.

GPR. There are limitations of the GPR technique as used to detect and/or locate targets such as those of the objectives of this survey. Limitations include: (1) surface conditions, (2) electrical conductivity of the ground, (3) contrast of the electrical properties of the target and the surrounding soil, and (4) spacing of the traverses. Of these restrictions, only the last is controllable by us.

The condition of the ground surface can affect the quality of the GPR data and the depth of penetration of the GPR signal. Sites covered with snow piles, high grass, bushes, landscape structures, debris, obstacles, soil mounds, etc. limit the survey access and the coupling of the GPR antenna with the ground. In many cases, the GPR signal will not penetrate below concrete pavement, especially inside buildings, and a target may not be detectable. The GPR method also commonly does not provide useful data under canopies found at some facilities.

The electrical conductivity of the ground determines the attenuation of the GPR signal and thereby limits the maximum depth of exploration. For example, the GPR signal does not penetrate clay-rich soils, and targets buried in clay might not be detected.

A definite contrast in the electrical conductivities of the surrounding ground and the target material is required to obtain a reflection of the GPR signal. If the contrast is too small, possibly due to construction details or deeply corroded metal in the target, then the reflection may be too weak to recognize, and the target can be missed.

RESULTS

General. The geophysical survey was conducted using the EM61, Mag, and GPR methods across the accessible portions of the AOIs specified by Arcadis and USACE. The following table lists the figures showing results for each of the AOCs:

Area	Location	EM Data	Mag Data	GPR and Integrated Interpretation
AOC57	Fig. 2	Fig. 3, top	Fig. 3, middle	Fig. 3, bottom
AOC50 North	Fig. 4	Fig. 5, top left	Fig. 5, top right	Fig. 5, bottom left
AOC50 South	Fig. 4	Fig. 6, left	Fig. 6, middle	Fig. 6, right
AOC74	Fig. 7	Fig. 8, top left	Fig. 8, top right	Fig. 8, bottom left

EM61. The EM61 data were acquired at approximately 8-inch intervals along survey lines spaced 5 feet apart across the accessible portions of the areas of interest. As indicated above, the results of the EM61 survey are shown in color contour form in Figure 3 (AOC57), Figure 5 (AOC50 North), Figure 6 (AOC50 South), and Figure 8 (AOC74). Interpretation of EM61 data is based on the relative response of the instrument in millivolts to local conditions. The instrument is not calibrated to provide an absolute measure of a particular property, such as the conductivity of the soil or the strength of the earth's magnetic field. Subsurface metal objects produce sharply defined positive anomalies when the EM61 is positioned directly over them. Acquiring data at short intervals along closely spaced lines, as was done at the subject site, provides high spatial resolution of the location and footprint of the targets. Thus, buried metal is recognized in contour plots of EM61 data by positive anomalies with spatial dimensions roughly corresponding to the dimensions of the buried metal.

Several moderate-to high-amplitude EM anomalies (green to red areas in Figures 3, 5, 6 and 8) are present in the AOIs and are inferred to have been caused by buried metal. For some such EM anomalies in AOC57 and AOC50, GPR reflections typical of buried objects were detected (see below) and their locations are shown as brown crossed boxes in the integrated interpretation plots in Figure 3 and in Figure 5. For the remainder of the moderate- to high-amplitude EM anomalies, GPR reflections typical of discrete objects were not detected, and such areas of unidentified buried metal are shown as red cross-hatched areas in the integrated interpretation panels of Figures 3, 5, 6 and 8. We note that the size and amplitude of several of the EM anomalies are large enough to be caused by drums, caches of drums, or other metal debris (see below).

Mag. A Mag survey measures variations in the earth's magnetic field which can be caused by the presence of ferrous metal objects, geological changes, and man-made magnetic fields. When a magnetometer is used with two vertically separated sensors, as was done at the subject site, local variations in the earth's vertical magnetic gradient are measured, and the locations of buried ferrous metal objects can be resolved more accurately than with total magnetic field data only. The magnetic method can detect a ferrous metal object roughly the size of a steel drum at a depth of approximately 20 feet. The results of the Mag survey are presented as a color contour plot of the vertical magnetic gradient in Figures 3, 5, 6 and 8.

Mag data corresponded closely to the EM61 data. Because the response is of the EM61 is more consistent (e.g. the EM61 response to buried metal is nearly always positive, and intensity of response is not as sensitive to object orientation), the majority of the buried metal areas shown in

Figures 3, 5, 6 and 8 as red hatched areas are based on the EM61 data (see above) rather than the magnetometer data.

GPR Survey and Integrated Interpretation. Apparent GPR signal penetration in all areas at the site was very good, with GPR two-way travel time reflections received from 65 ns of the 65 ns time window for the 300 MHz antenna and from 35 ns of the 35 ns time window for the 800 MHz antenna. Based upon site-specific time-to-depth conversions for the GPR signal, the GPR signal penetration in all areas is estimated to have been about 10 feet for the 300 MHz antenna and 6 feet for the 800 MHz antenna.

GPR reflections typical of discrete objects or caches of objects were observed in the GPR data at the locations of moderate- to high-amplitude EM and Mag anomalies in AOC 57 and AOC50 North. Such metallic objects or caches of objects are shown as crossed brown boxes areas in the integrated interpretation panels of Figures 3 and 5. Such features could not be identified on the basis of the GPR data, but we note that crushed drums and/or destroyed USTs could produce such reflections, and we cannot rule out their presence.

Scattered GPR reflections were received in other areas of buried metal, but were not useful for delineation or identification of objects. Such areas are shown as red cross-hatched areas in Figures 3, 5, 6, and 8. While GPR reflections consistent with discrete objects were not received for such areas, we note that jumbled metal caches, crushed drums and/or destroyed USTs could produce such reflections, and we cannot rule out their presence. Alternatively, other metal objects, such as mechanical parts, signposts, tire rims, reinforced concrete debris, etc., could produce GPR reflections and EM anomalies similar to those observed.

GPR reflections characteristic of small unidentified buried objects (no larger than about 2 feet wide) were detected in portions of the AOCs. The locations of such small buried objects are shown as small blue X's in Figures 3, 6, and 8. Most such small objects were located outside of areas of buried metal. In addition, several possible utility segments or other linear structures were detected in AOC57 and AOC50 North, and such possible utility segments or linear structures are shown as dashed black lines in Figures 3 and 5.

As noted above, HRGS and Arcadis cleared additional brush and logs from the two larger sub-areas of AOC57 to extend the geophysical northward and westward from their originally specified limits. Note that while some of the extents of the buried metal were better delimited, significant portions of buried metal still appear to extend northward from the sub-area of AOC57 located second from north. There was not sufficient time or equipment to continue clearing the areas further.

CONCLUSIONS

Based upon the geophysical survey conducted by HRGS at the former Fort Devens military complex located at in Devens, Massachusetts for Arcadis in December 2021, we conclude:

- Multiple areas of buried metal objects or caches of objects are present in the areas of the interest. It cannot be determined whether such objects are drums or USTs based on the geophysical data.

- Small unidentified buried objects and possible utility segments or linear structures are present in the AOCs.

LIMITATIONS ON USE OF THIS REPORT

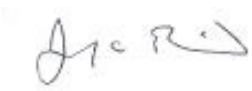
This letter report was prepared for the exclusive use of Arcadis (the Client). No other party shall be entitled to rely on this Report, or any information, documents, records, data, interpretations, advice or opinions given to the Client by Hager-Richter Geoscience, Inc. (HRGS) in the performance of its work. The Report relates solely to the specific project for which HRGS has been retained and shall not be used or relied upon by the Client or any third party for any variation or extension of this project, any other project or any other purpose without the express written permission of HRGS. Any unpermitted use by the Client or any third party shall be at the Client's or such third party's own risk and without any liability to HRGS.

HRGS has used reasonable care, skill, competence and judgment in the performance of' its services for this project consistent with professional standards for those providing similar services at the same time, in the same locale, and under like circumstances. Unless otherwise stated, the work performed by HRGS should be understood to be exploratory and interpretational in character and any results, findings or recommendations contained in this Report or resulting from the work proposed may include decisions which are judgmental in nature and not necessarily based solely on pure science or engineering. It should be noted that our conclusions might be modified if subsurface conditions were better delineated with additional subsurface exploration including, but not limited to, test pits, soil borings with collection of soil and water samples, and laboratory testing.

Except as expressly provided in this limitations section, HRGS makes no other representation or warranty of any kind whatsoever, oral or written, expressed or implied; and all implied warranties of merchantability and fitness for a particular purpose, are hereby disclaimed. If you have any questions or comments on this letter report, please contact us at your convenience. It has been a pleasure to work with Arcadis on this project. We look forward to working with you again in the future.

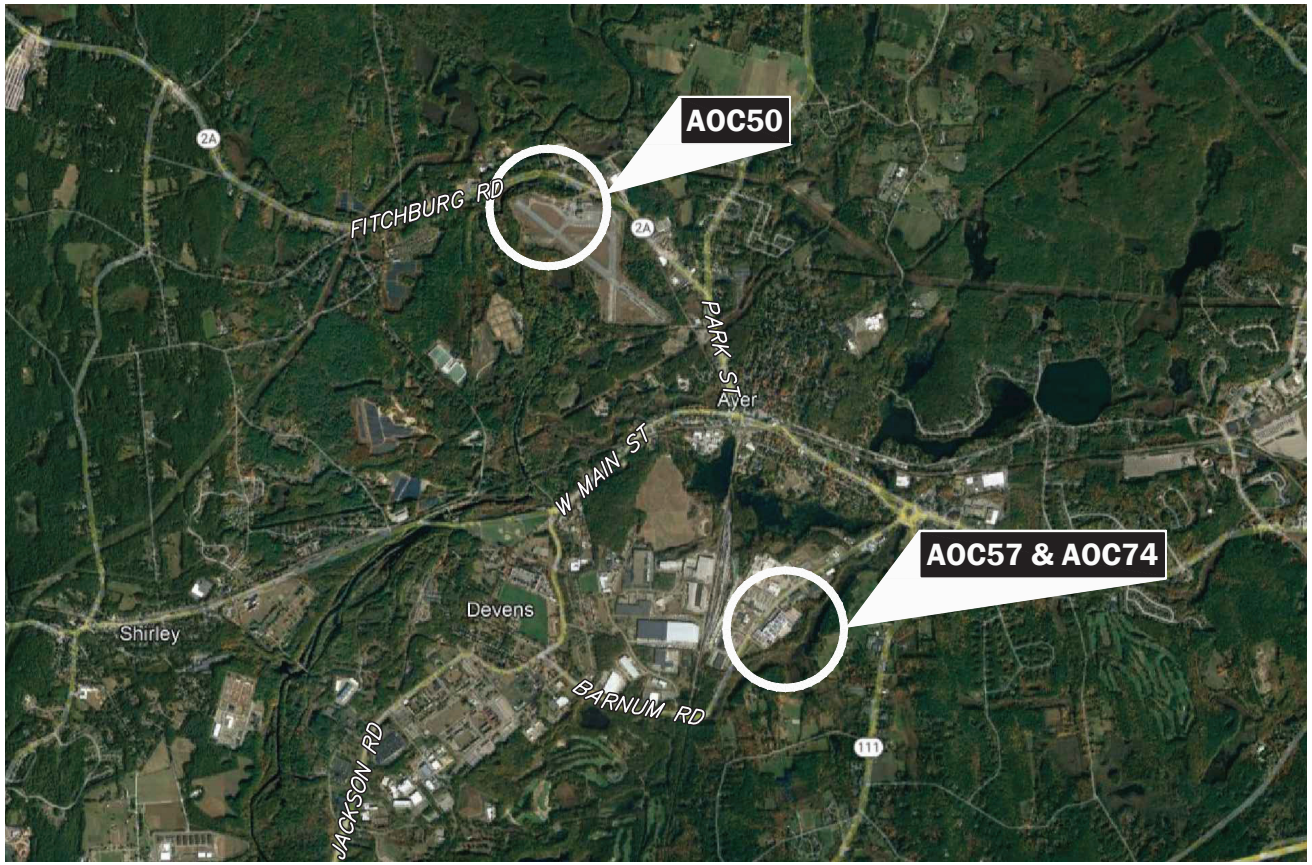
Sincerely,
HAGER-RICHTER GEOSCIENCE, INC.

Vanja Dezelic, Ph.D.
Geophysicist



Jeffrey Reid, P.G.
Owner / Principal Geophysicist

Attachments: Figures 1 - 8



N

H-R

APPROXIMATE SCALE (mile)

0 1 2

MASS

LOCATION

NOTE:

Modified from Google Earth Pro aerial photograph.

Figure 1
General Site Location
AOC50, AOC57, and AOC74
Debris Pile Removal Work Plan
Devens, Massachusetts

File 21SG06 | January, 2022

HAGER–RICHTER
Salem, NH | Fords, NJ

SCALE (feet)

0 200 400

LEGEND

APPROXIMATE LIMITS OF GEOPHYSICAL SURVEY AREA

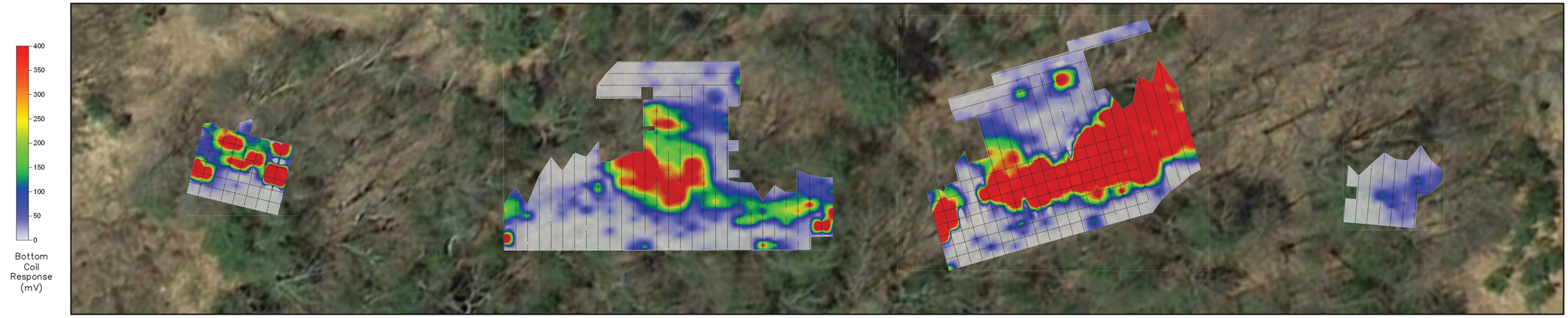
NOTE:

Modified from Google Earth Pro aerial photograph.

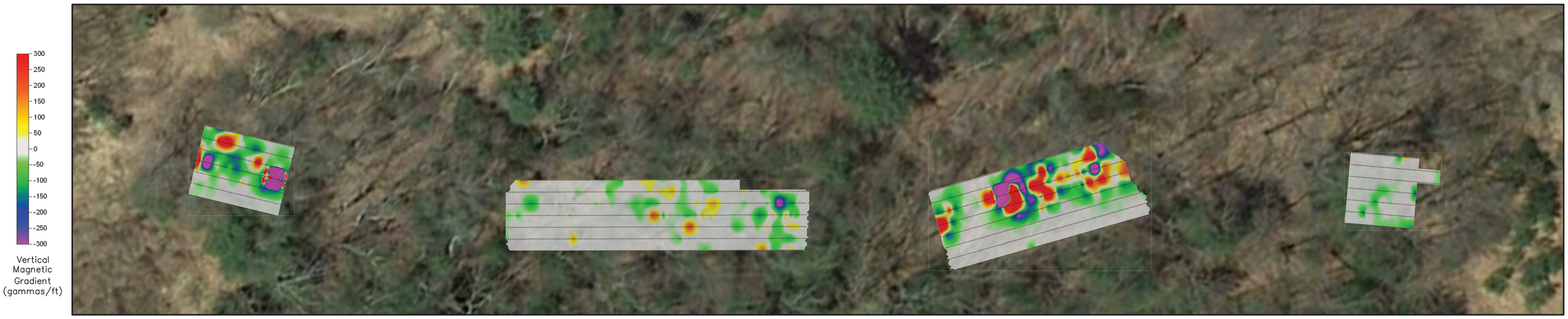
Figure 2
AOC57 Survey Area Location
Debris Pile Removal Work Plan
Devens, Massachusetts

File 21SG06 | January, 2022

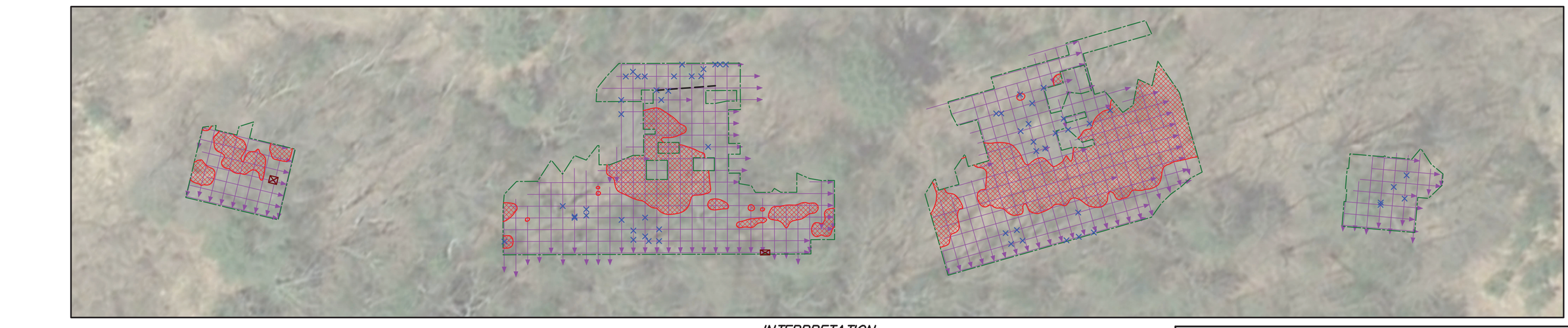
HAGER–RICHTER
Salem, NH | Fords, NJ



EM SURVEY



MAGNETIC SURVEY



INTERPRETATION

NOTES:

1. Modified from Google Earth Pro aerial photograph.
2. Data were acquired with Geonics EM61–MK2. Bottom coil response shown.
3. Data were acquired with Geometrics G 858.

SCALE (feet)
0 30 60

LEGEND

- EM & MAGNETIC DATA STATIONS
- APPROXIMATE LIMITS OF EM & MAGNETIC SURVEY AREA
- GPR TRAVERSE
- AREA OF POSSIBLE BURIED METAL
- UNIDENTIFIED BURIED METAL OBJECT
- POSSIBLE UTILITY
- UNIDENTIFIED BURIED OBJECT

N

H-R

FIGURE 3
GEOPHYSICAL SURVEY & INTERPRETATION – AOC57
DEBRIS PILE REMOVAL WORK PLAN
DEVENS, MASSACHUSETTS

FILE 21SG06 | JANUARY, 2022

HAGER–RICHTER
SALEM, NH | FORDS, NJ

N

H-R

LEGEND

APPROXIMATE LIMITS OF GEOPHYSICAL SURVEY AREA

SCALE (feet)

0 400 800

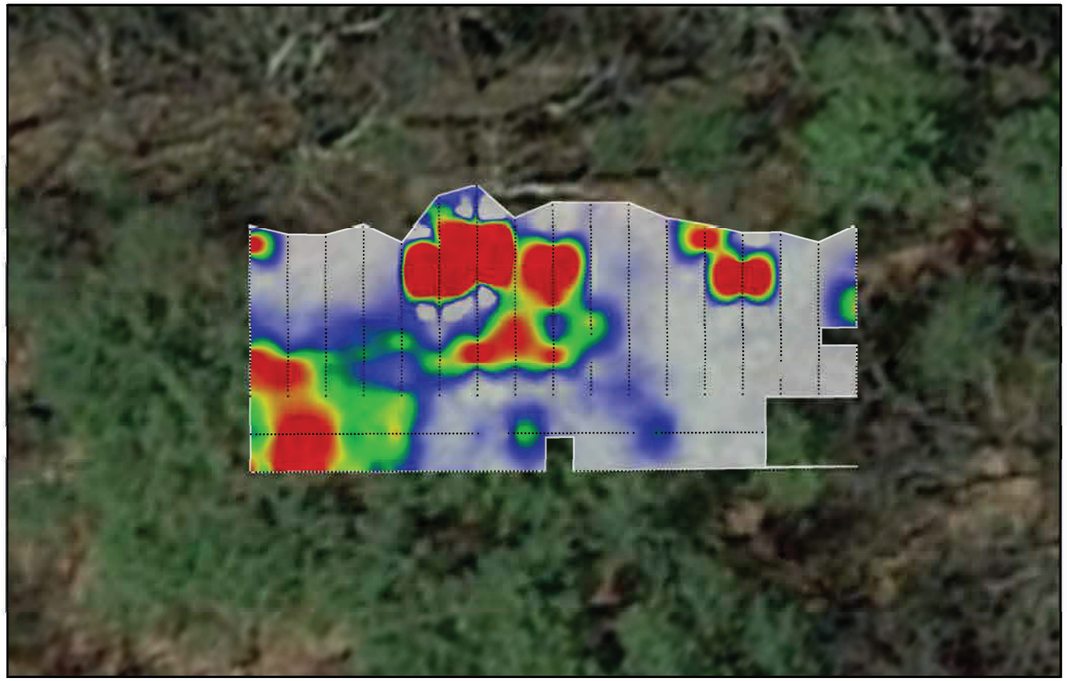
NOTE:

Modified from Google Earth Pro aerial photograph.

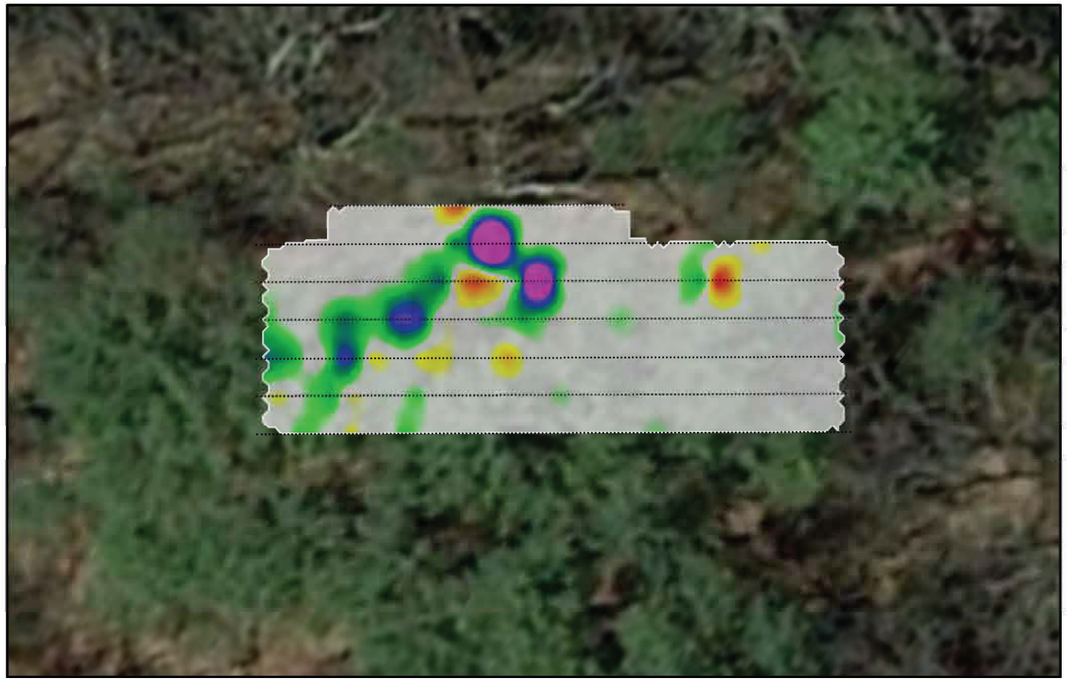
Figure 4
AOC50 Survey Area Location
Debris Pile Removal Work Plan
Devens, Massachusetts

File 21SG06 | January, 2022

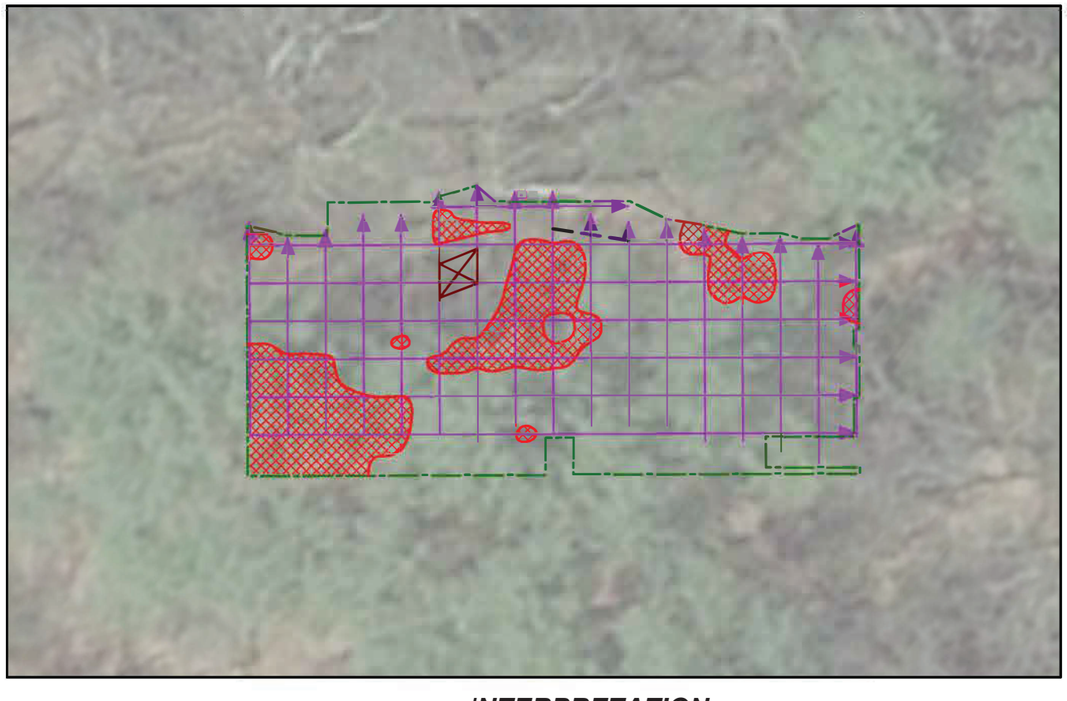
HAGER–RICHTER
Salem, NH | Fords, NJ



EM SURVEY



MAGNETIC



INTERPRETATION

LEGEND

- EM & MAGNETIC DATA STATIONS
- APPROXIMATE LIMITS OF EM & MAGNETIC SURVEY AREA
- GPR TRAVERSE
- AREA OF POSSIBLE BURIED METAL
- UNIDENTIFIED BURIED METAL OBJECT
- POSSIBLE UTILITY
- UNIDENTIFIED BURIED OBJECT

SCALE (feet)

0 20 40

N

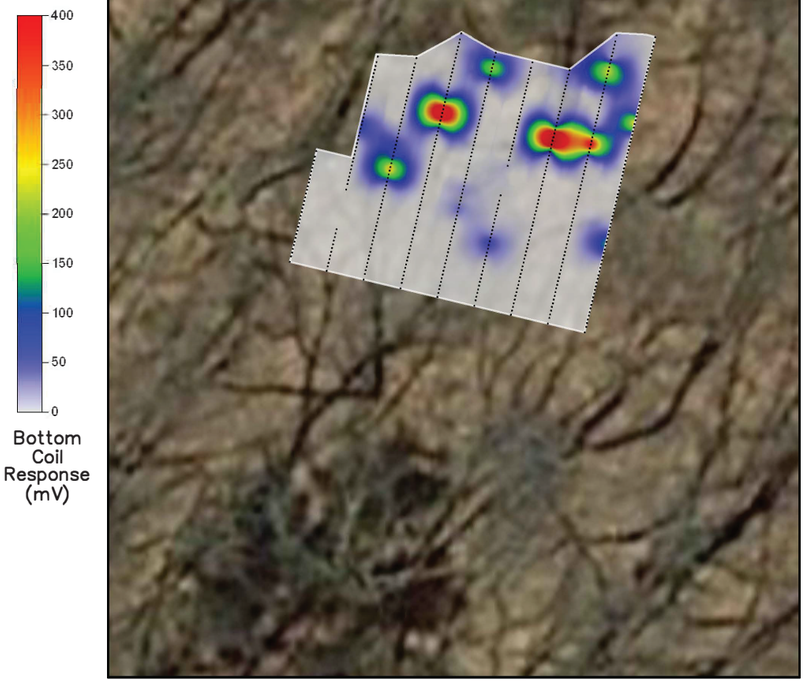
NOTES:

1. Modified from Google Earth Pro aerial photograph.
2. EM data were acquired with Geonics EM61–MK2. Bottom coil response shown.
3. Magnetic data were acquired with Geometrics G 858.

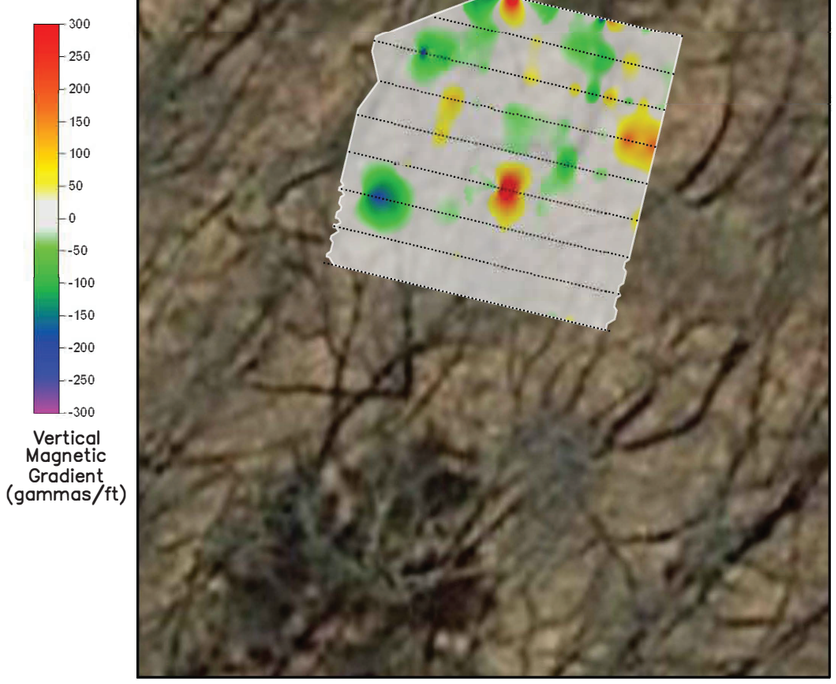
Figure 5
Geophysical Survey & Interpretation – AOC50 North Debris Pile Removal Work Plan
Devens, Massachusetts

File 21SG06 | January, 2022

HAGER–RICHTER
Salem, NH | Fords, NJ



EM SURVEY



MAGNETIC SURVEY

INTERPRETATION

LEGEND

SCALE (feet)
0 20 40

EM & MAGNETIC DATA STATIONS

APPROXIMATE LIMITS OF EM & MAGNETIC SURVEY AREA

GPR TRAVERSE

AREA OF POSSIBLE BURIED METAL

POSSIBLE UTILITY

UNIDENTIFIED BURIED OBJECT

N

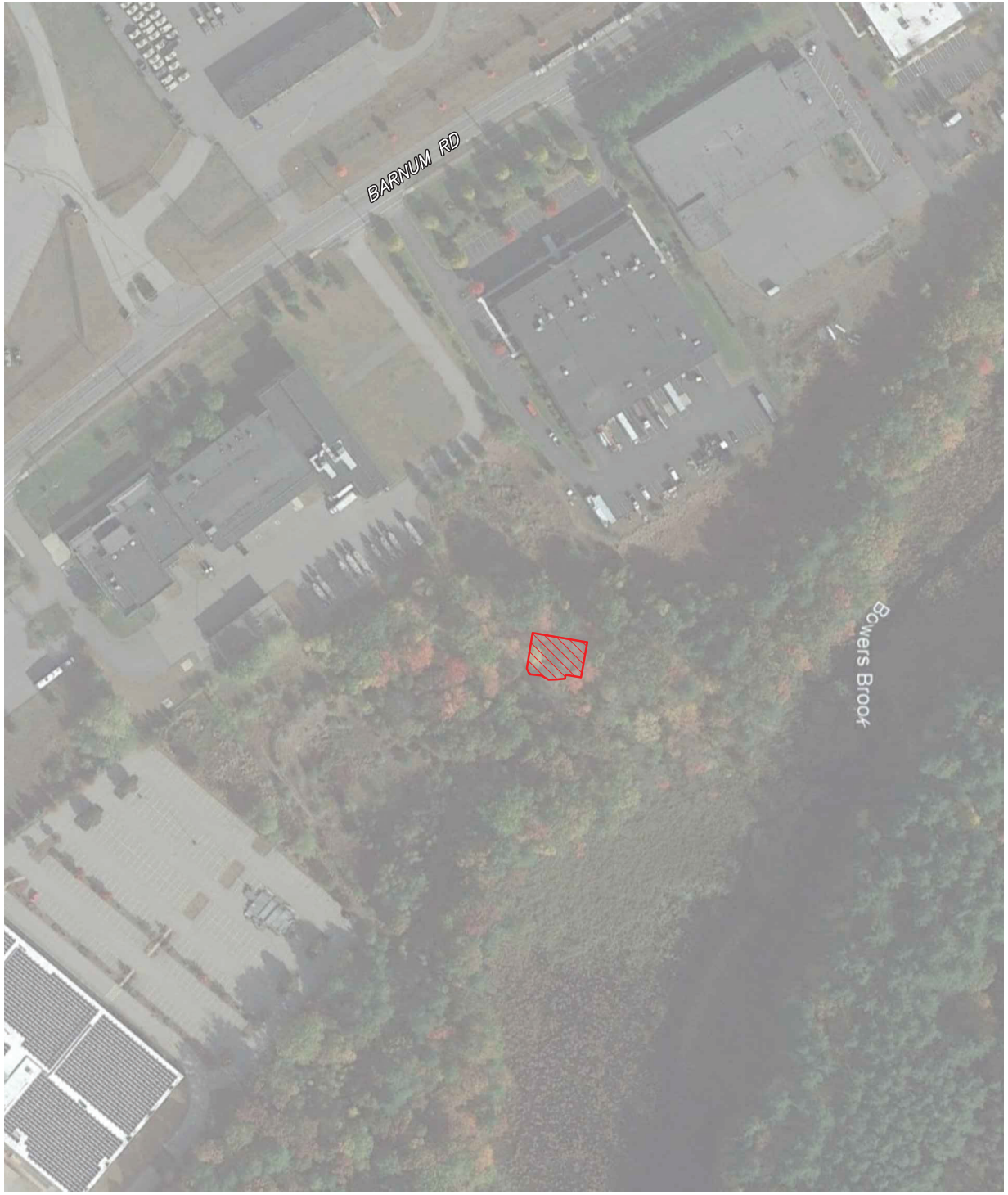
NOTES:

1. Modified from Google Earth Pro aerial photograph.
2. EM data were acquired with Geonics EM61–MK2. Bottom coil response shown.
3. Magnetic data were acquired with Geometrics G 858.

Figure 6
Geophysical Survey & Interpretation – AOC50 South Debris Pile Removal Work Plan
Devens, Massachusetts

File 21SG06 | January, 2022

HAGER–RICHTER
Salem, NH | Fords, NJ



N

H-R

LEGEND

APPROXIMATE LIMITS OF GEOPHYSICAL SURVEY AREA

SCALE (feet)

0 200 400

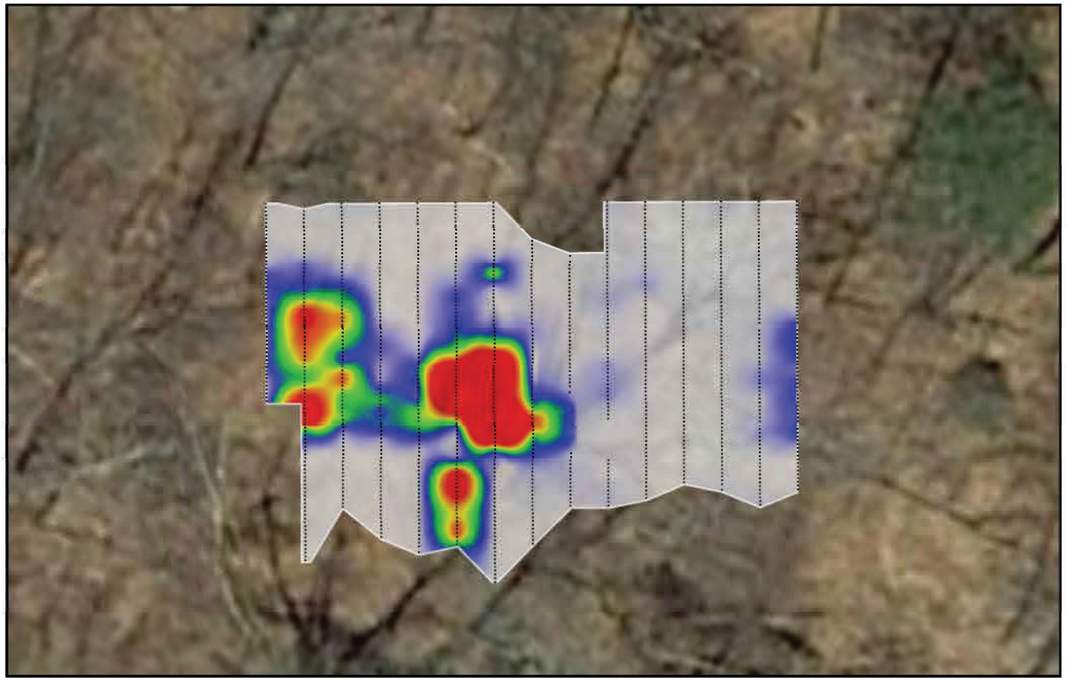
NOTE:

Modified from Google Earth Pro aerial photograph.

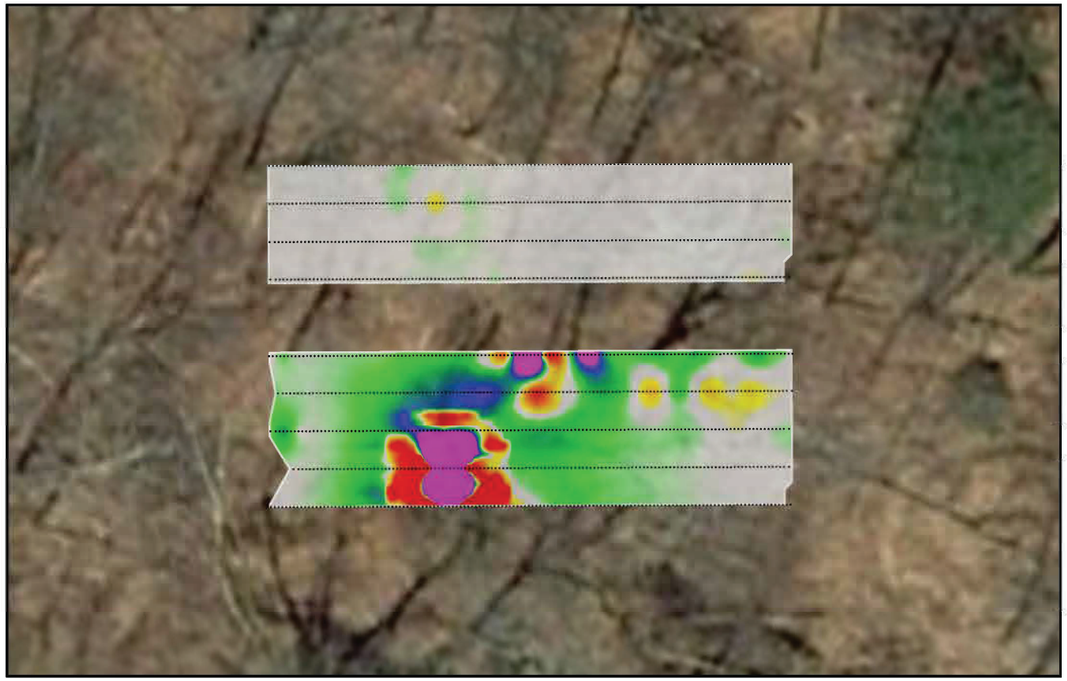
Figure 7
AOC74 Survey Area Location
Debris Pile Removal Work Plan
Devens, Massachusetts

File 21SG06 | January, 2022

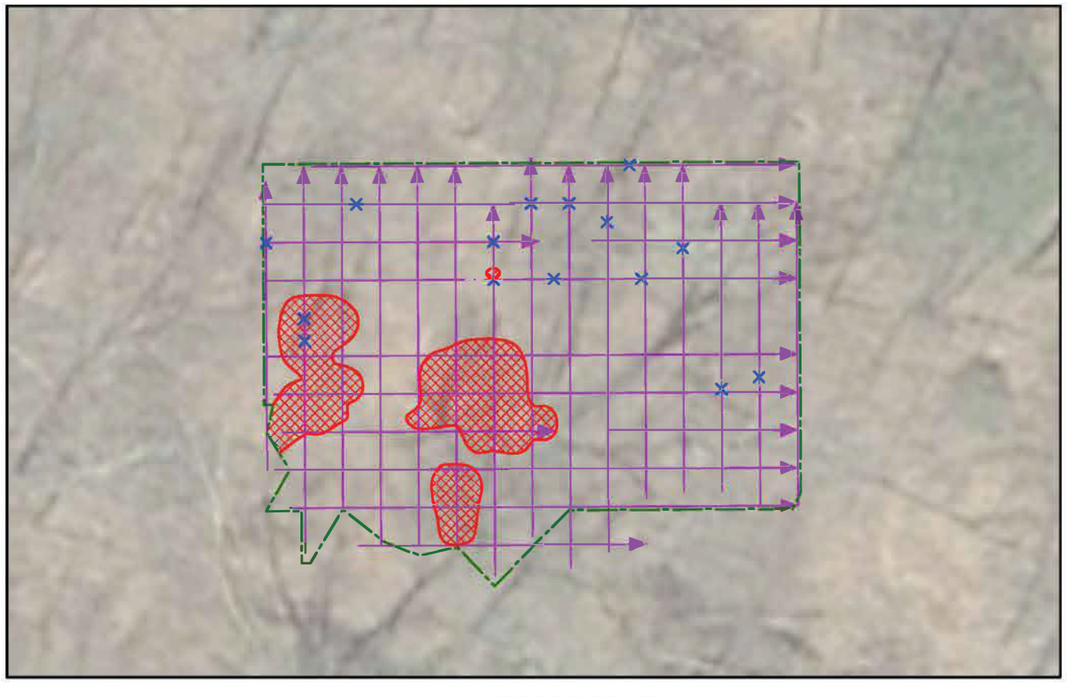
HAGER–RICHTER
Salem, NH | Fords, NJ



EM SURVEY



MAGNETIC



INTERPRETATION

LEGEND

- EM & MAGNETIC DATA STATIONS
- APPROXIMATE LIMITS OF EM & MAGNETIC SURVEY AREA
- GPR TRAVERSE
- AREA OF POSSIBLE BURIED METAL
- UNIDENTIFIED BURIED OBJECT

SCALE (feet)

0 20 40

N

NOTES:

1. Modified from Google Earth Pro aerial photograph.
2. EM data were acquired with Geonics EM61–MK2. Bottom coil response shown.
3. Magnetic data were acquired with Geometrics G 858.

Figure 8
Geophysical Survey & Interpretation – AOC74
Debris Pile Removal Work Plan
Devens, Massachusetts

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Appendix C

Waste Disposal Documentation

SITE
Devens Recycling Center 978-772-6500
45 Independence Dr -Devens, MA 01434

CUSTOMER 000999
Cash Customer
45 Independence Drive
Devens, MA 01434
Contract:CD / MIXED C&D*GATE $275

SITE DR	TICKET # 63425	CELL	
WEIGHMASTER	George L.		
DATE/TIME IN	12/22/21 10:26 am	DATE/TIME OUT	12/22/21 10:34 am
VEHICLE	CA1	CONTAINER	
REFERENCE	TANTARA CORPORATION - DEVENS		
BILL OF LADING	2 TRUCK TIRES		

SCALE IN GROSS WEIGHT	22,400	NET TONS	1.84
SCALE OUT TARE WEIGHT	18,720	NET WEIGHT	3,680

INBOUND
CASH

QTY	UNIT	DESCRIPTION	RATE	EXTENSION	TAX	TOTAL
0.00	YD	Tracking QTY				
1.84	tn	MSW Origin:Massachusetts 100%	$275.00	$506.00	$0.00	$506.00
2.00	un	TIRE	$125.00	$250.00	$0.00	$250.00

Disposal

Thank you for your business!

Payment(s)
CREDIT CARD-SCALE $756.00

NET AMOUNT
~~$756.00~~
TENDERED
~~$0.00~~
CHANGE
CHECK#

The undersigned individual signing this document on behalf of Customer acknowledges that he or she has read and understands the terms and conditions on the reverse side and that he or she has the authority to sign this document on behalf of the customer.

SIGNATURE _____

RS-F042UPR (04/19)

Appendix D

Responses to Comments

US Army Corps of Engineers ®

New England District
696 Virginia Road
Concord, Massachusetts
01742-2751

Project Name:	Former Fort Devens Army Installation	Report Date:	28 January 2022
Location:	Devens, Massachusetts	Reviewer:	Multiple
Document Name: Draft Debris Removal Summary Report			
Prepared By:	Seres Arcadis 8(a) JV		

No.	Ref. Page / Para.	COMMENT	RESPONSE
		Carol Keating (EPA)	
G1	General	It is unclear, based on the text and figures, what debris was removed. It would be helpful to include a table, similar to Table 1 included in the Final Debris Removal Work Plan (August 2021), that notes if a particular piece of debris was removed, not found, etc.	A table (Table 1) has been added to the report per the comment.
G2	General	Please add figures that show where observed debris was left in place and where, based on the geophysical investigation, suspected metal debris and or other objects may be located. Please also include a table listing such debris, similar to Table 1 included in the Final Debris Removal Work Plan (August 2022).	The figures in Appendix C show the areas where subsurface debris remains. All surface debris that could be removed using manual methods was removed, with the exception of the additional debris area (Area C) noted at the airfield (AOC 50).
G3	General	While the "original" *Final Work Plan for Debris Removal at AOC 57, AOC 74, and AOC 50* (KGS, December 2020) included soil sampling in each of the AOCs, the "second" *Final Debris Removal Work Plan, Area of Contamination 50, 57, and 74* (Arcadis, August 2021) stated that "soil sampling will only be conducted if field indications of a release are observed." Army's explanation for omitting the soil sampling component was because it did "not expect the identified debris to be a source of groundwater contamination." The Report should be amended to describe site (soil) conditions/characteristics within and surrounding each of the "debris areas" and explain how/if Army determined that soil (and possibility groundwater) was not adversely impacted in each area without supporting analytical data.	As noted in the report, there were no visual, olfactory, or measured (by PID) indications of contamination associated with any of the debris removed. This included the debris itself, as well as the soil around and beneath the debris. The report text in Section 3.2 has been amended to clarify this point.
G4	General	Based on the information provided, it appears that this field effort, although successful in removing the most readily accessible debris and other materials, was unsuccessful in	As noted in the Work Plan, the objectives of this work were to removal the identified debris to visual limits, documentation of the debris removal actions, and

New England District
696 Virginia Road
Concord, Massachusetts
01742-2751

No.	Ref. Page / Para.	COMMENT	RESPONSE
		investigating/addressing all of the confirmed buried drums and other metallic objects and determining whether soil (and possibly groundwater) in each area were not impacted by the debris/buried drums/containers, etc., contamination was present at these sites. Please amend the Report to Summary Report by adding a narrative that discusses whether additional follow up actions will be taken to assess these items.	documentation of areas of remaining debris that could not be removed. These objectives were accomplished, with the exception of the debris area discovered at the airfield, which was designated as Debris Pile C. The Army intends to remove the debris at Debris Pile C once funding is secured and will coordinate the removal with the EPA and MassDEP.
1	Page 2, § 3.1.2, 1st sentence	Please add the location of the debris staging area to Figure 2 as referenced.	The staging area is not within the boundaries of Figure 2, but it shown on Figure 3. The text in this section has been revised accordingly.
2	Page 3, § 3.2.2, ¶ 3, last sentence	The sentence states that "debris with no detectable VOCs was disposed of in the roll-off container". Were adjacent soils, if any, also disposed of in the container? If so, what was the fate of that debris/soil?	There were no soils removed from debris removal areas.
3	Page 3, § 3.2.2, ¶ 4, last sentence	The sentence states, "No evidence of hazardous material associated with the large debris was observed." Please provide details (i.e., analytical results) to support this determination. Also, what was the "evidence" used to determine that there was no hazardous material associated with the large debris? Were soil samples collected?	See response to General Comment 3. In addition, there were no visual, olfactory, or measured (by PID) indications of contamination associated with the large debris that remained that could be accessed/observed during the work.
4	Page 5, § 3.3.2	The first two paragraphs identify the types of geophysical instrumentation employed and the number of grids surveyed at each AOC, respectively, but the only discussion of geophysical survey results is a single sentence in the third paragraph that states "Potential buried debris identified from the geophysical survey results were marked in the field with blue pin flags and the locations were recorded with a Trimble Geo7X GPS unit for potential future disposal." Please expand the current discussion to provide specific details about the anomalies detected by the GSSI UtilityScan DF GPR system (used to identify potential subsurface metallic and non-metallic anomalies), Geonics EM61-MK2 time domain metal detector/electromagnetic induction (EMI) (used to identify shallow subsurface metallic objects), and Geometrics G858-G	The information concerning the types and extent geophysical anomalies is presented in Appendix C. There were no additional debris removal activities performed during or after the geophysical survey.

No.	Ref. Page / Para.	COMMENT	RESPONSE
		magnetometer (used to identify ferrous metal up to 25 feet below grade surface) in each area and when the area of large debris left in place at AOC 47 and other areas "marked in the field with blue pin flags" will be investigated for "potential future disposal." Also, please explain if any additional anomalies/objects were removed from each of the AOCs during or after the geophysical survey work.	
8	Page 5, § 3.4, 3rd sentence	Please correct the figure reference.	The figure reference has been edited to refer to Figure 4.
9	Page 5, § 3.5	The discussion must be expanded to explain how "the surficial material collected during site activity was determined to be nonhazardous." The first sentence suggests that the determination was based solely on PID field screening results, however, this information alone is insufficient for determining whether wastes slated for off-site disposal contain CERCLA hazardous substances, pollutants, or contaminants (especially since the materials were excavated from known, confirmed areas of contamination). Although Mr. O'Brien did confirm that *non-hazardous* debris was not subject to the Off-Site Rule, there was no discussion regarding the type and/or sufficiency of the testing performed to prove that the excavated debris and other materials did not contain CERCLA hazardous substances, pollutants, or contaminants. Further discussion is warranted to address/resolve this matter.	See responses to General Comment 3 and page-specific comment 2. Only metal debris was removed from the site, there were no liquids or solid material (i.e., soil) other than vegetation present with the debris or disposed with it; therefore, there was no material that could be sampled, or that needed to be sampled, for disposal characterization.
10		Figure 2 – See Page-Specific Comment 1. above.	See response to Comment 1.
11		Figures 2, 3 and 4 – Please expand the "Geophysical Survey Boundaries" on these figures to match those presented in Figure 2 of the Geophysical Survey report (Appendix C).	The figures have been revised.
12		Appendix C, Geophysical Survey, Figure 5 - All graphics are labeled "EM Survey". Please correct.	The figure has been revised.

		David Chaffin (MassDEP)	
1	Section 3.2.2, Second Paragraph	Text indicates that debris with no detectable VOCs was removed from the site; was any debris with detectable VOCs left at the site?	See responses to EPA Comment G3 and Page-Specific Comment No. 3.
2	Section 3.4	A third debris area was identified at AOC 50. The report should explain why cleanup like that completed at the other AOC 50 debris areas was not conducted.	The contract for the debris removal did not include funding for additional debris removal. As noted in the response to EPA Comment G4, the Army plans to remove the debris once the additional contracting process is complete.
3	Figure 4	Compared to Figures 2 and 3, Figure 4 provides little detail regarding the type and distribution of debris in the three AOC 50 debris areas – are the three areas much smaller in extent than the areas at AOC 57 and AOC 74, or is the scale of the figure too large to allow the details to be presented? If the scale of the figure is too large, then the figure should be replaced to provide detail like Figures 2 and 3 for future reference.	The insets on Figure 4 shows the closeup of each of the debris areas at similar (or smaller) scales than those shown on Figures 2 and 3.
4	Appendix A, Photos 1 and 3	Please confirm these AOC 57 locations are shown in Figure 2 or add them to Figure 2 for future reference.	The locations have been added to Figure 2.