REMEDIAL INVESTIGATION WORK PLAN FOR PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

AREA 3 FIELD SAMPLING PLAN

ADDENDUM NO. 1

FORMER FORT DEVENS ARMY INSTALLATION, DEVENS, MA

APRIL 2022

Prepared for:
U.S. Army Corps of Engineers
New England District
Concord, Massachusetts

Prepared by:
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Contract No.: W912WJ-18-C-0011

NOTICE

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Remedial Investigation Work Plan

for Per- and Polyfluoroalkyl Substances (PFAS)

Area 3 Field Sampling Plan

Addendum No. 1

Former Fort Devens Army Installation

Devens, Massachusetts

April 2022

CERTIFICATION:

I hereby certify that the enclosed Report, shown and marked in this submittal, is that proposed to be incorporated with Contract Number W912WJ-18-C-0011. 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:

3/29/2022

KGS Project Manager **Date**

Received By:

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Date: 2022.04.11 08:34:24 -04'00'

USACE Project Manager **Date**

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TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

ACRONYMS AND ABBREVIATIONS

AOC	Area of Contamination
bgs	below ground surface
Devens	former Fort Devens Army Installation
FSP	Field Sampling Plan
ft	feet/foot
KGS	KOMAN Government Solutions, LLC
PFDA	perfluorodecanoic acid
PFAS	per-and polyfluoroalkyl substances
PFHpA	perfluoroheptanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
TOC	total organic carbon
TOP	total oxidizable precursor
UFP-QAPP	Uniform Federal Policy Quality Assurance Project Plan
USACE	United States Army Corps of Engineers, New England District

1.0 INTRODUCTION AND BACKGROUND

This Area 3 Field Sampling Plan (FSP) Addendum No. 1 at Former Fort Devens Army Installation (Devens) located in Devens, Massachusetts has been prepared by KOMAN Government Solutions, LLC (KGS) on behalf of the United States Army Corps of Engineers, New England District (USACE) and has been generated as an addendum to Area 3 FSP (KGS, 2020a) which is an addendum to the *Final Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2020b).

A base-wide Preliminary Assessment for per- and polyfluoroalkyl substances (PFAS) was completed in 2017 (KGS, 2017) that identified several Areas of Contamination (AOC) at Devens where aqueous film-forming foam, which is a source of PFAS, was stored, used, or released. A Site Inspection (BERS-Weston, 2018) and a one-time sampling of existing long-term monitoring wells (KGS, 2018) concluded that PFAS are present in groundwater, surface water, sediment, and soil at several AOCs in Area 3. Therefore, the Army is conducting an RI under the Comprehensive Environmental Response, Compensation, and Liability Act to determine the nature and extent of PFAS in groundwater, soil, surface water, and sediment at AOCs 20, 21, 30, 31, and 50 at Devens to determine whether sources at Devens are impacting public water supply wells, and to evaluate whether PFAS are present in environmental media at Devens at concentrations that pose an unacceptable risk to human health or the environment.

As discussed in the *Area 3 Preliminary Site Characterization Summary Per- and Polyfluoroalkyl Substances (PFAS) Remedial Investigation* (KGS, 2021), soil and groundwater samples have been collected and analyzed for PFAS from AOC 31 as part of the Site Inspection and the RI. Six PFAS compounds [perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), perfluorodecanoic acid (PFDA), perfluorononanoic acid (PFNA), perfluoroheptanoic acid [PFHpA], and perfluorohexanesulfonic acid (PFHxS)] were detected in soil at concentrations greater than the Massachusetts S-1/GW-1 standards (Figure 1). The groundwater discussion evaluates PFAS concentrations with respect to; (1) the EPA lifetime health advisory PFOA and PFOS concentrations individually or summed to 70 nanograms per liter (ng/L); and (2) the Massachusetts maximum contaminant level/GW-1 standard of the individual or sum of six compound sum of the six compounds (PFOA, PFOS, PFDA, PFNA, PFHpA, and PFHxS) of 20 ng/L. In groundwater, the maximum PFOA+PFOS and sum of six compounds (PFOA, PFOS, PFDA, PFNA, PFHpA, and PFHxS) concentrations (39,000 ng/L and 42,900 ng/L, respectively) were detected at the water table at the center of the AOC 31 source area at Site Investigation location SA31-17-01 (Figure 2). The purpose of this Area 3 FSP Addendum No. 1 is to provide the sampling design for additional investigative activities at the AOC 31 source area, specifically focused on data that will be used to evaluate remedial alternatives. This document is intended to be used in conjunction with the RI Work Plan (KGS, 2020b) including the project Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP) [Appendix A of the RI Work Plan (KGS, 2020b)]. This Area 3 FSP Addendum No. 1 has been developed to support the study goals, questions and decision statements summarized in the UFP-QAPP.

The objectives of this FSP are to:

1) Collect soil samples to evaluate depth and volume of PFAS contamination; and
2) Collect vertical aquifer profile groundwater samples to assess vertical distribution of PFAS in groundwater.

2.0 INVESTIGATION APPROACH

A description of planned work is discussed below. All the planned and previously completed activities will be used to support the evaluation of AOC 31.

2.1 Soil Sampling

Surface and subsurface soil samples will be collected from the unsaturated zone at 13 deep soil borings and 15 shallow soil borings (Table 1, Figure 1).

At the deep borings (31SB-21-01 through -13), soil samples will be collected from the following depth intervals: 0 to 0.5 ft bgs, 0.5 to 1 ft bgs, 1-2 ft bgs, 2-3 ft bgs, then every 2 feet until 20 ft bgs, and then every 5 feet from 20 ft bgs until the water table is encountered. The samples will be submitted for PFAS analysis by isotope dilution.

At the shallow borings (31SB-21-14 through -28), soil samples will be collected from the following depth intervals: 0 to 0.5 ft bgs, 0.5 to 1 ft bgs, 1-2 ft bgs, 2-3 ft bgs, and every 2 feet until 20 ft bgs. The samples will be submitted for PFAS analysis by isotope dilution.

Two composite soil samples be collected: one composite sample from 3 to 15 ft bgs at 31SB-21-01 and one composite sample from 0 to 5 ft bgs at 31SB-21-05. These composite soil samples will be analyzed for total organic carbon (TOC) and total oxidizable precursor (TOP) assay.

2.2 Hydraulic Assessment

One monitoring well (31MW-21-01) will be installed within the AOC 31 source area to support groundwater flow direction assessment and to allow for future groundwater sampling (Table 1, Figure 1). The monitoring well will consist of a 10-foot screen installed across the water table. The proposed monitoring well, along with existing monitoring wells and piezometers will be used to provide depth to water measurements in order to calculate local groundwater flow direction. Piezometers and monitoring wells will be gauged as part of a synoptic water level event (Table 2, Figure 1). This data will support hydraulic evaluations including defining groundwater flow in the vicinity of the AOC 31 source area.

2.3 Groundwater Sampling

At each deep soil boring (31SB-21-01 through -13) a single groundwater sample will be collected at the water table.

Vertical profiles will be conducted at 15 locations (AFTA-1 through 5, PFT-A-1 through 5, and AFT-B-1 through 5). At the vertical profiles, groundwater samples will be collected in 10-ft intervals from the water table to refusal. The locations are in transects oriented perpendicular to groundwater flow. The transect angles may be adjusted based on evaluation of data from the synoptic gauging event. Each transect will consist of five vertical profile locations. Transect AFT-A is located upgradient of the AOC 31 source area, transect PFT-A is located on the downgradient edge of the AOC 31 source area, and transect AFT-B is located downgradient of the AOC 31 source area. The groundwater samples will be analyzed for PFAS by isotope dilution.

3.0 FIELD QUALITY CONTROL SAMPLES

Collection of field quality control samples, including field duplicates, equipment blanks, field reagent blanks, matrix spikes, and matrix spike duplicates, associated with groundwater sampling

via vertical profiling are required. A summary of the types and frequency of field quality control samples to be collected is provided in the UFP-QAPP (KGS, 2020b).

4.0 FIELD PROCEDURES

The field standard operating procedures associated with the project are provided in the UFP-QAPP (KGS, 2020b).

5.0 SAMPLING PACKAGING AND SHIPPING REQUIREMENTS

Sample volume, containers, preservation, and holding time requirements are provided in the UFP-QAPP (KGS, 2020b).

6.0 INVESTIGATION-DERIVED WASTE

Investigation derived waste management procedures are presented in UFP-QAPP (KGS, 2020b).

7.0 FIELD ASSESSMENT PROCEDURES AND CORRECTIVE ACTIONS

Periodic assessments will be performed during the project so that the planned project activities are implemented in accordance with the UFP-QAPP (KGS, 2020b).

8.0 SCHEDULE

The field work is planned to commence in winter of 2021/2022. Installation of the monitoring well will be the first task. The synoptic water level event will be conducted and the monitoring well will be surveyed. The soil sampling will be conducted followed by the groundwater vertical profiling. The positions of the vertical profiles may be adjusted based on evaluation of data from the synoptic gauging event.

9.0 REFERENCES

BERS-Weston Services, JVA, LLC (BERS-Weston). 2018 (May). *Final Site Inspection Report for Per- and Polyfluoroalkyl Substances (PFAS) at Former Fort Devens Army Installation, Devens, Massachusetts*. Prepared by BERS-Weston Services, JVA, LLC. For U.S. Army Corps of Engineers, New England District, Concord, Massachusetts.

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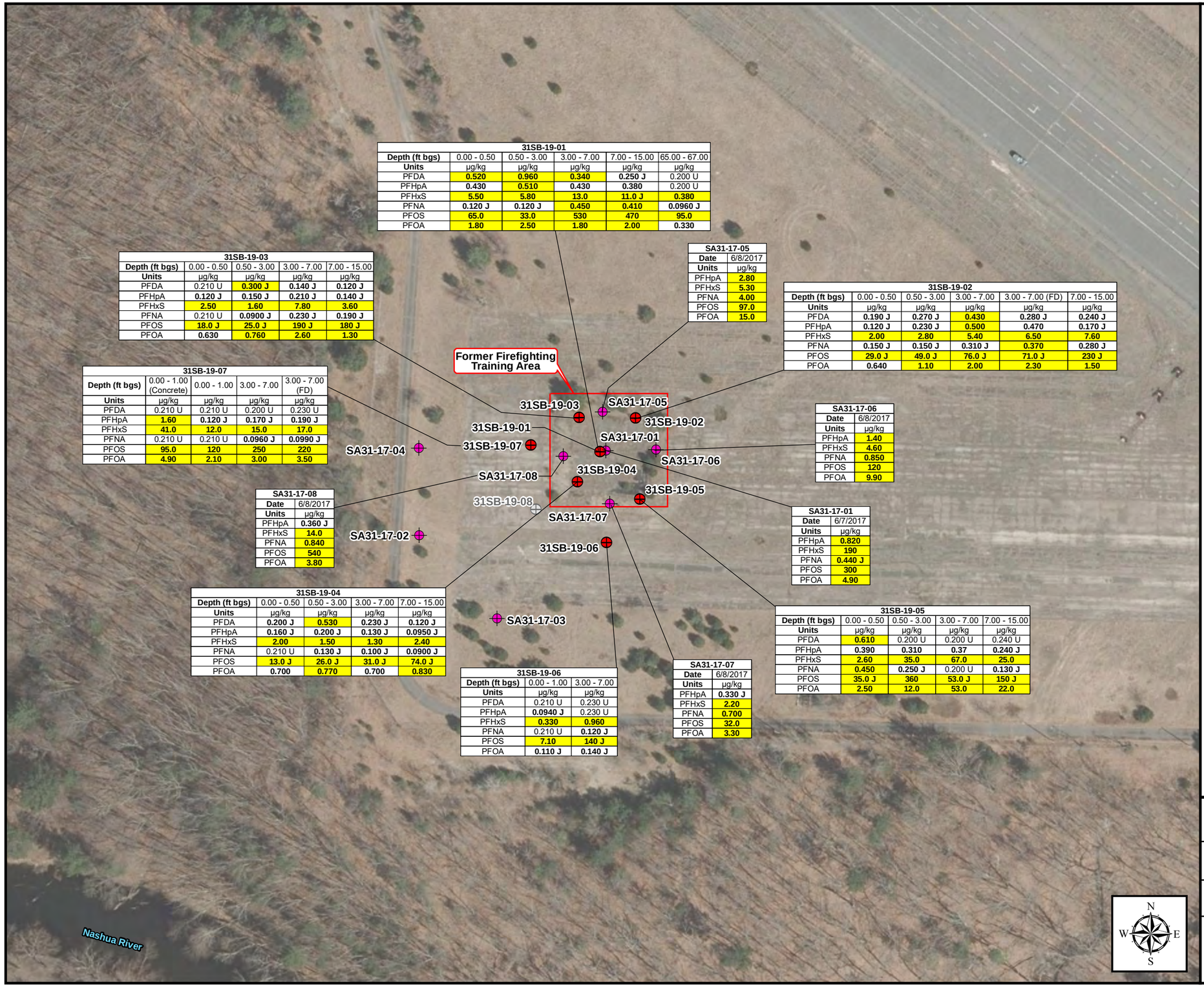
FIGURES



31SB-19-01

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 15.00	65.00 - 67.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.520**	**0.960**	**0.340**	**0.250 J**	0.200 U
PFHpA	**0.430**	**0.510**	**0.430**	**0.380**	0.200 U
PFHxS	**5.50**	**5.80**	**13.0**	**11.0 J**	**0.380**
PFNA	**0.120 J**	**0.120 J**	**0.450**	**0.410**	**0.0960 J**
PFOS	**65.0**	**33.0**	**530**	**470**	**95.0**
PFOA	**1.80**	**2.50**	**1.80**	**2.00**	**0.330**

31SB-19-03

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 15.00
Units	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	0.210 U	**0.300 J**	**0.140 J**	**0.120 J**
PFHpA	**0.120 J**	**0.150 J**	**0.210 J**	**0.140 J**
PFHxS	**2.50**	**1.60**	**7.80**	**3.60**
PFNA	0.210 U	**0.0900 J**	**0.230 J**	**0.190 J**
PFOS	**18.0 J**	**25.0 J**	**190 J**	**180 J**
PFOA	**0.630**	**0.760**	**2.60**	**1.30**

SA31-17-05

Date	6/8/2017
Units	µg/kg
PFHpA	**2.80**
PFHxS	**5.30**
PFNA	**4.00**
PFOS	**97.0**
PFOA	**15.0**

31SB-19-02

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	3.00 - 7.00 (FD)	7.00 - 15.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.190 J**	**0.270 J**	**0.430**	**0.280 J**	**0.240 J**
PFHpA	**0.120 J**	**0.230 J**	**0.500**	**0.470**	**0.170 J**
PFHxS	**2.00**	**2.80**	**5.40**	**6.50**	**7.60**
PFNA	**0.150 J**	**0.150 J**	**0.310 J**	**0.370**	**0.280 J**
PFOS	**29.0 J**	**49.0 J**	**76.0 J**	**71.0 J**	**230 J**
PFOA	**0.640**	**1.10**	**2.00**	**2.30**	**1.50**

31SB-19-07

Depth (ft bgs)	0.00 - 1.00 (Concrete)	0.00 - 1.00	3.00 - 7.00	3.00 - 7.00 (FD)
Units	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	0.210 U	0.210 U	0.200 U	0.230 U
PFHpA	**1.60**	**0.120 J**	**0.170 J**	**0.190 J**
PFHxS	**41.0**	**12.0**	**15.0**	**17.0**
PFNA	0.210 U	0.210 U	**0.0960 J**	**0.0990 J**
PFOS	**95.0**	**120**	**250**	**220**
PFOA	**4.90**	**2.10**	**3.00**	**3.50**

SA31-17-06

Date	6/8/2017
Units	µg/kg
PFHpA	**1.40**
PFHxS	**4.60**
PFNA	**0.850**
PFOS	**120**
PFOA	**9.90**

SA31-17-08

Date	6/8/2017
Units	µg/kg
PFHpA	**0.360 J**
PFHxS	**14.0**
PFNA	**0.840**
PFOS	**540**
PFOA	**3.80**

SA31-17-01

Date	6/7/2017
Units	µg/kg
PFHpA	**0.820**
PFHxS	**190**
PFNA	**0.440 J**
PFOS	**300**
PFOA	**4.90**

31SB-19-04

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 15.00
Units	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.200 J**	**0.530**	**0.230 J**	**0.120 J**
PFHpA	**0.160 J**	**0.200 J**	**0.130 J**	**0.0950 J**
PFHxS	**2.00**	**1.50**	**1.30**	**2.40**
PFNA	0.210 U	**0.130 J**	**0.100 J**	**0.0900 J**
PFOS	**13.0 J**	**26.0 J**	**31.0 J**	**74.0 J**
PFOA	**0.700**	**0.770**	**0.700**	**0.830**

31SB-19-05

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 15.00
Units	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.610**	0.200 U	0.200 U	0.240 U
PFHpA	**0.390**	**0.310**	**0.37**	**0.240 J**
PFHxS	**2.60**	**35.0**	**67.0**	**25.0**
PFNA	**0.450**	**0.250 J**	0.200 U	**0.130 J**
PFOS	**35.0 J**	**360**	**53.0 J**	**150 J**
PFOA	**2.50**	**12.0**	**53.0**	**22.0**

31SB-19-06

Depth (ft bgs)	0.00 - 1.00	3.00 - 7.00
Units	µg/kg	µg/kg
PFDA	0.210 U	0.230 U
PFHpA	**0.0940 J**	0.230 U
PFHxS	**0.330**	**0.960**
PFNA	0.210 U	**0.120 J**
PFOS	**7.10**	**140 J**
PFOA	**0.110 J**	**0.140 J**

SA31-17-07

Date	6/8/2017
Units	µg/kg
PFHpA	**0.330 J**
PFHxS	**2.20**
PFNA	**0.700**
PFOS	**32.0**
PFOA	**3.30**

Legend

- Soil Boring Location Installation Phase 1
- Temporary Well Location from SI
- Soil Boring Location Not Completed
- Area of Contamination (AOC)
- Former Fort Devens Boundary

Notes:

Criteria = S-1/GW-1,Massachusetts Contingency Plan, 2019 Proposed PFAS Revisions

PFAS	Limits (µg/kg)
Perfluorodecanoic acid (PFDA)	0.300
Perfluoroheptanoic acid (PFHpA)	0.500
Perfluorohexanesulfonic acid (PFHxS)	0.300
Perfluorononanoic acid (PFNA)	0.320
Perfluorooctanesulfonic acid (PFOS)	2.00
Perfluorooctanoic acid (PFOA)	0.720

2.00 = detection of PFAS

2.00 = detection of PFAS above criteria

Data reported to three significant figures

µg/kg = micrograms per kilogram
U = non-detect
J = estimated result

AST = Above ground storage tank
UST = Underground storage Tank
DRMO = Defense Reutilization and Marketing Office
TPHC = Total petroleum hydrocarbons

SI Sample locations were not analyzed for PFDA

Aerial Source: USGS, MassGIS 2019 Orthoimagery

AOC 31 Soil Sampling Results
Devens PFAS RI – Area 3 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

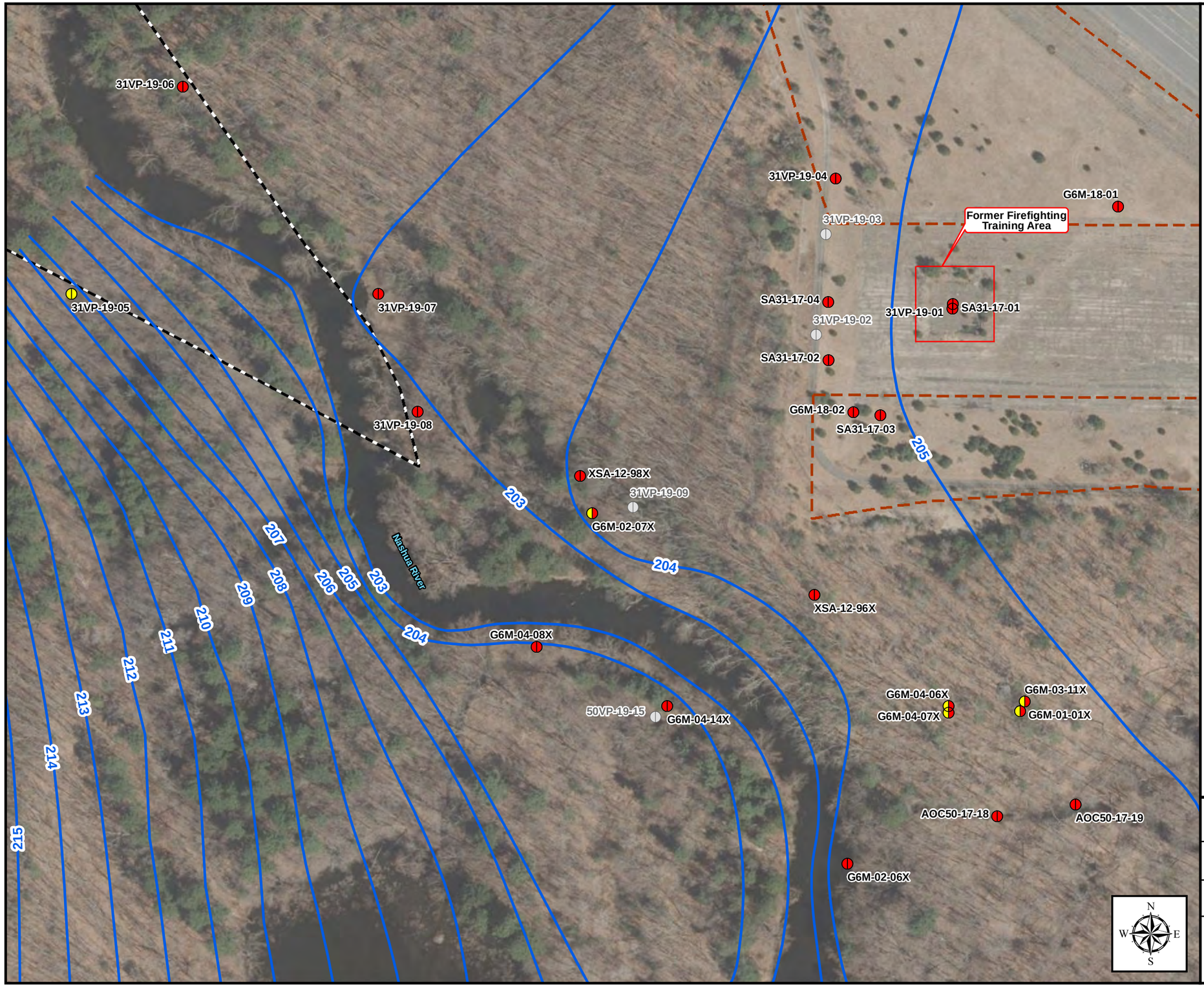
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 50 100
Feet

Date: 01/12/2021

Figure 1

File: PFAS_RI_A3_PSCS_F5-7_AOC31_SoilResults.mxd



Legend

- Monitoring Well/Vertical Profiling Location
- Monitoring Well/Vertical Profiling Locations Not Completed

EPA LHA
(sum of PFOA and PFOS) (ng/L)

- EPA LHA ≥ 70 ng/L
- EPA LHA < 70ng/L
- EPA LHA no detection

MassDEP
(sum of PFOS + PFOA + PFDA + PFHpA + PFHxS + PFNA) (ng/L)

- MassDEP ≥ 20 ng/L
- MassDEP < 20ng/L
- MassDEP no detection
- Groundwater Contour (April 27, 2020) (Contour Interval = 1 Foot) (ft NAVD88)
- Inferred Groundwater Contour (April 27, 2020) (Contour Interval = 1 Foot) (ft NAVD88)
- Area of Contamination (AOC)
- Former Fort Devens Boundary

Notes:

MassDEP GW-1 = sum of PFOS + PFOA + PFDA + PFHpA + PFHxS + PFNA
MassDEP Exceedance Criteria is defined as equal to or greater than 20 ng/L

EPA LHA (Lifetime Health Advisory) = sum of PFOA and PFOS
EPA LHA Exceedance Criteria is defined as equal to or greater than 70 ng/L

SI GW results were not analyzed for PFDA.

Refer to Figure 2-9 for Groundwater Elevation Data

Aerial Source: USGS, MassGIS 2019 Orthoimagery

AOC 31 Groundwater Results
Devens PFAS RI – Area 3 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

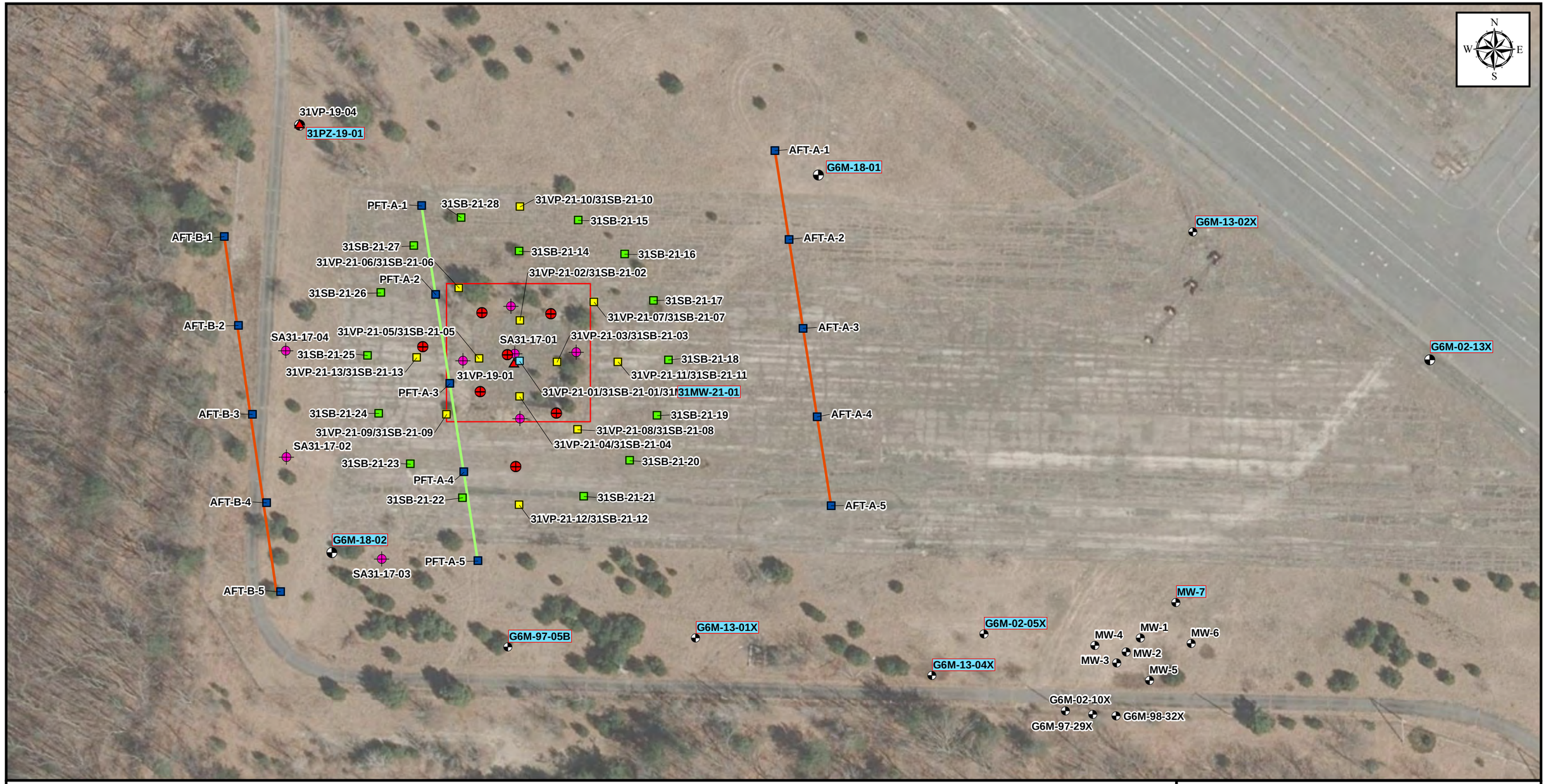
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 75 150
Feet

Date: 01/14/2021

Figure 2

File: PFAS_RI_A3_PSCS_F5-2_AOC31_GWResults.mxd



Legend

Proposed Sampling Locations

- Deep Soil/Vertical Profile/Monitoring Well
- Deep Soil/Vertical Profile Borehole
- Shallow Soil Borehole
- Vertical Profile Borehole
- Proposed Adaptive Flux Transect
- Proposed Primary Flux Transect

Existing Monitoring Points

- Monitoring Well/Piezometer

Previous Sampling Locations

- Vertical Profiling Location Installation Phase 1
- Soil Boring Location Installation Phase 1
- Temporary Well Location from SI

MW-7 Location to be used in synoptic gauging event

Area of Contamination (AOC)

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 31
Soil Boring and Vertical Profile Locations

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 40 80
Feet

Date: 03/30/2022

Figure 3

KGS TRINITY

File: Mar2022_AOC31_F1_SB_VP_locations.mxd

TABLES

Table 1
Groundwater Vertical Profiling/Soil Boring/Monitoring Well Locations and Rationale
Area 3 Field Sampling Plan AOC 31 Addendum
Devens PFAS Remedial Investigation Workplan

Proposed Location	Rationale	Soil Sampling intervals	Groundwater Sampling intervals
31VP-21-01/31SB-21-01/31MW-21-01	Define the extent of PFAS contamination in deep soil and in shallow groundwater within the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20, 25-26, 30-31, 35-36, 40-41, 45-46, 50-51, 55-56, and 60-61 ft bgs*. One composite sample from 3-15 ft bgs.	Water table
31VP-21-02/31SB-21-02	Define the extent of PFAS contamination in deep soil and in shallow groundwater within the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20, 25-26, 30-31, 35-36, 40-41, 45-46, 50-51, 55-56, and 60-61 ft bgs*	Water table
31VP-21-03/31SB-21-03	Define the extent of PFAS contamination in deep soil and in shallow groundwater within the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20, 25-26, 30-31, 35-36, 40-41, 45-46, 50-51, 55-56, and 60-61 ft bgs*	Water table
31VP-21-04/31SB-21-04	Define the extent of PFAS contamination in deep soil and in shallow groundwater within the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20, 25-26, 30-31, 35-36, 40-41, 45-46, 50-51, 55-56, and 60-61 ft bgs*	Water table
31VP-21-05/31SB-21-05	Define the extent of PFAS contamination in deep soil and in shallow groundwater within the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20, 25-26, 30-31, 35-36, 40-41, 45-46, 50-51, 55-56, and 60-61 ft bgs*. One composite sample from 3-15 ft bgs.	Water table
31VP-21-06/31SB-21-06	Define the extent of PFAS contamination in deep soil and in shallow groundwater outside of the berm former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20, 25-26, 30-31, 35-36, 40-41, 45-46, 50-51, 55-56, and 60-61 ft bgs*	Water table
31VP-21-07/31SB-21-07	Define the extent of PFAS contamination in deep soil and in shallow groundwater outside of the berm former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20, 25-26, 30-31, 35-36, 40-41, 45-46, 50-51, 55-56, and 60-61 ft bgs*	Water table
31VP-21-08/31SB-21-08	Define the extent of PFAS contamination in deep soil and in shallow groundwater outside of the berm former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20, 25-26, 30-31, 35-36, 40-41, 45-46, 50-51, 55-56, and 60-61 ft bgs*	Water table
31VP-21-09/31SB-21-09	Define the extent of PFAS contamination in deep soil and in shallow groundwater outside of the berm former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20, 25-26, 30-31, 35-36, 40-41, 45-46, 50-51, 55-56, and 60-61 ft bgs*	Water table
31VP-21-10/31SB-21-10	Define the extent of PFAS contamination in deep soil and in shallow groundwater outside of the berm former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20, 25-26, 30-31, 35-36, 40-41, 45-46, 50-51, 55-56, and 60-61 ft bgs*	Water table
31VP-21-11/31SB-21-11	Define the extent of PFAS contamination in deep soil and in shallow groundwater outside of the berm former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20, 25-26, 30-31, 35-36, 40-41, 45-46, 50-51, 55-56, and 60-61 ft bgs*	Water table
31VP-21-12/31SB-21-12	Define the extent of PFAS contamination in deep soil and in shallow groundwater outside of the berm former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20, 25-26, 30-31, 35-36, 40-41, 45-46, 50-51, 55-56, and 60-61 ft bgs*	Water table
31VP-21-13/31SB-21-13	Define the extent of PFAS contamination in deep soil and in shallow groundwater outside of the berm former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20, 25-26, 30-31, 35-36, 40-41, 45-46, 50-51, 55-56, and 60-61 ft bgs*	Water table
31SB-21-14	Define the extent of PFAS contamination in shallow soil outside of the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20 ft bgs	NA
31SB-21-15	Define the extent of PFAS contamination in shallow soil outside of the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20 ft bgs	NA
31SB-21-16	Define the extent of PFAS contamination in shallow soil outside of the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20 ft bgs	NA
31SB-21-17	Define the extent of PFAS contamination in shallow soil outside of the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20 ft bgs	NA
31SB-21-18	Define the extent of PFAS contamination in shallow soil outside of the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20 ft bgs	NA

Table 1
Groundwater Vertical Profiling/Soil Boring/Monitoring Well Locations and Rationale
Area 3 Field Sampling Plan AOC 31 Addendum
Devens PFAS Remedial Investigation Workplan

Proposed Location	Rationale	Soil Sampling intervals	Groundwater Sampling intervals
31SB-21-19	Define the extent of PFAS contamination in shallow soil outside of the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20 ft bgs	NA
31SB-21-20	Define the extent of PFAS contamination in shallow soil outside of the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20 ft bgs	NA
31SB-21-21	Define the extent of PFAS contamination in shallow soil outside of the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20 ft bgs	NA
31SB-21-22	Define the extent of PFAS contamination in shallow soil outside of the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20 ft bgs	NA
31SB-21-23	Define the extent of PFAS contamination in shallow soil outside of the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20 ft bgs	NA
31SB-21-24	Define the extent of PFAS contamination in shallow soil outside of the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20 ft bgs	NA
31SB-21-25	Define the extent of PFAS contamination in shallow soil outside of the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20 ft bgs	NA
31SB-21-26	Define the extent of PFAS contamination in shallow soil outside of the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20 ft bgs	NA
31SB-21-27	Define the extent of PFAS contamination in shallow soil outside of the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20 ft bgs	NA
31SB-21-28	Define the extent of PFAS contamination in shallow soil outside of the former fire training area.	0-0.5, 0.5-1, 1-2, 2-3, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20 ft bgs	NA
AFT-A-1	Define the extent of PFAS contamination in groundwater upgradient of the former fire training area.	NA	10-foot intervals, water table to refusal
AFT-A-2	Define the extent of PFAS contamination in groundwater upgradient of the former fire training area.	NA	10-foot intervals, water table to refusal
AFT-A-3	Define the extent of PFAS contamination in groundwater upgradient of the former fire training area.	NA	10-foot intervals, water table to refusal
AFT-A-4	Define the extent of PFAS contamination in groundwater upgradient of the former fire training area.	NA	10-foot intervals, water table to refusal
AFT-A-5	Define the extent of PFAS contamination in groundwater upgradient of the former fire training area.	NA	10-foot intervals, water table to refusal
PFT-A-1	Define the extent of PFAS contamination in groundwater at the western edge of the former fire training area.	NA	10-foot intervals, water table to refusal
PFT-A-2	Define the extent of PFAS contamination in groundwater at the western edge of the former fire training area.	NA	10-foot intervals, water table to refusal
PFT-A-3	Define the extent of PFAS contamination in groundwater at the western edge of the former fire training area.	NA	10-foot intervals, water table to refusal
PFT-A-4	Define the extent of PFAS contamination in groundwater at the western edge of the former fire training area.	NA	10-foot intervals, water table to refusal
PFT-A-5	Define the extent of PFAS contamination in groundwater at the western edge of the former fire training area.	NA	10-foot intervals, water table to refusal
AFT-B-1	Define the extent of PFAS contamination in groundwater downgradient of the former fire training area.	NA	10-foot intervals, water table to refusal
AFT-B-2	Define the extent of PFAS contamination in groundwater downgradient of the former fire training area.	NA	10-foot intervals, water table to refusal
AFT-B-3	Define the extent of PFAS contamination in groundwater downgradient of the former fire training area.	NA	10-foot intervals, water table to refusal
AFT-B-4	Define the extent of PFAS contamination in groundwater downgradient of the former fire training area.	NA	10-foot intervals, water table to refusal
AFT-B-5	Define the extent of PFAS contamination in groundwater downgradient of the former fire training area.	NA	10-foot intervals, water table to refusal

Notes:
AOC = Area of Contamination
ft bgs = feet below ground surface
* soil sampling will be conducted until the water table is encountered, which is estimated to be approximately 60 ft bgs.

Table 2
Synoptic Gauging Event
Area 3 Field Sampling Plan Addendum No. 1
Devens PFAS Remedial Investigation Workplan

Well ID
31MW-21-01
31PZ-19-01
G6M-18-01
G6M-18-02
G6M-97-05B
G6M-02-05X
G6M-02-13X
G6M-13-01X
G6M-13-02X
G6M-13-04X
MW-7

APPENDIX A

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	Date:	3 March 2022
Location:	Devens, Massachusetts	Reviewer:	EPA and MassDEP
Document Name: Draft Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS), Area 3 Field Sampling Plan Addendum No. 1			
Prepared By:	KOMAN Government Solutions, LLC		

No.	Ref. Page / Para.	COMMENT	RESPONSE
EPA Comments			
1	Section 1.0, Introduction and Background	In light of the fact that the highest concentrations of PFOA and PFOS were detected in samples collected within AOC 30 – Former Fire Training Area, the draft FSP Addendum should be amended to include a brief discussion of prior sampling events and associated results. Specifically, results from soil and groundwater sampling conducted in conjunction with the PFAS SI, SSI and Phase 1 Area 3 RI should be discussed, and associated data summarized in a table to further support the sampling rationale in Table 1. (See May 22, 2018, Final SI Report and February 8, 2021, Area 3 Preliminary Site Characterization Summary (PSCS)).	A brief discussion and two figures will be added to the FSP: one figure summarizing prior sampling results performed for PFAS in soil and one summarizing prior sampling results performed for PFAS in groundwater.
2	Section 2.0, Investigative Approach	Soil and groundwater samples for total oxidizable precursor (TOP) assay analysis should be performed on select samples collected within the former Fire Training Area. The Area 3 FSP stated TOP assay analysis would be performed (2 to 4 in each AOC on groundwater and soil). However, results of the TOP assay analyses were not presented in the Area 3 PSCS.	TOP assay analysis will be added to the FSP. Army proposes that two composite samples be collected: one composite sample from 3 to 15 ft bgs at location 31SB-21-01 (collocated with previous location 31SB-19-01) and one composite sample from 0 to 5 ft bgs at 31SB-21-05 (located just east of previous location SA31-17-08). The sample locations and intervals are based on the locations of the highest prior concentrations of PFOS detected in soils at SA31-17-08 and 31SB-19-01. The text and tables will be revised appropriately.
3	Section 2.0, Investigative Approach	Soil and groundwater samples should also be collected for analysis of AOC 50 ROD-specified COCs to ensure that any proposed interim remedy to address PFAS contamination does not interfere with or negatively impact performance of the existing CERCLA remediation of AOC 50 groundwater.	AOC 31 is located hydraulically cross gradient to the west of the AOC 50 plume. Based on groundwater vertical profiling and monitoring well samples at AOC 50 monitoring wells G6M-18-01 (located upgradient of AOC 31) and G6M-18-02 (located downgradient of AOC 31) AOC 31 is not collocated with the AOC 50 source area or plume. The VOC concentrations at G6M-18-01 and -02 are below the cleanup goals for AOC 50.

US Army Corps of Engineers ®

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

No.	Ref. Page / Para.	COMMENT	RESPONSE
			Prior to potential implementation of treatment in the AOC 31 area, the effect of that treatment on the surrounding area and the AOC 50 remedy would be evaluated.
4	Section 2.3, Groundwater Vertical Profiling	While it is part of the overall proposed groundwater sampling, the groundwater samples to be collected at the water table from the deep soil borings (31SB-21-01 through -13) do not fit the vertical profiling definition. For clarity, please add groundwater sampling to the section title or move that sampling to its own section.	The section will be renamed to Groundwater Sampling. The first sentence will be deleted. The new third sentence will be revised as follows: "At the vertical profiles, groundwater samples will be collected in 10-ft intervals from the water table to refusal."
5	Figures	For reasons discussed in comment 1. above, please add SI sample locations SA31-17-01, SA31-17-02, SA31-17-03, SA31-17-04, G6M-13-01X and G6M-02-07X and the six RI DPT vertical profile locations to this figure.	Locations SA31-17-01, SA31-17-02, SA31-17-03, SA31-17-04, 31VP-19-01, and 31VP-19-04 are shown on Figure 1 from the draft FSP. Labels will be added for these locations. G6M-13-01X is shown and labeled on Figure 1 from the draft FSP. Locations G6M-02-07X, 31VP-19-05, -06, -07, -08 will be included in the groundwater results figure that will added to the FSP in response to EPA Comment #1.
MassDEP			
1	Section 2.0	Depending on magnitude and extent, fuel and solvent contamination at AOC 31 could affect decisions about remedial alternatives. Consequently, available fuel and solvent data should be reviewed to determine if it is adequate for the purposes of evaluating remedial alternatives, and if not, collection of additional data (e.g., supplemental analysis of selected proposed samples for fuel and solvent constituents) should be considered for inclusion in this addendum.	As noted in response to EPA Comment #3, the focus of the scope of work is collection of additional soil and groundwater data for PFAS. If necessary, additional data to evaluate remedial alternatives could be collected during the feasibility study process.
		END OF COMMENTS	

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

Project Name:	Former Fort Devens Army Installation	Date:	01 April 2022
Location:	Devens, Massachusetts	Reviewer:	MassDevelopment and Haley & Aldrich, Inc.
Document Name: Draft Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS), Area 3 Field Sampling Plan Addendum No. 1			
Prepared By:	KOMAN Government Solutions, LLC		

No.	Ref. Page / Para.	COMMENT	RESPONSE
Comments			
1	General	As activities increase, MassDevelopment requests that the Army re-initiate conference calls or virtual meetings on a weekly to bi-weekly basis to provide the opportunity for the Army to update us on the status of the RI work, and for stakeholders to provide comments and questions on completed and proposed RI work.	Comment noted.
2	General	Given that vertical profiling will collect data that will inform the Army's understanding of PFAS extent in this deep glaciofluvial aquifer, these data should be used to select a location and depth interval for the monitoring well that will support an assessment of the hydraulic gradient and long-term trends in water quality at a critical elevation (i.e., where elevated PFAS concentrations are detected). If existing data indicate PFAS extent and transport are primarily within the top 10 ft of the saturated zone, this should be provided as rationale for the proposed monitoring-well interval in the FSP.	Based on the history and the soil and groundwater data, it is evident that the AOC 31 source area is a PFAS source area and the greatest impact from AOC 31 activities would be close to the water table. The work plan indicates that the rationale for the well is to "support hydraulic evaluations including defining groundwater flow in the vicinity of the AOC 31 source area." As such and as indicated in the work plan, the well is proposed to be installed at the water table.
3	General	Additional monitoring wells should be considered, using the profiling data to guide the well installation details. Additional wells will enable a more rigorous analysis of PFAS fate and transport toward the Nashua River, including concentration trends, magnitude and direction of hydraulic gradient, and the associated mass flux of PFAS from AOC 31.	Comment noted. The results will be used to inform further investigations and well installations during the subsequent phases of the RI.
		END OF COMMENTS	