AREA 1 PRELIMINARY SITE CHARACTERIZATION SUMMARY
PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) REMEDIAL INVESTIGATION

FORMER FORT DEVENS ARMY INSTALLATION, DEVENS, MA

JUNE 2020

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Area 1 Preliminary Site Characterization Summary
Per- and Polyfluoroalkyl Substances (PFAS) Remedial Investigation
Former Fort Devens Army Installation
Devens, Massachusetts

June 2020

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.

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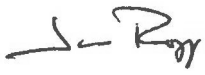

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ACRONYMS AND ABBREVIATIONS

ABB	ABB Environmental Services, Inc.
AFFF	aqueous film forming foam
AOC	area of contamination
Army	U.S. Army
BERS-Weston	BERS-Weston Services JVA, LLC
bgs	below ground surface
BRAC	Base Realignment and Closure
BTEX	benzene, toluene, ethylbenzene, and xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSMS	Consolidated Support Maintenance Shop
DPT	direct push technology
DRFTA	Devens Reserve Forces Training Area
DQO	data quality objectives
E&E	Ecology and Environment, Inc.
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
FOSET	Finding of Suitability for Early Transfer
FS	Feasibility Study
FSP	field sampling plan
ft	feet
GAC	Granular Activated Carbon
GERE	Grant of Environmental Restriction and Easement
gpm	gallons per minute
GW-1	Massachusetts Contingency Plan Method 1 Groundwater
HLA	Harding Lawson Associates
H&S	H&S Environmental, Inc.
J	estimated result
KGS	KOMAN Government Solutions, LLC
LHA	lifetime health advisory
LTM	long-term monitoring
MAARNG	Massachusetts Army National Guard
MassDEP	Massachusetts Department of Environmental Protection
MassDevelopment	Massachusetts Development and Finance Agency
MCP	Massachusetts Contingency Plan
MNA	monitored natural attenuation
NAVD88	North America Vertical Datum 1988
ng/L	nanograms per liter
PA	Preliminary Assessment
PCB	polychlorinated biphenyls
PFDA	perfluorodecanoic acid
PFAS	per- and polyfluoroalkyl substances
PFHpA	perfluoroheptanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PSCS	preliminary site characterization summary
RI	Remedial Investigation
ROD	Record of Decision

SA	Study Area
SSSL	site-specific screening level
S&W	Stone and Webster Environmental Technology and Services
S-1	MCP Method 1 S-1 Soil Category
TCRA	time-critical removal action
TOP	total oxidizable precursor
µg/kg	micrograms per kilogram
USACE	U.S. Army Corps of Engineers
UST	underground storage tank

1.0 INTRODUCTION

KOMAN Government Solutions, LLC (KGS), on behalf of the U.S. Army Corps of Engineers (USACE) New England District, has prepared this Preliminary Site Characterization Summary (PSCS) for the Per- and Polyfluoroalkyl Substances (together, "PFAS") Remedial Investigation (RI) at the former Fort Devens Army Installation (Devens) located in Devens, Massachusetts.

The PSCS summarizes data that have been collected at numerous Areas of Contamination (AOC) identified in the *Draft Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018a) and as shown on Figure 1-1.

To expedite the field investigations, the identified AOCs, Grove Pond wellfield, and MacPherson, Patton, and Shabokin water supply well areas were grouped into three areas (Areas 1, 2, and 3). This PSCS addresses Area 1 and part of Area 2 as indicated below. Future PSCS submittals will include the remainder of Area 2 and Area 3.

Area 1:

- AOC 57 Building 3713 Fuel Oil Spill Site;
- AOC 74 Barnum Road Firefighting Exercise Site;
- AOC 75 Former Building T-1445 Warehouse Fire; and,
- Grove Pond wellfield.

Area 2 (partial):

- AOC 40 Cold Spring Brook Landfill;
- AOC 43G Historical Gas Station G;
- AOC 43J Historical Gas Station J;
- Patton water supply well; and,
- Shabokin water supply well.

The PSCS is a summary of site data following completion of the initial field sampling and analysis (EPA, 1988). The intent is to better understand and assess any potential data gaps remaining at the AOCs, and determine additional data gathering activities. The U.S. Army (Army) will prepare a bulleted list of data gaps following discussions at the Base Cleanup Team (BCT) meetings, which will be used to develop specific Data Quality Objectives (DQO) for the development of an RI Addendum work plan.

1.1 Investigation Approach

The initial field activities for the RI were detailed in the *Draft Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018a), the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b), and the *Area 2 Field Sampling Plan (FSP) Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018c). The initial activities were planned based on results from the *Final Base-Wide Preliminary Assessment for Evaluation of Perfluoroalkyl Substances* (KGS, 2017), the *Site Inspection (SI) Addendum for Additional Per- and Polyfluoroalkyl Substances (PFAS) Sampling at Area of Contamination (AOC) 76-Devens Fire Department and Long Term Monitoring (LTM) Wells at AOCs 57, 43G, 43J, 32, 43A, 50 and Shepley's Hill Landfill (SHL) Former Fort Devens Army Installation Devens, Massachusetts* (BERS-Weston, 2018a), and the *Final Site Inspection Report for Per- and Polyfluoroalkyl Substances (PFAS) at Former Fort Devens Army Installation, Devens, MA* (BERS-Weston, 2018b). Knowledge of the sites through previous investigations, operation and maintenance activities, and long-term monitoring activities, which included various groundwater models were also used to plan field activities.

The field work was conducted in an iterative manner. The field work commenced with the work detailed in the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b). While executing the field work, analytical data from

sampling of existing monitoring wells, groundwater vertical profiling, soil sampling, and surface water and sediment sampling was shared with U.S. Environmental Protection Agency (EPA) and Massachusetts Department of Environmental Protection (MassDEP) as it was received from the laboratory. The results were discussed with EPA and MassDEP and additional activities, not detailed in the FSP, needed to achieve the study goals and DQOs were recommended. The recommendations were developed based on review of the analytical data and understanding of groundwater flow direction based on analysis of field data or review of information from previous field investigations or groundwater flow models. Additional activities included additional vertical profiles, additional soil borings, additional surface water and sediment sampling, sampling of additional existing monitoring wells, installation of piezometers, synoptic water level surveys, and selection of samples to be analyzed for total oxidizable precursor (TOP) assay. As additional results were received and reviewed, further work was conducted, which sometimes resulted in numerous phases of field activities at different AOCs. The field work at each AOC is discussed in subsequent sections.

Review of the data was also used to develop addendums to the FSPs. The *Final Area 2 Field Sampling Plan Area of Contamination 40 Addendum* (KGS, 2020a) details activities at AOC 40. The *Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS) Area 1 Field Sampling Plan Addendum No. 2* (KGS, 2020b) details activities in Cold Spring Brook. The *Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances* and the *Area 1 Field Sampling Plan – Monitoring Well Plan Addendum Remedial Investigation Work Plan for PFAS* (KGS, 2019b) details additional drilling activities at the Area 1 AOCs using a variety of drilling techniques (sonic, drive and wash, and direct push technology), specific activities included: 1) overburden and bedrock groundwater monitoring well installation; 2) piezometer installation; 3) groundwater vertical profiling using direct push technology, 4) deep groundwater vertical profiling; 5) soil core collection for field lithologic classification (with grain size and total organic carbon sample collection), and 6) confirmation of bedrock.

After existing monitoring wells were sampled in Area 1 and Area 2, additional sampling of existing monitoring wells was detailed in the *Work Plan for Additional Sampling of Existing Wells to Support the PFAS Remedial Investigation Former Fort Devens Army Installation, Devens, MA* (KGS, 2019c). This supplemental sampling of existing monitoring wells is intended to provide additional data regarding the nature and extent of PFAS at these sites for the RI and can be used to support evaluation of trends in PFAS concentrations in groundwater over time.

There were minor deviations to the FSPs and FSP addendums related to locations of drilling activities, additions and deletions of locations, or activities at specific locations. As is typical with field investigations, some locations were adjusted based on field conditions (e.g., steep terrain, proximity to wetlands, safety considerations). None of the adjustments to the locations negatively impacted meeting the DQOs. There were no major deviations to the methods detailed in the work plan, FSPs, and FSP addendums.

1.2 Report Organization

The site characteristics, general geology, and regional hydrogeology at former Fort Devens are described in Section 2. The results of synoptic water level events conducted in the areas addressed in this report are reported in Section 2 and site-specific groundwater flow conditions are described in the subsequent site-specific sections. Sections 3 through 9 each address a specific area of investigation listed above. The PFAS results related to each area of investigation are discussed in the applicable section. The PFAS results in various media are described in each applicable section with respect to the media-specific criteria (Table 1-1). The field sheets, soil boring logs, well construction logs, and results are presented in appendices.

2.0 FORMER FORT DEVENS SITE LOCATION AND DESCRIPTION

Devens is located in the towns of Ayer and Shirley in Middlesex County, and the towns of Harvard and Lancaster in Worcester County, Massachusetts, approximately 35 miles northwest of Boston, Massachusetts. The installation occupied approximately 9,260 acres. Fort Devens was divided into the North Post, Main Post, and South Post. Route 2 divides the South Post from the Main Post. The Nashua River runs through the North, Main, and South Posts. The area surrounding Devens is primarily comprises rural residential properties. Portions of Devens have been redeveloped for commercial/industrial use.

Camp Devens was established in 1917 as a temporary training area for soldiers during World War I. In 1932, the site was named Fort Devens and made a permanent installation with the primary mission of commanding, training, and providing logistical support for non-divisional troop units. Fort Devens was used for a variety of training missions between 1917 and 1990. Pursuant to the CERCLA, Fort Devens was placed on the National Priorities List on November 21, 1989, due to environmental contamination at several sites.

Fort Devens was identified for cessation of operations and closure under Public Law 101-510, the Defense Base Realignment and Closure (BRAC) Act of 1990, and officially closed in March 1996. As part of the Devens BRAC program, portions of the property formerly occupied by Devens were retained by the U.S. Army for reserve forces training and renamed the Devens Reserve Forces Training Area (DRFTA). Areas not retained as part of the DRFTA were transferred to new owners, the Massachusetts Development and Finance Agency (MassDevelopment), U.S. Department of Labor, U.S. Department of Justice, and the U.S. Fish and Wildlife Service, for reuse and redevelopment. In 2009, the DRFTA was renamed the U.S. Army Garrison Fort Devens.

2.1 Physical Characteristics

Devens lies within the Nashua River basin. The Nashua River flows north through the former North, Main, and South Posts (Figures 2-1 and 2-2). The Nashua River forms the western installation boundary on the former Main Post. Other notable surface water features include: Grove Pond located north of the Grove Pond wellfield, Plow Shop Pond located west of Grove Pond, Nonacoicus Brook flowing from Plow Shop Pond to the Nashua River, Cold Spring Brook located east of AOCs 57, 74, and 75, an unnamed stream located east of AOC 43G, Robbins Pond located east of AOC 43G, Willow Brook flowing north from Robbins Pond to Nonacoicus Brook, Cold Spring Brook Pond (AOC 40), and Mirror Lake and Little Mirror Lake located between Patton and Shabokin wells. The specific surface water bodies and their relations to specific areas of investigation are discussed in applicable sections.

The geography of Devens is characterized by undulating glacial terrain. The landforms are products of glacial erosion and deposition on a crystalline bedrock terrain. Terrain at Devens falls generally into three types. The least common is bedrock terrain, where rocks that have been resistant to both glacial and fluvial erosion remain as topographic highs, sometimes thinly veneered by glacial deposits. A more common terrain at Devens consists of tills deposited by glaciers. These landforms often conform to the shape of the underlying bedrock surface. They range from areas of comparatively low topographic relief to elongated hills (drumlins) [Harding Lawson Associates (HLA), 2000].

The most common terrain at Devens was formed by sediment accumulations in glacial-meltwater streams and lakes (glaciofluvial and glaciolacustrine deposits). Other prominent glacial meltwater features are kame and kettle topography present on the former Main Post near Mirror Lake and Little Mirror Lake located between the Patton and Shabokin wells.

2.2 Geology

The major glacial units consist of till, deltaic deposits from former glacial Lake Nashua, and deposits from glacial meltwater streams (Figure 2-3). Glacial till at Devens consists of unstratified gravel to silt and typically contains boulders. The till at the site is typically approximately 10 feet thick but is up to 60 feet

thick in the cores of drumlins. The glacial lake deposits consist chiefly of sand and gravelly sand. Lake bottom deposits consist of sand, silt, and clay. Post-glacial deposits consist of river terrace sands and gravels, fine alluvial sands and silts, as well as peat and silt and sands in swampy areas. Generalized surficial geology by AOC is described below and is based on the Geologic Map of the Ayer Quadrangle, Massachusetts, Surficial Geology (Jahns, 1953).

- AOC 57 and 75 – Primarily coarse terrace deposits, chiefly kame terraces, with some shore and near-shore deposits of Glacial Lake Nashua along the edge of Cold Spring Brook and swamp deposits, chiefly muck and peat in Cold Spring Brook.
- AOC 74 – Similar to AOCs 57 and 75, but generally missing the shore and near-shore deposits of Glacial Lake Nashua.
- Grove Pond Area - Primarily coarse terrace deposits, with lesser amounts of kame deposits and shore and near-shore deposits of Glacial Lake Nashua along the shoreline of Grove Pond.
- AOC 40 – Primarily coarse kame-plain or ice-contact plain deposits, with some kame deposits, shore and near-shore deposits of Glacial Lake Nashua, and swamp deposits (chiefly muck and peat).
- AOC 43G – Mix of coarse kame deposits, terrace and delta-outwash plain deposits, bottom sands and clays of Glacial Lake Nashua, and artificial fill.
- AOC 43J – Primarily coarse terrace and delta-outwash plain deposits, and kame deposits, with some shore and near-shore deposits of Glacial Lake Nashua, as well as bottom sands and clays of Glacial Lake Nashua.
- Patton Well Area – Primarily coarse kame, kame-plain, or ice-contact plain deposits, with some swamp deposits (chiefly muck and peat), shore and near-shore deposits of Glacial Lake Nashua, and terrace deposits.
- Shabokin Well Area - Primarily kame-plain or ice-contact plain deposits, with some kame deposits, bottom sands and clays of Glacial Lake Nashua, wind deposits (chiefly dune sand), and shore and near-shore deposits of Glacial Lake Nashua.

Bedrock beneath the portion of Devens covered under this PSCS has been mapped as part of the *Preliminary Bedrock Geologic Map of the Ayer Quadrangle, Massachusetts* (Kopera, 2006). Bedrock chiefly consists of low-grade metasedimentary rocks, gneisses, and granites. The principal bedrock units are described below and illustrated on Figure 2-4.

- The Oakdale Formation underlies AOCs 57, 74, 43G, 43J, and the Shabokin well areas. The formation is described by Kopera as thinly laminated, light tan micaceous quartz-muscovite-ankerite siltstone and quartzite interbedded with thin, dark greenish-grey, chlorite-muscovite-quartz- ankerite phyllite. At biotite and actinolite grade, consists of fine grained reddish and greenish siltstone granofels.
- The Devens Gneiss Complex underlies AOCs 40, 75, Grove Pond area, and Patton Well area and is believed to be of Silurian age. The unit is described by Kopera as light to medium grey, buff to pink weathering, coarse-grained quartz-potassium (k)-spar biotite granite-gneiss, with subordinate tonalitic and dioritic gneiss near Harvard Center. Biotite content varies locally as much as approximately 15 percent. Sheared to a medium to dark grey fine- to medium-grained S/C mylonite with k-spar porphyroclasts near the Clinton-Newbury fault zone. Intruded by the Ayer Granite.

Other bedrock units beneath or in the general vicinity of Devens and depicted on Figure 2-4 include:

- The Ayer Granite of Silurian age and described by Kopera as light to dark grey, buff weathering, coarse-grained, porphyritic quartz-k-spar biotite granite with distinctive k-spar megacrysts up to 8

cm in diameter. Locally foliated, sheared and altered to an augen gneiss and talc-bearing schist near the Clinton-Newbury fault zone. A non-porphyritic phase has been mapped separately northwest of Harvard center.

- The Chelmsford Granite of Devonian age and described by Kopera as white to buff weathering, light grey medium- to coarse-grained feldspar-quartzbiotite granite. Biotite occurs in isolated rusty weathering clots. Commonly contains screens and xenoliths of presumed Berwick formation. Distinctive quartz veins, up to 2 cm in width and several meters in length, are common. Locally foliated and/or sheared near the Clinton-Newbury fault zone. Also includes a medium grey, buff weathering, fine- to medium-grained quartz-feldspar-muscovite-biotite granite-gneiss, and a well-foliated light grey k-spar-quartz-muscovite granite-gneiss near the Clinton-Newbury fault. Intrudes the Ayer granite and Devens gneiss complex.
- The Berwick Formation of Silurian age and described by Kopera as thinly to massively bedded, light green-grey, fine-grained metamorphosed calcareous siltstone, quartzite, and quartzo-feldspathic granofels. Also contains a fine-grained, massively bedded muscovite-quartz-biotite quartzite and schist containing distinctive 1-mm knots of biotite.
- The Tadmuck Brook Schist is possibly of late Proterozoic or early Paleozoic age. The formation is described by Kopera as rusty weathering, sulfidic, quartz-muscovite-biotite with or without sillimanite, andalusite, or staurolite, schist. Metamorphic grade increases from west to east across strike.

The bedrock elevation contours were mapped using data gathered as part of the PFAS RI, previous investigations at Devens, well drilling records available through the Massachusetts Energy & Environmental Affairs Data Portal (eeaonline.eea.state.ma.us), and Massachusetts Geological Survey (Figure 2-4, Table 2-1). There is significant relief in bedrock elevations across Devens and the surrounding area. The area shown has bedrock elevations ranging from -49 feet (ft) North America Vertical Datum 1988 (NAVD88) to 408 ft NAVD88.

2.3 Regional Hydrogeology

The Nashua River is the eventual discharge locus for surface water and groundwater flow at Devens. The tributaries of the Nashua River at Devens are Nonacoicus Brook and Walker Brook on the former North Post; Cold Spring Brook (which is a tributary of the Nonacoicus Brook through Grove Pond and Plow Shop Pond) on the former Main Post. There is also a lesser stream, Willow Brook that discharges to Nonacoicus Brook to the north. Willow Brook originates from Robbins Pond and is fed by Robbins Pond, surface water runoff, storm water discharge, and groundwater. The groundwater flow direction at each AOC is addressed in applicable sections.

Glacial meltwater deposits constitute the primary overburden aquifer at Devens. Groundwater also occurs in the underlying bedrock; however, flow is limited because regional bedrock lacks primary porosity and/or has been affected by metamorphism that limits transmissivity (an example would be the degree of development of transmissive partings parallel to layering). The result is bedrock groundwater flow that is primarily via fractures and dissolution voids.

The zones of highest transmissivity within the overburden are found in areas of thick glacial meltwater (outwash) deposits on the former Main Post at Devens, and these encompass deposits in which the Shabokin, Patton, MacPherson, and Grove Pond water supply wells are screened (Figure 2-16). Due to the high transmissivity of these overburden deposits, these areas are preferential groundwater flow areas. The zones of lowest transmissivity are typically associated with exposed till and bedrock.

Groundwater recharge occurs in upland areas and groundwater flows generally from the topographic highs to topographic lows. Groundwater discharges in wetlands, ponds, streams, and directly into the Nashua River.

The synoptic water level measurements taken for the PFAS RI in the areas addressed in this report are presented in Tables 2-2 through 2-5. The groundwater elevation contour maps based on those measurements are on Figures 2-6 through 2-15 The contour intervals vary between figures based on the level of scale and area of interest. The vertical gradients are presented in Table 2-6. The groundwater flow directions and gradients are discussed in the applicable sections.

The Devens Groundwater Use and Value is categorized as "High" as determined by MassDEP (MassDEP, 2003) and the MassDEP groundwater classification of GW-1 is applied throughout Devens. The MassDEP approved water supply Zone I's and Zone II's, as well as the potentially productive aquifer areas, and the Devens Aquifer Protection and Watershed Protection Districts are shown on Figure 2-16.

3.0 AOC 57 PRELIMINARY SITE CHARACTERIZATION SUMMARY

3.1 Site Description

AOC 57 was first identified for investigation of PFAS based on analysis of groundwater samples collected from existing long-term monitoring (LTM) wells at the site in December 2017/January 2018. AOC 57 consists of three sub-areas (Area 1, Area 2, and Area 3) that are located between Barnum Road and Cold Spring Brook, south to southeast of former Building 3713 (Figure 3-1). The three sub-areas are located on undeveloped MassDevelopment land designated as Open Space/Recreational. The three sub-areas are all in areas that are sloped downward to Cold Spring Brook in varying degrees. The elevation of the brook is approximately 220 ft NAVD88. The areas upslope of the AOC 57 sub-areas are generally flat at approximately 240 ft NAVD88, have all been developed, and are privately owned or owned by the Army. The current and previous subsurface features are shown on Figures 3-2 and 3-3. There is a large storm water detention area that was constructed between AOC 57 Area 1 and Area 2 between 2003 and 2005 (Figure 3-3).

3.2 Facility History and Utilities

Area 1 is a storm water drain that collects rainfall from the paved areas around Building 3713. The runoff from the storm drain flows to the outfall at Area 1, and eventually into Cold Spring Brook (HLA, 2000). Area 2 is located 800 feet northeast of Area l, and adjacent to a vehicle storage yard associated with the former motor repair shops (Figure 3-1). Area 2 formerly consisted of an eroded drainage ditch created by periodic rain runoff. Area 3 is located approximately 600 feet to the northeast of Area 2, south of former vehicle maintenance motor pools and north of the Cold Spring Brook floodplain. The site is characterized by a historical garage and vehicle waste disposal area (HLA, 2000). Area 3 was identified after test pits were excavated east of Area 2 where soil staining was identified on historical photographs, which was later determined to be an area impacted by total petroleum hydrocarbon and chlorinated volatile organic compounds in 1995 (Harding, 2001).

In 1977, an estimated 50 to 100-gallon spill of No. 4 fuel oil was discharged through the Area 1 outfall (Harding, 2001). The fuel oil spill occurred from an overfilled underground storage tank (UST) at Building 3713 into a nearby storm drain (HLA, 2000). Approximately 3,000 gallons of impacted mixed soil and water were removed through use of containment dikes and absorbent booms set up across Cold Spring Brook adjacent to Area 2 in 1977 (Harding, 2001). The remediation, investigations and monitoring of AOC 57 related to the fuel oil spill is discussed in Section 3.3.

The property at 112 Barnum Road was sold through the base closure process. Evergreen Solar constructed a manufacturing facility at 112 Barnum Road in 2008/2009 to manufacture silicon wafers used in solar power systems (Figure 3-2). The building was constructed with oversized/complex air handling and humidification, air and process cooling, power supply and distribution, compressed air production and distribution, specialty gas distribution, and wastewater and hazardous material treatment systems. Evergreen Solar went bankrupt in 2011 and the property was sold to Calare Properties/Hackman Capital Properties. In 2012, Calare leased half the facility to Saint-Gobain Ceramics & Plastics. Saint-Gobain upgraded the facility for the manufacture of components used in LED lights. In 2013, Calare leased the other half of the building to Nypro Healthcare. In 2014, Nypro started manufacturing of precision plastic products for customers in the healthcare, packaging, and consumer electronics industries (e.g., medical device manufacturing). In August 2014, Saint-Gobain ceased operations and Nypro moved into their space. In May 2015, Calare sold the property to an LLC/institutional buyer.

The property at former Building 3713 was retained by the Army during the base closure process. Building 3713 was demolished and the Major David S. Connolly Armed Forces Reserve Center was constructed on the property between 2008 and 2010.

The current and previous subsurface features are shown on Figures 3-2 and 3-3. The historic storm sewer system drained paved and unpaved areas and a discharge point to Cold Spring Brook near AOC 57 Area 1. The system was revised and there are numerous detention pond areas across the area.

3.3 Remedial Status

In September 1992, an investigation was performed at Area 1 and 2 to determine the presence or absence of environmental contamination at AOC 57 resulting from the 1977 fuel oil spill. Polycyclic aromatic hydrocarbons and total petroleum hydrocarbon content, possibly associated with fuel oil, were detected at Area 1; however, a preliminary risk evaluation indicated that there was no unacceptable risk for presumed commercial/industrial site reuse (HLA, 2000). At Area 2, naphthalene and total petroleum hydrocarbon content were detected in surface soils, and fingerprint analysis of soil indicated contaminated soil was most likely derived from lubricating oil, possibly from the release of vehicle crank case oil and not likely related to the No. 4 fuel oil release.

In 1994, a soil removal action was conducted at Area 2 in response to newly promulgated MCP standards (Harding, 2001). During the removal action, it was discovered that the soil and groundwater contamination were more widespread than expected, the soil removal was stopped after 1,300 cubic yards of soil were excavated, and AOC 57 Area 2 was administratively transferred to the RI/feasibility study (FS) process. Following the soil removal action, the area was regraded, and a stone drainage swale was installed that discharges into Cold Spring Brook (HLA, 2000).

In 1997, excavation of Area 1 outfall soil was conducted to address soil contamination resulting from releases of petroleum oil in response to newly promulgated MCP standards (HLA, 2000). The time-critical removal action included excavation of a 22-foot by 22.5-foot area to a maximum depth of 3 feet below ground surface (bgs) at the outfall location, approximately 25 cubic yards of contaminated soil were removed (Harding, 2001).

In the spring of 1999, a total of 1,860 cubic yards of soil was removed from Area 3 focusing on polychlorinated biphenyls (PCB) and extractable petroleum hydrocarbons (HLA, 2000) (Figure 3-17). In June 2000, the Army completed an RI at AOC 57 Areas 2 and 3 that revealed the presence of residual contamination at both sites (HLA, 2000). The record of decision (ROD) selected no further action for Area 1, Excavation (For Possible Future Use) and land use controls for Area 2, and Excavation (To Accelerate Groundwater Cleanup) and land use controls for Area 3 (Harding, 2001). The remedies for Area 2 and 3 also included long-term monitoring of groundwater and surface water.

The soil excavations in Area 2 and 3 were initiated in January 2002 and completed in February 2003 (H&S, 2015). At Area 2, the contamination extended beyond the assumed limits and petroleum waste seeped into the excavation. A petroleum product recovery system was operated while additional sampling was conducted. In 2003, the remaining contaminated soil was removed. A total of 4,361 tons of contaminated material were excavated from Area 2 (H&S, 2015). At Area 3, the excavation was completed to the target limits and the planned volume of soil was removed within these limits to depths ranging between 2 and 4 feet resulting in the removal of 197 tons of soil. The confirmatory samples met the ROD cleanup criterion and the area was backfilled (H&S, 2015).

Data obtained and observations made at Area 2 between 2002 and 2003 (during the soil excavation activities and subsequent investigations) prompted the submittal of an explanation of significant differences (ESD) in March 2004. The ESD expanded the Area 2 LTM activities to include extractable petroleum hydrocarbons C_{11}-C_{22} aromatics and PCB Aroclors (BRAC, 2004).

Per the ROD and ESD, LTM activities have continued at AOC 57 Area 2 and Area 3.

3.4 PFAS Field Investigation

The RI field investigation at AOC 57 included sampling existing monitoring wells, collecting surface water and sediment samples in Cold Spring Brook, groundwater vertical profiling using direct push technology

(DPT), soil borings using DPT, groundwater vertical profiling and soil borings using rotosonic drilling, installation of piezometers and monitoring wells, sampling of monitoring wells, and synoptic water level measurements. The work was completed in general accordance with the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b). Field activities were added as the data was received and reviewed. Field activities were added as the data was received and reviewed. Sampling locations are presented on Figures 3-4, 3-5, and 3-6 and summarized in Table 3-1. The results are discussed in Section 3.5.

3.4.1 Existing Wells

Groundwater samples were collected from existing monitoring wells at AOC 57 Area 2 and AOC 57 Area 3 in September 2018 in accordance with the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b) (Table 3-1, Figure 3-4, 3-5, 3-6). 57WP-05-01 could not be located. Monitoring well 57M-96-10X was blocked by roots and could not be sampled.

Groundwater samples were collected from four existing monitoring wells at AOC 57 Area 2 and AOC 57 Area 3 in January and February 2020 in accordance with the *Work Plan for Additional Sampling of Existing Wells to Support the PFAS Remedial Investigation Former Fort Devens Army Installation, Devens, MA* (KGS, 2019c). The groundwater results are discussed in Section 3.5.

3.4.2 Surface Water and Sediment

Surface water and sediment samples were collected in Cold Spring Brook in September 2018, including samples collected near AOC 57 Area 2 and AOC 57 Area 3 in accordance with the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b). Samples in close proximity to AOC 57 included a sample upstream of AOC 57 Area 2 (CSB-18-02), a sample at AOC 57 Area 2 (CSB-18-02), a sample at AOC 57 Area 3 (CSB-18-04), and from a location downstream of AOC 57 Area 3 (CSB-18-05) (Table 3-1, Figures 3-4, 3-5, and 3-6).

Two surface water and sediment samples were subsequently collected in Cold Spring Brook (CSB-20-04 and -05) at AOC 57 Area 2 and Area 3 (Table 3-1, Figures 3-4, 3-5, and 3-6). The samples were collected in accordance with *Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS) Area 1 Field Sampling Plan Addendum No. 2*. (KGS, 2020b). The samples were collected in April 2020. All of the results are discussed in Section 3.5.

3.4.3 DPT Vertical Profiles

Numerous phases of DPT vertical profiles were conducted at AOC 57. As results were received and reviewed, additional profiles were conducted to better delineate the PFAS contamination. The DPT vertical profiles are described below, are shown on Figures 3-4, 3-5, and 3-6, and are summarized in Table 3-1.

AOC 57 Area 1

The vertical profiles at AOC 57 Area 1 were conducted in December 2018 just downgradient of the AOC 57 Area 1 soil removal area (Table 3-1, Figure 3-4). Based on review of the results [maximum perfluorooctanoic acid (PFOA) + perfluorooctanesulfonic acid (PFOS) of 12.2 nanograms per liter (ng/L)], additional vertical profiles were not conducted at AOC 57 Area 1. The results are discussed in Section 3.5.

AOC 57 Area 2

The first round of vertical profiles at AOC 57 Area 2 (5702VP-18-01 through -08) was conducted in November and December 2018 in and around the area of historic AOC 57 Area 2 contamination (Table 3-1, Figure 3-5).

Review of the initial vertical profile results at AOC 57 Area 2 indicated that the upgradient extent of PFAS in groundwater at concentrations above the EPA life-time health advisory (LHA) was not defined, specifically based on results at 5702VP-18-01 and -03. Two additional vertical profiles were conducted upgradient of AOC 57 Area 2 along Barnum Road (5702VP-19-01 and -02) to help bound the western extent of PFAS in groundwater. Vertical profiles 5702VP-19-01 and -02 were conducted in January 2019.

Review of the second set of vertical profile results at AOC 57 Area 2 indicated that the upgradient extent of PFAS in groundwater at concentrations above the EPA LHA was not defined, specifically based on results at 5702VP-19-01. Four additional vertical profiles (5702VP-19-03, -04, -05, and -06) were conducted west (presumed to be upgradient) of 5702VP-19-01. Vertical profiles 5702VP-19-03 through -06 were conducted in March 2019.

Review of the results from 5702VP-19-06 indicated that the extent of PFAS in groundwater at concentrations above the EPA LHA was not defined at AOC 57 along Barnum Road. An additional vertical profile (5702VP-19-07) was conducted northeast (presumed crossgradient) of 5702VP-19-06. Vertical profile 5702VP-19-07 was conducted in May 2019.

Review of results at 5702VP-18-08 and 57M-95-07X indicated that the extent of PFAS in groundwater at concentrations above the EPA LHA was not defined at AOC 57 to the southwest. An additional vertical profile (5702VP-19-08) was conducted to the west (crossgradient) of 5702VP-18-08 and 57M-95-07X. Vertical profile 5702VP-19-08 was conducted in June 2019. All of the results are discussed in Section 3.5.

AOC 57 Area 3

The first round of vertical profiles at AOC 57 Area 3 (5703VP-18-01 through -08) were conducted in October and November 2018 in and around the area of historic AOC 57 Area 3 contamination (Table 3-1, Figure 3-6).

Review of the initial vertical profile results at AOC 57 Area 3 indicated that the upgradient extent of PFAS in groundwater at concentrations above the EPA LHA was not defined, specifically based on results from 5703VP-18-02 and -03. Two additional vertical profiles were conducted to help bound the northern and western extent of PFAS in groundwater. Vertical profile 5703VP-19-01 was conducted northeast of 5703VP-18-03 to bound the crossgradient extent to the north and 5703VP-18-09 was conducted west of 5703VP-18-02 to bound the upgradient extent. Vertical profile 5703VP-18-09 was conducted in December 2018 and vertical profile 5703VP-19-01 was conducted in January 2019. All of the results are discussed in Section 3.5.

3.4.4 DPT Soil Borings

The soil borings at AOC 57 Area 1 were not conducted as specified in the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b). Based on review of the vertical profile results at AOC 57 Area 1, EPA and Massachusetts Department of Environmental Protection (MassDEP) agreed that soils borings at AOC 57 Area 1 were not necessary.

The soil borings at AOC 57 Area 2 (5702SB-19-01 through -07) were conducted in January 2019. The soil borings were planned to be conducted in and around the area of historic AOC 57 Area 2 contamination. Soil borings 5702-19-01 through -06 were drilled at locations specified in the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b). An additional soil boring (5702SB-19-07) was added next to 5702VP-18-01 based on the high detections of PFOA and PFOS in the shallow intervals of the vertical profile 5702VP-18-01.

The soil borings at AOC 57 Area 3 (5703SB-19-01 through -04) were conducted in January 2019 at locations specified in the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b). All of the results are discussed in Section 3.5.

3.4.5 Monitoring Well Installation and Vertical Profiling with Sonic

In accordance with the cover letter to the Army Responses to EPA and MassDEP Comments, *Area 1 Field Sampling Plan – Monitoring Well Plan Addendum Remedial Investigation Work Plan for PFAS* dated October 8, 2019 (KGS, 2019d), select drilling activities were conducted at AOC 57 Area 2 and AOC 57 Area 3. Specific activities included vertical profiling at 5702MW-19-01; piezometer 5703PZ-19-01 was installed; and drilling and well installation at locations 5702MW-20-01 through -07 and 5703MW-20-01 through -04. Vertical profiling at 5702MW-20-03 and -05 was added during the field implementation. Although not originally part of the work plan, it was conducted in the same fashion as the vertical profiling conducted at 5702MW-19-01. Specifically, vertical profiling was started at the refusal depth of the collocated DPT vertical profile and samples were collected every 10 feet to bedrock. These activities were conducted in December 2019 through February 2020.

The newly installed monitoring wells were sampled for PFAS from February to March 2020. All of the results are discussed in Section 3.5.

3.4.6 Synoptic Water Level Surveys

An Area 1 synoptic water level monitoring event, that encompassed all of the AOC 57 Area 2 and AOC 57 Area 3 piezometers and monitoring wells, was conducted on March 12, 2020. All of the results are discussed in Section 3.5.

3.5 Nature and Extent

Groundwater results are summarized on Figures 3-7 through 3-9 and in cross section (Figures 3-10 through 3-13). Soil sampling results are summarized on Figures 3-14 and 3-15. Surface water and sediment sampling results are summarized on Figure 3-16. Area and site-specific groundwater contour figures are presented on Figures 2-9, and 2-12 through 2-15. All of the results are presented in tables in Appendix H. The media specific criteria are presented in (Table 1-1).

3.5.1 Groundwater

Groundwater in the overburden at AOC 57 was characterized through groundwater samples collected from existing wells, via DPT vertical profiles, via sonic vertical profiles, and samples from new monitoring wells. During the RI, DPT vertical profile samples were collected from 29 locations and sonic vertical profiles samples were collected from three locations. A total of 245 vertical profile samples were collected. Table 3-2 provides summary statistics of the results of the vertical profile samples. Of those samples, 41 samples (17%) had concentrations greater than the EPA LHA and 124 samples (86%) had concentrations greater than the GW-1 standard. A total of 37 monitoring well samples were collected. Table 3-3 provides summary statistics o the result of the monitoring well samples. Of the 37 monitoring well samples collected, 20 samples (54%) had concentrations greater than the EPA LHA and 31 samples (84%) had concentrations greater than the GW-1 standard. None of the concentrations were greater than the GW-3 standard (protective of surface water).

The summary statistics table provides statistics with respect to individual compounds (e.g., number of samples with PFOA that exceed the EPA LHA and the GW-1 standard) and with respect to the sum of applicable compounds in the EPA LHA and the GW-1 standard (e.g., numbers of samples with the sum of PFOA+PFOS that exceed the EPA LHA, and number of samples with the sum PFOA+PFOS+ perfluorohexanesulfonic acid (PFHxS) + perfluorononanoic acid (PFNA) + perfluoroheptanoic acid (PFHpA)+perfluorodecanoic acid (PFDA) that exceed the GW-1 standard]. Due to the summing of concentrations needed for comparison to the EPA LHA and the GW-1 standard, the numbers of samples that exceed the EPA LHA or GW-1 standard for individual compounds may not equal the numbers of samples that exceed the sum of the appropriate compounds for the EPA LHA or GW-1 standard. One example is, if individual results of PFOA and PFOS were both below the EPA LHA, but the sum of the

results exceeded the EPA LHA, then the sample would be counted as an exceedance of the EPA LHA even though the individual compounds would not be counted as exceedances.

At AOC 57 Area 1, all of the samples from both the vertical profile locations had concentrations lower than the EPA LHA and some sample intervals had PFAS concentrations greater than the GW-1 standard at both vertical profile locations. The maximum concentrations were detected at 5701VP-18-02 at 32-36 ft bgs (89.8 ng/L, for the sum of the six GW-1 compounds). The thickness of aquifer with concentrations greater than the GW-1 standard is 34 ft (22 to 56 ft bgs).

At AOC 57 Area 2, PFAS was detected at concentrations greater than the EPA LHA at locations in and around the historic AOC 57 Area 2 groundwater contamination as well as at locations upgradient of the historic AOC 57 Area 2 (5702VP-18-01), at locations along Barnum Road (5702VP-19-01, -06, and -07) and west of Barnum Road (5702VP-19-09). The extent of PFAS at concentrations greater than the EPA LHA are bounded to the south by lower concentrations detected at 5702VP-19-02 and -08 and to the west at 5702VP-19-03, -04, and -05. PFAS was detected at concentrations greater than the GW-1 standard in at least one sample interval or well screen at every AOC 57 Area 2 location.

The highest PFAS concentrations were detected at 5702VP-18-08 (PFOA + PFOS = 4,390 ng/L and 8,760 ng/L, sum of six GW-1 compounds), which is slightly crossgradient to the south of the center of the historic AOC 57 Area 2 contamination. Another area of higher concentrations was observed along a groundwater flow path that is crossgradient to the north and upgradient of 5702VP-18-08 at 5702VP-19-01 (PFOA + PFOS = 1,480 ng/L and 2,300 ng/L sum of six GW-1 compounds), 5702VP-18-01 (PFOA + PFOS = 1,950 ng/L and 4,660 ng/L, sum of six GW-1 compounds), and migrating toward 5702VP-18-02 (PFOA + PFOS = 560 ng/L and 1,740 ng/L, sum of six GW-1 compounds) and through 57WP-06-02 (PFOA + PFOS = 381 ng/L and 1,120 ng/L, sum of six GW-1 compounds) before discharging to the Cold Spring Brook. Crossgradient to the northeast and southwest of both of these areas of contamination the PFAS concentrations are lower suggesting the extent of the high concentrations in limited in the crossgradient extent (Figure 3-8).

The PFAS concentrations detected above the EPA LHA along Barnum Road (5702VP-19-06 and -07) and west of Barnum Road (5702VP-19-09) may not be related to the same source of the historical AOC 57 Area 2 and Area 3 and may be attributable to other Army legacy activities.

Most the PFAS concentrations greater than the EPA LHA were detected shallow in the aquifer (above 56 ft bgs), except at 5702VP-19-07 where PFAS was detected greater than the EPA LHA at 62-66 ft bgs. A similar pattern is observed with the PFAS concentrations greater than the GW-1 standard. Overall, beneath the zones of higher concentrations in the shallow aquifer, concentrations decreased with depth (sometimes PFOA and PFOS and the six GW-1 compounds were not detected) in the aquifer down to bedrock. The lowest concentrations, below both the EPA LHA and GW-1 standard, were observed in the deeper vertical profiles conducted using sonic drilling techniques at 5702VP-19-01/5702MW-19-01 (sampled down to 144 ft bgs), 5702VP-19-03/5702MW-20-03 (sampled down to 140 ft bgs), and 5702MW-20-05 (sampled down to 130 ft bgs), which sampled groundwater down to bedrock. The bedrock was confirmed with coring.

The groundwater flow at AOC 57 Area 2 close to Cold Spring Brook is toward the Brook in the shallow aquifer (above 40 ft bgs) and in the deeper aquifer (below 40 ft bgs). For Area 2, slight downward vertical gradients (ranging from +0.0008 to +0.0071) were identified at Well Pair 2 (57M-03-01X/5702MW-20-06A) and Well Pair 3 (57M-95-06X/5702MW-20-04A), which are located on at the top of the slope above Cold Spring Brook. Upward vertical gradients were observed at Well Triplets 1 and 2 and Well Pair 4 located mid-way down the slope toward Cold Spring Brook (5702MW-20-05A,B) or at the bottom of the slope adjacent to the Cold Spring Brook wetlands. For the well triplets, upward vertical gradients were identified between the deep and shallow wells, between the deep and mid-depth wells, and between the mid-depth and shallow wells. The upward gradients ranged from -0.0028 to -0.0333. These upward gradients suggest that deep groundwater at Area 2 moves upward toward Cold Spring Brook.

At AOC 57 Area 3, the highest PFAS concentrations were detected along the axis of the previous soil removal area, specifically at 5703VP-18-04 at the water table (PFAO + PFOS = 1,800 ng/L and 2,010 ng/L, sum of six GW-1 compounds, 12-16 ft bgs) and at 5703VP-18-02 (PFAO + PFOS = 988 ng/ L and 1,190 ng/L, sum of six GW-1 compounds, at 22-26 ft bgs). The shallowness of the maximum concentrations suggest a nearby source of PFAS. The upgradient extent of PFAS concentrations greater than the EPA LHA is limited by results from 5703VP-18-09, and the crossgradient extent to the north is limited by results from 5703VP-19-01. PFAS concentrations greater than the GW-1 standard was detected at all AOC 57 Area 3 locations in at least one sample interval or well screen.

The PFAS concentrations greater than the EPA LHA were detected in the shallow and mid-portion of the aquifer (above 46 ft bgs) with lesser concentrations deeper in the aquifer. A similar pattern is observed with PFAS concentrations with respect to the GW-1 standard, expect those lower concentrations were detected deeper in the aquifer down to 76 ft bgs (5703VP-18-03).

The groundwater flow at AOC 57 Area 3 is toward Cold Spring Brook in the shallow aquifer (above 40 ft bgs) and in the deeper aquifer (below 40 ft bgs). Downward vertical gradients were identified in the groundwater at Well Pairs 1, 2, and 3 located close to the top of the slope and at the mid-slope above Cold Spring Brook. The downward gradients ranged from 0.0059 to 0.0179. Upward vertical gradients were identified at Well Triplet 1 located adjacent to the Cold Spring Brook wetlands. Upward vertical gradients were identified between the deep and shallow wells, between the deep and mid-depth wells, and between the mid-depth and shallow wells at this well triplet. The upward gradients ranged from 0.0021 to 0.0228. These upward gradients suggest that deep groundwater at Area 3 moves upward toward Cold Spring Brook.

3.5.2 Soil

At AOC 57 Area 2, seven soil borings were advanced to a maximum depth of 16 feet bgs. Six locations had one or more sample intervals with detections of PFAS compounds greater than the MCP Method 1 S-1 Soil Category (S-1)/GW-1 standard. At 5702SB-19-01 PFAS compounds were not detected at concentrations greater than the S-1/GW-1 standards. All six of the PFAS compounds in the MCP Method 1 Soil Category (S-1)/GW-1 standard were detected at concentrations above the S-1/GW-1 standards (Figure 3-14, Appendix H). Location 5702SB-19-07 had the largest number of samples with concentrations above the S-1/GW-1 standards and also had the highest concentrations of five PFAS compounds. The maximum concentrations were PFOS = 17.0 micrograms per kilogram (µg/kg), PFOA = 17.0 µg/kg, PFNA = 4.60 µg/kg, PFHpA = 1.80 µg/kg, PFDA = 43.0 µg/kg. At 5702SB-19-04, concentrations of three PFAS compounds were greater than the S-1/GW-1 standards and the maximum concentration of PFHxS was detected (4.80 µg/kg). The other locations had lower concentrations with few samples that had concentrations greater than the S-1/GW-1 standards.

At AOC 57 Area 3, four soil borings were advanced to a maximum depth of 12 feet bgs. Two soil borings had one or more sample intervals with detections of PFAS compounds greater than the S-1/GW-1 standards. At 5703SB-19-01 and -03 PFAS compounds were not detected at concentrations greater than the S-1/GW-1 standards. Four of the PFAS compounds with S-1/GW-1 standards were detected at concentrations above the S-1/GW-1 standards (Figure 3-15, Appendix H). Location 5703SB-19-02 had the largest number of samples with concentrations above the S-1/GW-1 standards and also had the highest concentrations. The maximum concentrations were PFOS = 2.70 µg/kg, PFOA = 1.00 µg/kg, PFNA = 2.10 µg/kg, PFDA = 5.60 µg/kg. Two locations did not have any PFAS concentrations greater than the S-1/GW-1 standards. At 5703SB-19-04, PFDA (1.90 µg/kg) and PFOS (2.20 µg/kg) were detected in the 0-0.5 ft bgs sample at concentrations above the S-1/GW-1 standards.

As part of prior removal activities, soil has been removed from AOC 57 Area 2 and Area 3. The highest PFAS concentrations in both areas are on the edges or outside of the estimated areas where soil was removed.

3.5.3 Surface Water and Sediment

Five surface water and sediment samples were collected near AOC 57 Area 2 and Area 3 (CSB-18-02 through -05, CSB-20-04 and -05). All of the detections in surface water and sediment in Cold Spring Brook were below the EPA site-specific screening levels (SSSL) for PFAS at former Fort Devens (Table 1-1). The sampling locations and data are summarized on Figure 3-18 and the data are presented in Appendix H. Other sample locations in Cold Spring Brook are discussed in Section 4.4.4 (AOC 74) and Section 5.4.4 (AOC 75).

The PFOA concentrations in the surface water ranged from 12.0 ng/L to 190 ng/L, the PFOS concentrations ranged from 2.80 estimated result (J) ng/L to 35.0 ng/L, and the PFBS concentrations ranged from 3.6 ng/L to 11.0 ng/L. The highest concentrations were detected at CSB-20-04 (AOC 57 Area 2) and CSB-20-05 (AOC 57 Area 3) suggesting the areas where these samples were collected is receiving groundwater with the higher concentrations as compared to adjacent areas.

In the sediment samples, PFOA concentration ranged from 0.460J ng/L to 2.40 ng/L, PFOA concentrations ranged from non-detect to 5.60 µg/kg, and PFBS was non-detect.

4.0 AOC 74 PRELIMINARY SITE CHARACTERIZATION SUMMARY

4.1 Site Description

AOC 74 (Barnum Road Firefighting Exercise Site) is a former firefighting exercise site where aqueous film-forming foam (AFFF) was used during firefighting training behind former Building 3773 (Figure 4-1) [BERS-Weston Services JVA, LLC (BERS-Weston), 2018b]. The property is currently owned by 78 Barnum Road, LLC.

The portion of the property near Barnum Road, buildings, and parking lots is fairly flat with little change in ground surface elevations (generally 240 ft NAVD88). Behind the main building the topography has been altered by the installation of two storm water detention ponds. Between the storm water detention ponds the land slopes down to a drainage swale that discharges to Cold Spring Brook where the shoreline is approximately 222 ft NAVD88.

4.2 Facility History and Utilities

AOC 74 was first identified for PFAS investigation based on interviews conducted as part of the Devens PFAS Preliminary Assessment (PA) (KGS, 2017). The site was identified as study area (SA) 74 as part of the PFAS PA. No previous environmental investigations were found for former Building T-3773 during historical document review (KGS, 2017).

A base-wide PA was performed in 2016 to determine if a release of PFAS had occurred at Devens (KGS, 2017). Evaluation of SA 74 found no historical documentation that indicated the use, storage, or disposal of AFFF at SA 74. However, interviews conducted with personnel knowledgeable about this site indicated historical use of AFFF by the Army during firefighting training behind the building. Former Building 3773 was used as an administrative building as part of the Army Reserve Center. Firefighting equipment was stored at this location during the closure of the former Moore Army Airfield (KGS, 2017).

The PA concluded that a SI was warranted to determine if additional action is required at SA 74. SA 74 was included in the *Final Site Inspection Report for Per- and Polyfluoroalkyl Substances (PFS) at Former Fort Devens Army Installation* (BERS-Weston, 2018b). Based on the results, the SI recommended that a RI be conducted at SA 74.

The current and previous subsurface features are shown on Figures 4-2 and 4-3. The historic storm sewer system drained paved and unpaved areas and had numerous discharge points to Cold Spring Brook behind former Building 3773. The system was revised and there are numerous detention pond areas across the area.

4.3 PFAS Field Investigation

The RI field investigation at AOC 74 included sampling the existing irrigation well, collecting surface water and sediment samples in Cold Spring Brook, groundwater vertical profiling using DPT, soil borings using DPT, installation of piezometers and monitoring wells, sampling of monitoring wells, and synoptic water level measurements. The work was completed in general accordance with the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b). Field activities were added as the data was received and reviewed. Sampling locations are presented on Figure 4-4 and summarized in Table 4-1. The results are discussed in Section 4.5.

4.3.1 Irrigation Well

A groundwater sample was collected from the irrigation well, located southeast of the building, in October 2018.

4.3.2 Surface Water and Sediment

Surface water and sediment samples were collected in Cold Spring Brook in September 2018, including samples collected near AOC 74. Sample CSB-18-06 was collected east of the former building and CSB-18-07 and -08, which are located downstream of AOC 74.

One additional surface water and sediment sample was collected in Cold Spring Brook in accordance with the *Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS) Area 1 Field Sampling Plan Addendum No. 2* (KGS, 2020b). The sample, CSB-20-06, was collected in April 2020.

4.3.3 DPT Vertical Profiles

Numerous phases of DPT vertical profiles were conducted at AOC 74. As results were received and reviewed, additional profiles were conducted to better delineate the PFAS contamination. The DPT vertical profiles are described below, are shown on Figure 4-4, and are summarized in Table 4-1.

The first round of vertical profiles 74VP-18-01 through -11 were conducted in October 2018 through December 2018 as planned in the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b). The locations were conducted within as well as cross-gradient, upgradient, and downgradient of the suspected source area (the area impacted by the firefighter training), to assess the nature and extent of PFAS in groundwater in this area.

Review of some of the initial vertical profile results at AOC 74 indicated there were high PFAS concentrations (sum of PFOA and PFOS = 2,270 ng/L) at 74VP-18-05 and the extent of PFAS in groundwater at concentrations above the EPA LHA was not defined. Two additional vertical profiles were conducted downgradient of 74VP-18-05 (74VP-18-12 and -13) to help define the extent of PFAS in groundwater. The vertical profiles were conducted in December 2018.

Review of additional initial vertical profile results at AOC 74 (specifically 74VP-18-01 and -03) indicated the southwest extent of PFAS in groundwater was not defined. One additional vertical profile (74VP-19-01) was conducted west of 74VP-18-01 and -03 to help define the extent of PFAS in groundwater. Location 74VP-19-01 was drilled in February 2019.

Results of vertical profiles 74VP-18-12 and GPVP-19-05 suggested that the high PFAS concentrations detected at 74VP-18-05 were migrating to the north. One additional vertical profile (74VP-19-02) was conducted east of GPVP-19-05 to help define the eastern extent of PFAS in groundwater. Location 74VP-19-02 was drilled in February 2019.

Review of AOC 74 groundwater level contours (Figure 2-3) developed from data collected from the new AOC 74 piezometers installed in February and March 2019 indicated there is a component of groundwater flow from behind former building 3773 toward Cold Spring Brook. The groundwater level contours indicated that groundwater with PFAS concentrations greater than the EPA LHA at 74VP-18-01, -04, -09 may potentially flow toward Cold Springs Brook. Therefore, vertical profile 74VP-19-03 was conducted at a location downgradient of 74VP-18-01 and -04 to further characterize PFAS concentrations in groundwater that is discharging to Cold Springs Brook. A second additional vertical profile, 74VP-19-04, was conducted along Cold Spring Brook at a location that is hydraulically crossgradient to 74VP-19-03 to confirm the crossgradient extent to the northeast of the PFAS concentrations greater than the EPA LHA that are discharging to Cold Springs Brook. Location 74VP-19-03 and -04 were drilled in June 2019.

In accordance with the cover letter to the Army Responses to EPA and MassDEP Comments, *Area 1 Field Sampling Plan – Monitoring Well Plan Addendum Remedial Investigation Work Plan for PFAS* (KGS, 2019d), select drilling activities were conducted at AOC 74. Specific activities included vertical profiling at 74VP-20-01. The vertical profiling was conducted in February 2020. The groundwater data are discussed in Section 4.4.1.

4.3.4 Soil Borings

The AOC 74 soil borings identified in the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b) (74SB-19-01 through -07) were drilled in January 2019. One soil boring (74SB-18-04) was moved to be collocated with 74VP-19-04 because the original planned location was inaccessible because it was within a steep-sided storm water detection basin. The borings were conducted in the general area of the presumed source area. The data are discussed in Section 4.4.3.

4.3.5 Monitoring Wells and Piezometers

A series of piezometers (74PZ-19-01 through -09) were installed in February and March 2019.

In accordance with the cover letter to the Army Responses to EPA and MassDEP Comments, *Area 1 Field Sampling Plan – Monitoring Well Plan Addendum Remedial Investigation Work Plan for PFAS* (KGS, 2019d), select drilling activities were conducted at AOC 74. Specific activities included installation of piezometers 74PZ-19-10 and 74PZ-20-01 through -05, installation of monitoring well 74MW-19-04A, and sampling of the new monitoring well 74MW-19-04A. These activities were conducted in December 2019 through March 2020.

4.3.6 Synoptic Water Level Event

An AOC 74/Grove Pond area synoptic water level event was conducted on March 19, 2019.

An Area 1 synoptic water level monitoring event, that encompassed all of the Grove Pond area piezometers and monitoring wells, was conducted on March 12, 2020. The groundwater flow contours estimated based on the data from the synoptic water level events are discussed in Section 4.4.1.

4.4 Nature and Extent

Groundwater results are summarized on Figure 4-5 and in cross section (Figures 4-6 through 4-8). Soil sampling results are summarized on Figure 4-9. Surface water and sediment sampling results are summarized on Figure 3-18. Area and site-specific groundwater contour figures are presented on Figures 2-3, 2-5, and 2-6. All of the results are presented in tables in Appendix H. The media specific criteria are presented in (Table 1-1).

4.4.1 Groundwater in Overburden

Groundwater in the overburden at AOC 74 was characterized through three groundwater samples collected during the SI (BERS-Weston, 2018b), and during the RI via DPT vertical profiles, and a sample from a new monitoring well. During the RI, vertical profile samples were collected from 18 locations. A total of 133 vertical profile samples were collected. Table 4-2 provides summary statistics of the results of the vertical profile samples. Of those samples, 17 samples (13%) had concentrations greater than the EPA LHA and 48 samples (36%) had concentrations greater than the GW-1 standard. One monitoring well (74MW-19-04A) was installed and sampled in the overburden and had concentrations greater than the EPA LHA and the GW-1 standard (Table 4-3). None of the concentrations were greater than the GW-3 standard (protective of surface water).

The maximum concentrations were detected at 74VP-18-05 at 52-56 ft bgs (PFOA + PFOS = 2,270 ng/L and 3,660 ng/L, for the sum of the six GW-1 compounds). High concentrations were also detected at 74VP-20-01 at the water table (12-16 ft bgs, PFAO + PFOS = 969 ng/L and 2,010 ng/L, for the sum of the six GW-1 compounds).

Based on the highest PFAS concentrations detected in soil at 74SB-19-01 and -03 (discussed in Section 4.4.3) and the high PFAS concentrations detected at the water table at 74VP-20-01, SA74-17-02 and -03 (SI locations) the source area is likely located behind former Building 3773 in the vicinity of these locations. Based on the groundwater level contours (Figures 2-3 and 2-6) some of the groundwater from this area

flows to the southeast toward Cold Spring Brook and some flows to the north toward 74VP-18-05 and then north towards Grove Pond.

The higher PFAS concentrations detected at 74VP-18-05, flowing with groundwater to the north and detected at 74VP-18-12, and GPVP-19-05 are bounded to the east by lower PFAS concentrations (below the EPA LHA) detected in crossgradient locations 74VP-18-13 and 74VP-19-02 (Figure 4-5). Farther downgradient, the eastern extent of PFAS concentrations defined by the EPA LHA are limited by results at GPVP-18-06, -07, and CSMS-11-02. To the west of 74VP-18-05, 74VP-18-12, and GPVP-19-05, there appears to be PFAS impacts to the groundwater separate from AOC 74. This area is discussed in Section 6, the Grove Pond Area.

The higher PFAS concentrations detected behind the building at 74VP-20-01, -18-01, SA74-17-02 and -03, are migrating with groundwater to the east toward Cold Spring Brook and were detected at 74VP-18-09 at concentrations above the EPA LHA. Crossgradient of this area to the south, PFAS concentrations were detected at concentrations below the EPA LHA at SA-17-01, -04, -05 and 74VP-18-02, -06, and -10. Crossgradient of this area to the north, PFAS concentrations were detected at concentrations below the EPA LHA at 74VP-19-03 and -04.

The downgradient extent of the AOC 74 plume that is flowing toward Grove Pond is not clearly defined and may be comingling with PFAS impacted groundwater in the Grove Pond area as the groundwater migrates north toward Grove Pond and the Town of Ayer Grove Pond water supply wellfield.

The upgradient extent of the AOC 74 plume is defined by PFAS concentrations less than the EPA LHA at 74VP-18-11 and 74VP-19-01.

All of the AOC 74 locations had at least on sample with PFAS concentrations greater than the GW-1 standard except for SA-17-04 and 74VP-18-10, located south of the portion of the plume migrating toward Cold Spring Brook, 74VP-19-04, located north of the portion of the plume migrating toward Cold Spring Brook, and at 74VP-19-02, located east of the portion of the plume migrating toward Grove Pond.

At 74VP-20-01 the highest PFAS concentrations were detected at the water table (12-16 ft bgs, PFOA + PFOS = 969 ng/L and 2,010 ng/L, for the sum of the six GW-1 compounds) and in the next sample interval (19-23 ft bgs, PFOA + PFOS = 705 ng/L and 1,260 ng/L, for the sum of the six GW-1 compounds). Most of the rest of the sample intervals had concentrations lower than the EPA LHA and the GW-1 standard, except at 49-53 ft bgs (PFOA + PFOS = 74.9 ng/L and 110 ng/L, for the sum of the six GW-1 compounds) and at 88-92 ft bgs (PFOA + PFOS = 29.0 ng/L and 55.9 ng/L, for the sum of the six GW-1 compounds). The highest concentrations were detected at 74VP-18-09 in the middle sample interval (22-26 ft bgs, PFOA + PFOS = 76.0 ng/L and 110 ng/L, for the sum of the six GW-1 compounds) with the deepest interval 32-36 ft bgs) only having a concentration of 0.950 ng/L (for the sum of the six GW-1 compounds) and no detections of PFOA and PFOS. A similar pattern was observed at crossgradient locations 74VP-18-02 and 74VP-19-04, where the higher PFAS concentrations were detected in the shallowest intervals at or close to the water table and the deepest intervals were nondetect (74VP-18-02) or very low concentrations (74VP-19-04, below 1 ng/L for PFOA + PFPOS and below 2 ng/L for the sum of the six GW-1 compounds).

For the portion of groundwater just north of 74VP-20-01 that flows toward 74VP-18-05, 74VP-18-12 and GPVP-19-05, the highest PFAS concentrations (above the EPA LHA) were observed in the shallowest four intervals at 74VP-18-05 but the plume appears to dive slightly in the aquifer as the groundwater flows to 74VP-18-12 and GPVP-19-05. At 74VP-18-12 and GPVP-19-05, the shallowest two sample intervals had PFAS concentrations less than the EPA LHA followed by concentrations greater than the EPA LHA in the deeper four intervals at 74VP-18-12 and the deeper three intervals at GPVP-19-05. The plume does not appear to continue to dive as groundwater migrates toward Grove Pond and the Town of Ayer Grove Pond wellfield. The highest PFAS concentrations were observed in the shallowest five intervals at GPVP-18-08 and the wells set in the shallow aquifer at MNG-3R and CSMS-11-02 with lower concentrations deeper in the aquifer. PFAS was not detected (for PFOA and PFOS and the six GW-1 compounds) in deeper intervals

at GPVP-19-08 (five deeper intervals) and GPVP-19-07 had two non-detect intervals and two intervals with a maximum concentration of 5.57 ng/L (sum of six GW-1 compounds). The Town of Ayer Grove Pond water supply wells are set from 42 to 73 ft bgs, which is in the approximate middle of the saturated aquifer in that area.

4.4.2 Groundwater in Bedrock

The irrigation well off the southeast corner of former Bldg. 3773 is 505 feet deep and sampled in October 2018. The screen information of the irrigation well is unknown. It is assumed to be cased into bedrock and that it is an open bedrock hole. A sample was collected from the output of the existing pump within the well. The sample was nondetect for all PFAS compounds.

4.4.3 Soil

At AOC 74 three soil borings were conducted during the SI (BERS-Weston, 2018b) and seven borings were conducted during the RI. The PFAS concentrations from the soil samples collected during the SI were less than the S-1/GW-1 standards. At three of the boring conducted during the RI, PFAS concentrations were less than the S-1/GW-1 standards, including at 74SB-19-04 where no PFAS compounds were detected. At the other four borings, five of the six PFAS compounds that have S-1/GW-1 standards were detected at concentrations above the S-1/GW-1 standards (Figure 4-9, Appendix H). Three locations (74SB-19-01, -02, -03) all had concentrations greater than the S-1/GW-1 standards in all intervals sampled. The largest number of analytes at concentrations greater than the S-1/GW-1 standards were detected at 74SB-19-03, which is also where the maximum concentrations of PFOA, PFOS, PFDA were detected. At 74SB-19-03, the maximum concentrations were PFOS = 9.30 µg/kg, PFOA = 5.50 µg/kg, PFNA = 1.40 µg/kg, PFHpA = 1.30 µg/kg, PFDA = 11.0 µg/kg. The highest PFHpA (2.40 µg/kg) and PFNA (2.80J µg/kg) concentrations were detected at 74SB-19-01. The other locations had lower concentrations with few samples that had concentrations greater than the S-1/GW-1 standards. The data suggest the greatest impact of fire-fighting training exercises was directly behind former Building 3773 in the vicinity of 74SB-19-01 and -03 with lesser impacts to the south, east, and north.

4.4.4 Surface Water and Sediment

Three surface water and sediment samples were collected east of former Building 3773 (CSB-18-06, -07 and CSB-20-06) and one sample was collected downstream (CSB-18-08). Five surface water and sediment samples were collected near AOC 57 Area 2 and Area 3 (CSB-18-02 through -05, CSB-20-04 and -05). All of the detections in surface water and sediment in Cold Spring Brook were below the EPA SSSLs for PFAS at former Fort Devens (Table 1-1). The sampling locations and data are summarized on Figure 3-18 and the data are presented in Appendix H. Other sample locations in Cold Spring Brook are discussed in Section 3.5.3 (AOC 57) and Section 5.4.4 (AOC 75).

The PFOA concentrations in the surface water ranged from 7.90 ng/L to 26.0 ng/L, the PFOS concentrations ranged from 3.10J ng/L to 4.10 ng/L, and the PFBS concentrations ranged from 0.800J ng/L to 1.70 ng/L. The highest concentrations were detected at CSB-20-06 suggesting that area is receiving groundwater with the higher concentrations as compared to adjacent areas.

In the sediment samples, PFOA concentration ranged from non-detect to 1.70 µg/kg, PFOS concentrations ranged from non-detect to 1.90J µg/kg, and PFBS was non-detect.

5.0 AOC 75 PRELIMINARY SITE CHARACTERIZATION SUMMARY

5.1 Site Description

AOC 75 is located off Saratoga Street and was first identified for PFAS investigation based on interviews conducted as part of the Devens PFAS PA (KGS, 2017). AOC 75 was identified as the former Building T-1445, where a large fire occurred during the late 1980s/early 1990s (Figure 5-1). AFFF was reportedly used to suppress the fire (KGS, 2017). Former Building T-1445 has been described as a shed that connected two other buildings (former Buildings T-1422 and T-1423) (KGS, 2017).

The property where former Building T-1445 was located is currently zoned as Rail, Industrial & Trade Related. After the closure of Fort Devens, the property was redeveloped, and a building was constructed between 2001 and 2003 (18 Saratoga Street) (Figure 5-2). Currently the building is occupied by Waiteco Machine Inc., which is a manufacturer and assembler of machined components.

To the west of 18 Saratoga Street, the property was commercially developed. Immediately to the north and east of 18 Saratoga Street is a drainage swale that is oriented east-west along the northern edge of the property and north-south along the eastern edge of the property. Water in the drainage swale flows to the south and empties into a man-made detention pond. Active railroad tracks exist north and east of the drainage swale in the same pattern as the swale (i.e., oriented east-west to the north of the property and north-south to the east of the property. East of the railroad tracks to Barnum Road is land owned by MassDevelopment that is currently undeveloped and is zoned as Rail, Industrial & Trade Related. East of Barnum Road, the land is undeveloped and zoned Open Space/Recreational. East of the open space is Cold Spring Brook and the former Fort Devens boundary. It is not anticipated that the land use at AOC 75 will change in the future.

There are currently no wells at AOC 75 that are used for drinking water supply, irrigation water supply, or any other water supply purposes. A permit is required from Devens Enterprise Commission for installation of any water supply well.

Overall, the area is generally flat with little change in ground surface elevation. There is a gentle slope from 18 Saratoga Street toward Cold Spring Brook. The ground surface elevation at 18 Saratoga Street is approximately 250 ft NAVD88 and the ground surface elevation at the edge of Cold Spring Brook is approximately 220 ft NAVD88.

5.2 Site History and Utilities

AOC 75 was first identified for PFAS investigation based on interviews conducted as part of the Devens PFAS PA (KGS, 2017). The site was identified as SA 75 as part of the PFAS PA. No previous environmental investigations were found for former Building T-1445 during historical document review (KGS, 2017).

A base-wide PA was performed in 2016 to determine if a release of PFAS had occurred at Devens (KGS, 2017). Although there was no historical documentation indicating the use, storage or disposal of AFFF at SA 75, interviews with personnel knowledgeable about these sites indicated historical use of AFFF by the Army to extinguish a warehouse fire at SA 75 The warehouse, Former Building T-1445, was reportedly used for storage of lumber and pipe (KGS, 2017). During the 22 December 2016 interview with the current Devens Fire Chief and Deputy Chief Scott Adams, they indicated a fire occurred at this warehouse in the late 1980s/early 1990s, resulting in alarm calls to neighboring fire departments. They described the building as a shed that connected two other buildings. The fire became out of control and numerous items that contained flammables were reportedly stored in the warehouses. Since the fire was so intense, it was dangerous to the crew. A decision was made to use all the foam available at Devens to put the fire out. After the fire, the buildings were inspected, and vehicles were found inside. (KGS, 2017). The PA concluded that a SI was warranted to determine if additional action is required at SA 75. SA 75 was included in the *Final Site Inspection Report for Per- and Polyfluoroalkyl Substances (PFAS) at Former Fort Devens Army*

Installation (BERS-Weston, 2018b). Based on the results, the SI recommended that a RI be conducted at SA 75.

The current and previous subsurface features are shown on Figures 5-2 and 5-3. As part of the evaluation of storm sewers completed in 1994 (Arthur D. Little, Inc., 1994), System #9 was identified east and west of former Building 1445. System #9 was an extensive system that drained paved residential areas, unpaved railroad tracks, and unpaved storage yards. There were catch basins to System #9 immediately adjacent to the east of former Building 1445. The system drains south along Saratoga Street (Figure 5-2) and discharges into Cold Spring Brook at the junction of Saratoga Street and Barnum Road. By 2001, redevelopment activities had started in the area and the storm sewer system revised. The current subsurface features are shown on Figure 5-3.

5.3 AOC 75 Field Investigation

The AOC 75 field investigation included groundwater vertical profiling using DPT, soil borings, installation of piezometers and monitoring wells, groundwater vertical profiling and soil borings using rotosonic drilling, sampling of monitoring wells, collection of surface water and sediment samples, and synoptic water level measurements. The work was completed in general accordance with the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b). Field activities were added as the data was received and reviewed. Sampling locations are presented on Figure 5-4 and summarized in Table 5-1. The results are discussed in Section 5.5.

5.3.1 DPT Vertical Profiles

Numerous phases of DPT vertical profiles were conducted at AOC 75. As results were received and reviewed, additional profiles were conducted to better delineate the PFAS contamination. The DPT vertical profiles are described below, are shown on Figure 5-4, and are summarized in Table 5-1.

The RI field investigation at AOC 75 began with vertical profiles planned in the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b). The first round of vertical profiles 75VP-18-01 through -09 were conducted in October 2018 within as well as cross-gradient, upgradient, and downgradient of the suspected source area (the area impacted by the warehouse fire), to assess the nature and extent of PFAS in groundwater in this area and assess if PFAS in groundwater was contributing to the PFAS detected in Town of Ayer water supply wells at Grove Pond.

Based on the results from 75VP-18-01, -03, -04, -07, -08, and -09, there appeared to be PFAS with higher concentrations (greater than the EPA LHA) located at 75VP-18-03, -04, and -07 and lower PFAS concentrations (less than the EPA LHA) at 75VP-18-01, -08, and -09. These data indicated groundwater with higher concentrations of PFAS was located near the presumed source of the warehouse fire (75VP-18-07) and groundwater was flowing toward Cold Spring Brook based on the concentrations observed at 75VP-18-03 and -04. Based on the results observed at 75VP-18-08 and -09 (less than the EPA LHA) it appeared that groundwater from the presumed source of the warehouse fire was not flowing toward the northeast (toward the Town of Ayer Grove Pond wellfield) but rather the groundwater was flowing to the east toward Cold Spring Brook. After review of the results, five vertical profiles (75VP-18-10 through -13 and 75VP-19-01) were conducted. One location (75VP-18-10) was conducted south of 75VP-18-04 to bound the southern extent of PFAS detected at 75VP-18-04. Three locations were conducted along Barnum Road (75VP-18-11, -12, -13) to bound the PFAS downgradient of 75VP-18-03 and -04. One location (75VP-19-01) was conducted upgradient of 75VP-18-07 to bound the upgradient extent of PFAS detected at 75VP-18-07. These vertical profiles were completed in December 2018 and January 2019.

The results from 75VP-19-01 (seven sample intervals with PFAS detections above the EPA LHA) indicated that the upgradient and crossgradient extent of PFAS in groundwater was not defined. Three additional vertical profiles were conducted upgradient of 75VP-19-01 to define the extent of PFAS in groundwater. One vertical profile was crossgradient to the south of 75VP-19-01 (75VP-19-02) and two vertical profiles

were conducted upgradient of 75VP-19-01 (75VP-19-03 and -04). These vertical profiles were completed in February 2019.

PFAS was detected greater than the EPA LHA at 75VP-19-02 and -04 but below the EPA LHA at 75VP-19-03. Based on these results, four vertical profiles (75VP-19-05, -06, -07, and -08) were conducted with the purpose of defining the crossgradient and upgradient extent of PFAS in groundwater at concentrations greater than the EPA LHA at AOC 75. One location (75VP-19-05) was conducted to the south of 75VP-19-02 and three locations (75VP-19-06, -07, and -08) were conducted to the west of 75VP-19-02, -03, and -04). These vertical profiles were completed in May 2019.

The results from 75VP-19-05 through -08 were reviewed. Based on results from 75VP-19-05 (one sample interval with PFAS detections above the EPA LHA) and -06 (one sample interval with PFAS detections above the EPA LHA), one additional vertical profile (75VP-19-09) was conducted. Vertical profile 75VP-19-09 was conducted southwest of 75VP-19-05 to delineate the crossgradient extent of PFAS concentrations above the EPA LHA south of 75VP-19-05 and -06. The vertical profile was completed in June 2019.

In accordance with the cover letter to the Army Responses to EPA and MassDEP Comments, *Area 1 Field Sampling Plan – Monitoring Well Plan Addendum Remedial Investigation Work Plan for PFAS* (KGS, 2019d), select drilling activities were conducted at AOC 75. Specific activities included vertical profiling at 75VP-20-01. Vertical profiling was also conducted at 75MW-19-02. These activities were conducted in December 2019 through February 2020.

5.3.2 DPT Soil Borings

The AOC 75 soil borings identified in the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b) (75SB-19-01 through -07) were drilled in January 2019. The borings were conducted in the presumed source area.

The PFAS concentrations were generally low (maximum PFOS = 1.80 µg/kg and PFOA = 0.670 µg/kg) in 75SB-19-01 through -07. Based on the results of the first soil borings, the results from vertical profile 75VP-19-01 (detections of PFAS greater than the EPA LHA at the water table), and the low PFAS concentrations (less than the EPA LHA) detected at the water table at 75VP-18-06 and -07, the data indicated that the soils to the east of the former warehouse footprint might not be a source of the higher PFAS concentrations detected in groundwater at AOC 75. The higher concentrations of PFAS at the water table at 75VP-19-01 suggest a potential source area may be located to the west of the former warehouse.

Three additional soil borings were drilled closer to 75VP-19-01. One soil boring (75SB-19-08) was conducted at 75VP-19-01. Two soil borings (75SB-19-09 and -10) were conducted in a low topographic area southeast of 75VP-19-01. A review of historical aerial photographs indicated the land between 75VP-19-01 and Saratoga St., where 75SB-19-09 and -10 were conducted, was likely not reworked after the warehouse fire in support of construction activities to the east and west. The ground surface in this area is also lower in elevation than the immediately adjacent parking lots and building. During the warehouse fire, the AFFF may have accumulated in this low area. The soil borings were completed in May 2019.

5.3.3 Monitoring Well, Piezometer Installation and Vertical Profiling with Sonic

In accordance with the cover letter to the Army Responses to EPA and MassDEP Comments, *Area 1 Field Sampling Plan – Monitoring Well Plan Addendum Remedial Investigation Work Plan for PFAS* (KGS, 2019d), select drilling activities were conducted at AOC 75. Specific activities included installation of piezometers 75VP-19-01 through -04 and 75PZ-20-01 through -07; drilling and well installation at locations 75MW-19-01, -02, and -04. Based on vertical profiling results and lithology observed during drilling of 75MW-19-02, an additional overburden well (75MW-19-02C) was installed at this location. These activities were conducted in December 2019 through February 2020.

Newly installed monitoring wells 75MW-19-01BR, 75MW-19-02A, B, C, BR, and 75MW-19-04A, B were sampled in March 2020.

5.3.4 Synoptic Water Level Event

An Area 1 synoptic water level monitoring event, that encompassed all of the AOC 75 piezometers and monitoring wells, was conducted on March 12, 2020.

5.3.5 Surface Water and Sediment Sampling

Two surface water and sediment samples were collected in Cold Spring Brook (CSB-20-02 and -03) where the AOC 75 PFAS impacted groundwater discharges to the brook. The samples were collected in accordance with the *Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS) Area 1 Field Sampling Plan Addendum No. 2*. (KGS, 2020b). The samples were collected in April 2020.

5.4 Nature and Extent

Groundwater results are presented on Figure 5-5 and in and in cross section (Figures 5-4 through 5-9). Soil sampling results are summarized on Figure 5-10. Surface water and sediment sampling results are summarized on Figure 3-18. Area and sitewide groundwater contours are presented on Figures 2-5 and 2-7. All of the results are presented in Appendix H. The discussions below are focused on results with respect to the media specific criteria (Table 1-1).

5.4.1 Groundwater in Overburden

Groundwater in the overburden at AOC 75 was characterized through three groundwater samples collected during the SI (BERS-Weston, 2018b), and during the RI via DPT vertical profiles, sonic vertical profiles, and samples from new monitoring wells. During the RI, vertical profile samples were collected from 24 locations. A total of 194 vertical profile samples were collected. Table 5-2 provides summary statistics of the results of the vertical profile samples. Of those samples, 33 samples (17%) had concentrations greater than the EPA LHA and 119 samples (61%) had concentrations greater than the GW-1 standard. Five monitoring wells were installed and sampled in the overburden. Table 5-3 provides summary statistics of the results of the monitoring well samples. Of the five monitoring wells installed and sampled in the overburden, three samples had concentrations greater than the EPA LHA and four samples had concentrations greater than the GW-1 standard. None of the concentrations were greater than the GW-3 standard (protective of surface water).

The extent of the AOC 75 PFAS contamination defined by PFAS concentrations greater than the EPA LHA are present along the same flow path, extending from the far western locations 75VP-19-04 and -06, to the site of the warehouse fire and downgradient toward 75VP-18-11 at Barnum Road and toward Cold Spring Brook. Groundwater is flowing west to east toward Cold Spring Brook. The maximum concentrations were detected at 75VP-18-07 (PFOA + PFOS = 1,400 ng/L, 62-66 ft bgs) and 75VP-19-01 at 27-31 ft bgs (2,050 ng/L, for the sum of the six GW-1 compounds). The high PFAS concentrations at 75VP-19-01 and shallow depth, combined with the proximity to the former warehouse fire, suggest that 75VP-19-01 is within the source area caused by AFFF used to extinguish the warehouse fire. The presence of PFAS upgradient of the former warehouse fire may be a result of legacy Army activities. There are numerous locations crossgradient to the north (75VP-19-18, -19-03, -18-01, -18-02, -18-05, 18-08, 18-09, 18-12, and -20-01) and to the south (75VP-19-09, -18-10, and -18-13) with PFAS concentrations less than the EPA LHA (Figure 5-5). Upgradient the extent of the PFAS defined by concentrations of the EPA LHA was defined by results at 75VP-19-07. All of the locations had at least one sample interval where PFAS concentrations were greater than the GW-1 standard.

The overburden is thin in the western portion of the site where the bedrock is shallow (75MW-19-01-BR, 26 ft bgs) and then bedrock deepens rapidly toward the east, with the maximum depth of bedrock observed at 75MW-19-02 (297 ft bgs), and then rises to the east to 95 ft bgs at 75MW-19-04. The PFAS impacted water is also thin in the western portion of the site with PFAS detected above the EPA LHA in as little as

4 (75VP-19-06) to 13 (75VP-19-04) vertical feet of the aquifer. At these same locations, PFAS was detected at concentrations greater than the GW-1 standard in all of the sample intervals, which were 22-26 to 27.8-31.8 ft bgs at 75VP-19-06 and 22-26 ft bgs to 41-40 ft bgs at 75VP-19-04.

The overburden is thicker and the PFAS plume is thicker in the area of and just downgradient of the warehouse fire at 75VP-19-01 and 75VP-18-06/75MW-19-02. At 75VP-19-01, PFAS concentrations detected greater than the EPA LHA were detected from the water table (17-21 ft bgs) to 47-51 ft bgs, at 67-72 ft bgs, and from 97-109 ft bgs. The maximum PFAS concentrations at this location were detected in the shallowest portion of the aquifer. All of the sample intervals at this location had PFAS concentrations greater than the GW-1 standard.

Just downgradient of 75VP-19-01, the PFAS plume is slightly diving in the aquifer. The downward -vertical gradients at 75MW-19-02, the deepening of PFAS concentrations greater than the EPA LHA and the GW-1 standard at 75VP-018-06 and -07 compared to 75VP-19-01, and the deepening of the high PFAS concentrations at 75VP-18-106 and -07 indicate some downward flow of the groundwater downgradient of the source area. As groundwater migrates downgradient from the general area of the warehouse fire (i.e., 75VP-19-01, 75VP-18-06 and -07), the thickness of the aquifer with PFAS concentrations greater than the EPA LHA thins. At 75VP-19-01 the overall impacted thickness of the aquifer with PFAS concentrations greater than the EPA LHA is 92 ft thick (with some lower concentrations observed in some of the middle intervals) and 54 ft at 75VP-18-06, which thins downgradient in the area of 75VP-18-03 (44 ft) and 75VP-18-04 (24 ft), and continues to thin downgradient at 75VP-18-11 (14 ft). A similar overall pattern is observed with concentrations greater than the GW-1 standard; thicker at 75VP-19-01 (17-109 ft bgs) and 75VP-18-06/75MW-19-02 (22-120 ft bgs and from 205-230 ft bgs) and thinner at Barnum Road areas, specifically at 75VP-19-11/75MW-19-04 (12-46 ft bgs) and 75VP-20-01 (13-27 ft bgs and 53-77 ft bgs).

The shallowness of the PFAS concentrations greater than the EPA LHA concentrations in the aquifer at 75VP-18-03 (203-159 ft NAVD88), -04 (190-166 ft NAVD88), and -11 (255-241 ft NAVD88) and the upward vertical gradients at 75PZ-19-01/75MW-19-04A suggest the higher PFAS concentrations in this portion of the aquifer are rising in the aquifer in response to upward vertical gradients closer to Cold Spring Brook.

5.4.2 Groundwater in Bedrock

Two wells were installed in bedrock at AOC 75. The results from both wells were below the GW-1 standard. At 75MW-19-01BR the result was 19.8 ng/L for the sum of the six GW-1 compounds. At 75MW-19-02BR the result was 2.80 ng/L for the sum of the six GW-1 compounds. The data suggest there is not a significant impact from PFAS to the groundwater in bedrock at these locations.

5.4.3 Soil

At AOC 75, three soil borings were conducted during the SI (BERS-Weston, 2018b) and ten borings were conducted during the RI. PFAS were detected at all 13 locations. The PFAS concentrations from the soil samples collected during the SI were less than the S-1/GW-1 standards. At nine of the borings conducted during the RI, PFAS concentrations were less than the S-1/GW-1 standards. PFAS was detected at concentrations above the S-1/GW-1 standards at one location (75SB-19-09) in the shallowest sample (0-0.5 ft bgs). The PFAS concentrations greater than the S-1/GW-1 standards included PFDA detected at 0.560 µg/kg, PFNA detected at 0.420 J µg/kg, PFOS detected at 2.00 µg/kg, and PFOA detected at 1.2 µg/kg. Presently low concentrations of PFAS compounds are present in the soil. During the fire, much of the AFFF may have flowed into the storm drains at the site and either discharged to the groundwater via breaks in the storm drain or directly into Cold Spring Brook.

5.4.4 Surface Water and Sediment

All of the detections in surface water and sediment in Cold Spring Brook were below the EPA SSSLs for PFAS at former Fort Devens (Table 1-1). The sampling locations and data are summarized on Figure 3-18 and the data are presented in Appendix H.

Two surface water and sediment samples (CSB-20-02 and -03) were collected where AOC 75 groundwater discharges to Cold Spring Brook (Figure 3-18, 5-4). The PFOA concentrations in the surface water ranged from 22.0 ng/L to 28.0 ng/L, the PFOS concentrations ranged from 33.0 ng/L to 41.0 ng/L, and the PFBS concentrations ranged from 3.30 ng/L to 4.30 ng/L.

PFAS compounds were detected in the surface water upstream (CSB-18-01) (Figure 7-9) of where AOC 75 is discharging suggesting there are other PFAS impacts to Cold Spring Brook upstream of AOC 75. PFAS was detected in surface water downstream (CSB-18-02) of where AOC 75 is discharging but at lower concentrations than at CSB-20-02 and -03. The data indicates there is a limited area of higher PFAS concentrations in the brook, resulting from PFAS impacted groundwater discharging to the brook, and the PFAS impacted surface water at AOC 75 mixes with other surface water inputs resulting in lower concentrations downstream.

In the sediment samples, PFAS compounds where only detected in CSB-20-02. The PFOS concentration was 4.40 µg/kg, the PFOA concentration was 1.10 µg/kg, and PFBS was not detected. PFOA was detected in sediment upstream (CSB-18-01 PFOA = 2.50 J µg/kg) and downstream (CSB-18-02 PFOA = 0.630 J µg/kg) of CSB-20-02.

6.0 GROVE POND AREA PRELIMINARY SITE CHARACTERIZATION SUMMARY

6.1 Site Description

The Grove Pond Area includes the Town of Ayer Grove Pond wellfield and areas upgradient of the wellfield. The Town of Ayer operates the wellfield on the south shore of Grove Pond as part of the town municipal water supply. There are five supply wells on the south shore of Grove Pond. The screen for Well 1 is set at 42 to 62 ft bgs, Well 2 is 42 to 62 ft bgs, Well 6 is 47 to 57 ft bgs, Well 7 is 56 to 71 ft bgs, and Well 8 is 60 to 73 ft bgs. The wells are operated as they are needed with generally two to three wells operated at a time. In 2019, the approximate flow rates for the wells were 450 gallons per minute (gpm) for Well 1, 250 gpm for Well 6, 275 gpm for Well 7, and 230 gpm for Well 8. Upgradient of the Town of Ayer property is Massachusetts Army National Guard property (outside of the former Fort Devens boundary) and the Army retains property south of the MAARNG property. Most of the area is developed. MassDevelopment retains a small portion of property in the area that is zoned Open Space/Recreational.

The MAARNG property is home to the Consolidated Support Maintenance Shop (CSMS), the Annex, and a recruiting office. The MAARNG CSMS facility functions as a motor vehicle maintenance, repair, rebuilding, and cannibalization facility.

Overall, the MAARNG property and Army property west of MAARNG property is generally flat with little change in ground surface elevation (generally 247 to 250 ft NAVD88). East of the developed portion of the MAARNG property, the land is sloped downward to Grove Pond where the shoreline is approximately 220 ft NAVD88.

6.2 Facility History and Utilities

The MAARNG property has been used primarily for vehicle maintenance and storage for its entire history. The facility currently and previously has relied on former Fort Devens fire department for support. There was reportedly a fire in a warehouse in the western portion of the facility in the early 1960's. It is unknown if AFFF was used to extinguish the fire, but due to the early date, it is unlikely. There are no other known use, storage, or disposal of AFFF at the MAARNG property.

The current and previous subsurface features are shown on Figures 4-2 and 4-3. The historic storm sewer system drained paved and unpaved areas and had numerous discharge points to Cold Spring Brook. The system was revised and there are numerous detention pond areas across the area.

6.3 Remedial Status

The Town of Ayer operates the wellfield on the south shore of Grove Pond as part of the town municipal water supply. There are five supply wells on the south shore of Grove Pond. The Town of Ayer was operating Wells 6, 7, and 8 in September 2016 and the combined flow from the wells is treated at a facility to reduce concentrations of metals. The Town of Ayer first sampled the supply wells and the combined flow after treatment in September 2016. The results indicated PFAS was present in the flow from all three wells with the highest concentrations from Well 8. The sum of the PFOS and PFOA concentrations from Well 8 exceeded the LHA. The supply wells and the combined flow after treatment were sampled on a quarterly basis since September 2016.

On February 26, 2018, the Town of Ayer discontinued use of Well 8 as a water supply well after MassDEP informed them that MassDEP was considering adopting recommendations addressing five PFAS chemicals (PFOS, PFOA, PFNA, PFHxS, and PFHpA) at a sum of 70 ng/L. Well 8 was pumped at a reduced rate of 150 to 200 gpm and the water was discharged to Grove Pond rather than contributing to the town drinking water supply. The Town of Ayer supplemented the water supply by reinitiating use of Well 1 (Town of Ayer, 2018).

The Army wrote an action memorandum to document the approval and decision to conduct a time-critical removal action (TCRA) in response to the release of PFOS and PFOA from operations associated with the

former Fort Devens (USACE, 2019). The removal action objective for the TCRA is to prevent unacceptable risk to human health posed by PFOS/PFOA in groundwater migrating or likely migrating toward public drinking water supply wells through removal of PFOS/PFOA from water pumped by the Town of Ayer Grove Pond Public Water Supply Wells. The proposed actions are:

- Eliminate the current discharge of extracted groundwater with PFOS/PFOA from Grove Pond Well 8 into Grove Pond by installing a temporary treatment system that will reduce PFOS/PFOA from the extracted water. The treated water from Grove Pond Well 8 will then be returned to the Town of Ayer Grove Pond Treatment Facility.
- Install a drinking water treatment system to address PFOS/PFOA in Grove Pond public drinking water supply wells to ensure combined PFOS/PFOA levels in drinking water are below 70 ppt.

The Well 8 temporary treatment system was installed in June 2019. The permanent upgrade to Grove Pond water treatment plant to address PFOS/PFOA is anticipated to be completed in June 2020.

6.4 PFAS Field Investigation

The Grove Pond area RI field investigation included sampling of existing monitoring wells, collection of surface water and sediment samples, groundwater vertical profiling using DPT, soil borings, installation of piezometers and monitoring wells, groundwater vertical profiling and soil borings using rotosonic drilling, sampling of new monitoring wells, and synoptic water level measurements. The work was completed in general accordance with the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b). Field activities were added as the data was received and reviewed. Sampling locations are presented on Figure 6-1 and summarized in Table 6-1. The results are discussed in Section 6.5.

6.4.1 Existing Wells

Groundwater samples were collected from existing monitoring wells in the Grove Pond area in September 2018 in accordance with the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b). One well was blocked with equipment (92-5) and one was bent (92-2); neither well could be sampled.

6.4.2 Surface Water and Sediment

Surface water and sediment samples were collected in Grove Pond in accordance with the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b) in September 2018 and Balch Pond in December 2018.

6.4.3 DPT Vertical Profiles

Numerous phases of DPT vertical profiles were conducted at the Grove Pond area. As results were received and reviewed, additional profiles were conducted to better delineate the PFAS contamination. The DPT vertical profiles are described below, are shown on Figure 6-1, and are summarized in Table 6-1.

The initial set of vertical profiles at the Grove Pond area (GPVP-18-01 through -12) were conducted from October 2018 through March 2019 as planned in the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b). The initial set of vertical profiles were located in all directions around the Grove Pond wellfield because the source of PFAS to these wells was unknown.

Of the initial set of vertical profiles, locations GPVP-18-07, -08, -09, -10, -11 were drilled in October and November 2018. Based on results from those vertical profiles and results from the existing wells it appeared the area with higher PFAS concentrations included MNG-3R and west of GPVP-18-08. Two additional transects of vertical profiles for a total of ten additional vertical profiles were conducted upgradient of the

GPVP-18-08, -09, -10, -11. Those vertical profiles (GPVP-19-01 through -10) were conducted in January 2019.

The results of some of the second set of vertical profiles, specifically GPVP-19-06, -07, -08, -09, and -10 indicated that the extent of the PFAS in groundwater greater than the EPA LHA was mostly limited to the MAARNG. The results from GPVP-19-08 were above the EPA LHA, which indicated that the extent of PFAS in groundwater at concentrations above the EPA LHA was not defined in that area. Based on those results, two additional vertical profiles (GPVP-19-11 and -12) (the third set of vertical profiles) were conducted in February 2019.

Based on discussions during the March 25, 2019 BRAC Cleanup Team meeting, three additional vertical profiles around GPVP-18-12 were proposed. These locations GPVP-19-13, -14, and -15 (fourth set of vertical profiles), were selected with regulatory agency input. The purpose of these additional vertical profiles was to better define the extent of PFAS in groundwater at locations upgradient, crossgradient and downgradient of the PFAS contamination observed at GPVP-18-12. These vertical profiles were conducted in April and May 2019.

6.4.4 DPT Soil Borings

The nine soil borings at the Grove Pond area (GPSB-19-01 through -09) were conducted in July 2019. The soil boring locations were selected based on review of the groundwater vertical profile results, review of historical documents, and review of historical aerial photography.

6.4.5 Monitoring Well, Piezometer Installation and Vertical Profiling with Sonic

In accordance with the cover letter to the Army Responses to EPA and MassDEP Comments, *Area 1 Field Sampling Plan – Monitoring Well Plan Addendum Remedial Investigation Work Plan for PFAS* dated October 8, 2019 (KGS, 2019d), select drilling activities were conducted at the Grove Pond area. Specific activities included vertical profiling at GPMW-19-01; piezometer GPPZ-19-01 was installed; and monitoring wells GPMW-19-01A and BR were installed. These activities were commenced in December 2019 and concluded in February 2020.

The newly installed monitoring wells were sampled for PFAS in March 2020.

6.4.6 Synoptic Water Level Surveys

A Grove Pond synoptic water level event was conducted on October 2, 2018 (Figure 2-2).

An AOC 74/Grove Pond area synoptic water level event was conducted on March 19, 2019 (Figure 2-3).

An Area 1 synoptic water level monitoring event, that encompassed all of the Grove Pond area piezometers and monitoring wells, was conducted on March 12, 2020 (Figure 2-5 and 2-6).

6.5 Nature and Extent

Groundwater results are presented on Figure 6-2 and in and in cross section (Figures 6-3 through 6-7). Soil sampling results are summarized on Figure 6-8. Surface water and sediment sampling results are summarized on Figure 6-9. Area and sitewide groundwater contours are presented on Figures 2-3, 2-4, 2-5 and 2-6. All of the results are presented in Appendix H. The discussions below are focused on results with respect to the media specific criteria (Table 1-1).

6.5.1 Groundwater in Overburden

Groundwater in the overburden in the Grove Pond area was characterized through sampling of existing monitoring wells, via DPT vertical profiles, sonic vertical profiles, and samples from new monitoring wells. Vertical profile samples were collected from 28 locations. A total of 208 vertical profile samples were collected. Table 6-2 provides summary statistics of the results of the vertical profile samples. Of those

samples, 41 samples (20%) had concentrations greater than the EPA LHA and 129 samples (62%) had concentrations greater than the GW-1 standard. A total of the 13 samples were collected from existing and new monitoring wells sampled in the overburden. Table 6-3 provides summary statistics of the results of the monitoring well samples. Six samples had concentrations greater than the EPA LHA and nine samples had concentrations greater than the GW-1 standard. None of the concentrations were greater than the GW-3 standard (protective of surface water).

The extent of PFAS detected at concentrations greater than the EPA LHA covers a broad area covering most of the MAARNG property. AOC 74 PFAS contamination appears to cross the MAARNG property on the east side as groundwater migrates toward Grove Pond and the Town of Ayer Grove Pond wellfield. The extent is bounded by lesser concentrations to the south (upgradient) by results from locations GPVP-19-06, -07, -11, -12, and -09, to the west (crossgradient) by results from locations GPVP-19-06 and -10), and the AOC 74 and Grove Pond area contamination is bounded on the east (crossgradient) by results from locations 74VP-19-02, GPVP-18-06, -06, -07, CSMS-11-02. The downgradient extent is undefined as the groundwater migrates toward Grove Pond and the Town of Ayer Grove Pond wellfield. PFAS was not detected at concentrations greater than the EPA LHA on the north side of Grove Pond. Most of the locations had at least one sample interval where PFAS concentrations were greater than the GW-1 standard. Lower concentrations were detected in the overburden, in the eastern portion at 74VP-19-02, CSMS-11-02, north of Grove Pond at GPVP-18-04, and at a few wells within the Town of Ayer Grove Pond wellfield (i.e., 92-1 and GF-4).

North of Grove Pond the PFAS concentrations are fairly low with the maximum concentration detected at GPVP-18-03 (31.3 ng/L, sum of the six GW-1 compounds). These data suggest the groundwater north of Grove Pond is impacted by PFAS. Groundwater flow in this area is toward Grove Pond (Gannett Fleming, Inc., 2002).

As described in Section 4.4.1, PFAS impacted water from AOC 74 is flowing north along the eastern side of the Grove Pond Area toward Grove Pond, specifically water at 74VP-18-12, GPVP-19-05, and likely GPVP-18-08. West of these locations, it appears a broad portion of the shallow to mid-portion of the aquifer has been impacted by activities on the MAARNG property and legacy Army activities that may have occurred on the Army property to the south. The highest PFAS concentrations in this area were detected at GPVP-19-12 (PFOA + PFOS = 919 ng/L and 1,160 ng/L, sum of six GW-1 compounds). The distribution of PFAS in the Grove Pond Area covers a broad area and specific source areas have not been identified. The overall groundwater flow is toward Grove Pond and it appears PFAS impacted groundwater south of the Town of Ayer Grove Pond wellfield is entering the water supply wells.

In the upgradient (southern) portion, the PFAS concentrations greater than the EPA LHA were detected in the shallowest one or two sample intervals (GPVP-19-08, -01, -02, -03, and -04) with lesser concentration deeper in the aquifer, suggesting a local source. A similar pattern was observed with PFAS concentrations compared to the GW-1 standard; the higher concentrations were detected in the shallower sample intervals. Except at GPVP-19-07, the deepest sample intervals had PFAS concentrations less than the GW-1 standard with some intervals non-detect for the six compounds in the GW-1 standard.

The area closest to Grove Pond had the greatest variability in PFAS concentrations in groundwater. A larger portion of the aquifer had PFAS concentrations greater than the EPA LHA, the highest concentrations were not always detected at the water table, and the highest PFAS concentrations were detected in this area. In this western area around GPVP-18-12 and GPVP-19-15, PFAS was detected at concentrations greater than the EPA LHA throughout most of the aquifer. The lowest concentrations (below the EPA LHA) were still detected in the deepest sample intervals.

East of this area at GPVP-18-11, PFAS was only detected at concentrations greater than the EPA LHA (shallowest sample interval) and GW-1 standard (in the shallowest two sample intervals) with the eight deepest sample intervals (82 feet thick) with very low PFAS concentrations (below 10.2 ng/L, sum of the six GW-1 compounds) or non-detect.

East of GPVP-19-11 a slightly different pattern of PFAS in the groundwater is observed at GPVP-18-09 and -10. The highest PFAS concentrations and the concentrations greater than the EPA LHA are detected in the shallower portion of the aquifer (top 50 feet) but the maximum concentrations are not at the water table. Concentrations decrease with depth, but more intervals have PFAS concentrations greater than the GW-1 standard. At GPVP-19-09, there was a deep sample with PFOA+PFOS = 70.0 ng/L (178 ng/L, sum of the six GW-1 compounds) at 142-146 ft bgs and similar, deep detections at GPVP-18-10 (PFOA + PFOS = 56.7 ng/L and 150 ng/L, sum of the six GW-1 compounds) at 131-135 ft bgs. Both of these samples appear to have been collected from a portion of the aquifer that had more clay and the PFAS might have absorbed to the clay or the PFAS in groundwater might not be moving as fast as in the surrounding higher conductivity units. But a deeper sample, just above bedrock from GPMW-19-01 (146-151 ft bgs) was non-detect for PFOA and PFOS and the six compounds in the GW-1 standard.

6.5.2 Groundwater in Bedrock

There are three wells installed in bedrock in the Grove Pond Area, GF-1, GF-2, and GPMW-19-01BR. The results from all three wells were below the GW-1 standard. At GF-1 the result was 7.58 ng/L for the sum of the six GW-1 compounds. At GF-2 the result was 4.10 ng/L for the sum of the six GW-1 compounds. At GPMW-19-01BR the result was 0.620 ng/L for the sum of the six GW-1 compounds. The data suggest there is not a significant impact from PFAS to the groundwater in bedrock at these locations.

6.5.3 Soil

At the Grove Pond Area, nine soil borings were advanced to a maximum depth of 38 ft bgs. PFAS were detected at all nine locations sampled. Five of the locations (GPSB-19-01, -02, -05, -07, and -08) had one or more sample intervals with detections of PFAS compounds greater than the S-1/GW-1 standards (Figure 6-8, Appendix H). Four of the locations (GPSB-19-03, -04, -06, and -09) had concentrations of PFAS compounds lower than the S-1/GW-1 standards. All six PFAS compounds in the S-1/GW-1 standards were detected at concentrations above the S-1/GW-1 standards (Figure 6-8, Appendix H). Three locations (GPSB-19-01, -05, and -08) had PFAS detected at concentrations greater than the S-1/GW-1 standards in all samples collected from each location with exceedances as deep as 28 feet below grade. The maximum concentrations of the six PFAS compounds in the S-1/GW-1 standards detected in the Grove Pond area are below:

- PFDA = 32.0 µg/kg at GPSB-19-08
- PFHpA = 2.00 µg/kg at GPSB-19-05
- PFHxS = 0.390 µg/kg at GPSB-19-01
- PFNA = 3.60 µg/kg at GPSB-19-08
- PFOS = 29.0 µg/kg at GPSB-19-08
- PFOA = 15.0 µg/kg at GPSB-19-05

All of the samples with PFAS concentrations greater than the S-1/GW-1 standards were collected on MAARNG property at five different locations around the property. These data suggest there are potential sources of PFAS in the soil within the MAARNG property.

6.5.4 Surface Water and Sediment

Six locations were sampled for surface water and sediment in Balch and Grove ponds. All concentrations were below the EPA SSSLs for PFAS at former Fort Devens (Table 1-1). The PFAS concentrations were fairly consistent across the different locations in Grove Pond. PFOA concentrations in surface water ranged from 7.50 ng/L to 10.0 ng/L, and PFOS concentrations ranged from 3.30J ng/L to 4.00 ng/L. None of the PFAS compounds in the EPA SSSLs were detected in sediment samples collected from Grove Pond. The PFOA and PFOS in surface water in Balch Pond was slightly higher at 16.0 ng/L and 6.50 ng/L, respectively. Also, PFOA was detected in the sediment sample from Balch Pond (0.160J ng/L). Balch Pond

is hydraulically upgradient from Devens (not affected by conditions at Devens) and drains into Grove Pond from the north.

7.0 PATTON WATER SUPPLY WELL AREA AND AOC 40 PRELIMINARY SITE CHARACTERIZATION SUMMARY

7.1 Site Description

MassDevelopment operates the Patton water supply well as part of the Devens municipal water supply. The Patton well screen is set at 61 to 83 ft bgs and is operated at 330 gpm. The well is located just south of Patton Road, north of Mirror Lake (Figure 7-1).

AOC 40 was first identified for investigation of PFAS based on results from vertical profiling around the Patton water supply well. AOC 40 is located along the edge of Patton Road just east of Patton water supply well. AOC 40 consists of an abandoned landfill that was remediated in 2000 through the removal of debris, contaminated soil, and contaminated sediment (KGS, 2019a).

AOC 40 is part of the remediated Cold Spring Brook Pond. North of the pond is a steep wooded slope on top of which is a portion of Red Tail Golf Course (300 to 315 ft NAVD88), approximately 55 to 70 feet higher than the pond (approximately 245 ft NAVD88) (Figure 7-2). South of AOC 40 is Patton Road and further south is another steep wooded slope up to another portion of the Red Tail Golf Course (315 ft NAVD88). To the east, Cold Spring Brook Pond empties to Cold Spring Brook under Patton Road. Cold Spring Brook continues to flow to the north. West of AOC 40, the land is owned by the Red Tail Golf Course and is currently undeveloped.

Patton well is located on property owned by MassDevelopment. North of Patton Road the land is owned by the Red Tail Golf Course and is undeveloped. To the east of Patton well, the land is sloped steeply upward to portions of the Red Tail Golf Course. To the south and west of Patton well, the land is owned by MassDevelopment, it is undeveloped, and there are steep hills between the well and Mirror Lake to the south. All of the land around Patton well and AOC 40 is zoned as Open Space/Recreational.

7.2 Facility History and Utilities

AOC 40 consists of an abandoned landfill that was remediated in 2000 through the removal of debris, contaminated soil, and contaminated sediment (KGS, 2019a). The impacted area was approximately four acres and was used for the disposal of construction debris (masonry, asphalt, wire, and metal), ash, stumps, and logs (KGS, 2019a). AOC 40 was estimated to contain 110,000 cubic yards of debris. Portions of the landfill area were situated in a wetland and were subsequently submerged under Cold Spring Brook Pond. The abandoned landfill was discovered in November 1987, when drums were uncovered along Cold Spring Brook. An identification number on the drums indicated that the original contents had been antifreeze manufactured by Union Carbide and that they were 15 to 20 years old. Apparently, the drums had been painted yellow and reused. In March 1988, the drums were examined by a response team from Union Carbide, New Hampshire (E&E, 1993). A RI was completed in 1993 (E&E, 1993).

A ROD was issued in July 1999 (HLA, 1999). The selected remedial alternative (Alternative 4c) required full excavation of AOC 40, with on-site consolidation or off-site disposal options. In a separate evaluation after the ROD was issued, an evaluation of on-site versus off-site disposal options was conducted and disposal of the remedial debris in an on-site landfill to be built at the former golf course driving range on Patton Road was chosen (S&W, 2000). Excavation activities at AOC 40 began in November 2000 and were completed in September 2002. A total of 148,450 cubic yards of debris was removed from AOC 40 and disposed of at the Devens Consolidation Landfill, which was constructed to accommodate excavated material from numerous removal areas within Devens.

The current and previous subsurface features in the area are shown on Figures 7-2 and 7-3.

7.3 Remedial Status

MassDevelopment first sampled the Patton well for PFAS in July 2016. The well was taken out of service in August 2019 after MassDEP informed MassDevelopment that MassDEP is proposing a standard for

drinking water addressing six PFAS (PFOS, PFOA, PFNA, PFHxS, PFHpA, and PFDA) at a sum of 20 ng/L.

MassDevelopment installed temporary treatment for PFAS at the Patton well and brought the well back into service in March 2020. MassDevelopment is planning a permanent treatment system of granular activated carbon (GAC) followed by ion exchange that would treat water from Patton and Shabokin wells. MassDevelopment is also planning permanent treatment for iron and manganese using green sand filters. The permanent treatment plant for Patton and Shabokin water supply wells is planned to be online in early 2022.

At AOC 40, the remedial excavation activities at AOC 40 began in November 2000 and were completed in September 2002.

7.4 PFAS Field Investigation

The RI field investigation at Patton well area/AOC 40 included DPT groundwater vertical profiling, piezometer installation, soil borings using DPT, collecting surface water and sediment samples in Cold Spring Brook Pond and Cold Spring Brook, and synoptic water level measurements. The methods used to complete the work are detailed in the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b). Field activities were added as the data was received and reviewed. Sampling locations are presented on Figure 7-4 and summarized in Table 7-1. The results are discussed in Section 7.5.

7.4.1 DPT Vertical Profiles

Numerous phases of DPT vertical profiles were conducted at the Patton Well area/AOC 40. As results were received and reviewed, additional profiles were conducted to better delineate the PFAS contamination. The DPT vertical profiles are described below, are shown on Figure 7-4, and are summarized in Table 7-1.

An initial series of eight vertical profiles (PWVP-19-01 through -08) was conducted in May and June 2019. The vertical profiles were sited based on review of historical aerial photography and were located west, north, and east of the Patton well. The locations were chosen focusing on groundwater coming to Patton well from areas of previous Army activities and locations bounding those areas.

Results from the initial series of vertical profiles indicated greater impact to groundwater from PFAS at PWVP-19-04 (607 ng/L, sum of the six GW-1 compounds) and at PWVP-19-06 (109 ng/L, sum of the six GW-1 compounds) compared to other locations. In accordance with *Final Area 2 Field Sampling Plan Area of Contamination 40 Addendum, Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances* (KGS, 2020a), six additional vertical profiles (PWVP-19-09 through -13 and PWVP-20-01) were conducted to gather additional information on the nature and extent of PFAS in groundwater around AOC 40. The vertical profiles PWVP-19-09 through -13 were conducted in October and November 2019. Vertical profile PWVP-20-01 was conducted in February 2020.

7.4.2 DPT Soil Borings

The four soil borings at AOC 40 were conducted in November 2019 and March 2020. The soil boring locations were selected based on review of the groundwater vertical profile results and review of historical documents. The borings were conducted in accordance with the *Final Area 2 Field Sampling Plan Area of Contamination 40 Addendum, addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances* (KGS, 2020a).

7.4.3 Piezometer and Staff Gauge Installation

Four staff gauges were installed (Cold Spring Brook, Cold Spring Brook Pond, Mirror Lake, pond northwest of Patton well) in accordance with the *Final Area 2 Field Sampling Plan Area of Contamination 40 Addendum, addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances* (KGS, 2020a). The staff gauges were installed in December 2019 and March 2020.

A series of piezometers (PWPZ-19-01 through -10 and PWPZ-20-01) were installed in accordance with the *Final Area 2 Field Sampling Plan Area of Contamination 40 Addendum, addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances* (KGS, 2020a). The installation effort was started in October 2019 and was complete in March 2020. During two failed attempts at installation of PWPZ-19-04, water was not encountered during installation but PWPZ-19-04 was successfully installed at a third location.

7.4.4 Synoptic Water Level Surveys

A synoptic water level event was conducted on January 2-3, 2020 (Figure 2-8). A separate Area 1 synoptic water level monitoring event, that encompassed all of the area piezometers and monitoring wells, was conducted on March 13, 2020 (Figure 2-9).

7.4.5 Surface Water and Sediment

Three surface water and sediment samples were collected in Cold Spring Brook Pond and one sample was collected in Cold Spring Brook (Figure 7-4, Table 7-1). The samples were collected in accordance with *Final Area 2 Field Sampling Plan Area of Contamination 40 Addendum, addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances* (KGS, 2020a). The samples were collected in March 2020. The results are discussed in Section 7.5.

7.4.6 Irrigation Well Sampling

A sample was collected from the outflow of the irrigation well. The sample was collected in April 2020. The results are discussed in Section 7.5.

7.5 Nature and Extent

Groundwater results are presented on Figure 7-5 and in and in cross section (Figures 7-6 and 7-7). Soil sampling results are summarized on Figure 7-8. Surface water and sediment sampling results are summarized on Figure 7-11. Groundwater contours are presented on Figures 2-8 and 2-9. All of the results are presented in Appendix H. The discussions below are focused on results with respect to the media specific criteria (Table 1-1).

7.5.1 Groundwater

Groundwater in the Patton well area/AOC 40 was characterized through vertical profiles. Four vertical profile locations had PFAS concentrations greater than the EPA LHA, 11 locations had PFAS concentrations greater than the GW-1 standard, and three locations had PFAS concentrations less than the GW-1 standard. A total of 84 vertical profile samples were collected. Table 7-2 provides summary statistics of the results of the vertical profile samples. Of those samples, eight samples (10%) had concentrations greater than the EPA LHA and 42 (50%) samples had concentrations greater than the GW-1 standard. None of the concentrations were greater than the GW-3 standard (protective of surface water).

The maximum concentrations were detected at PWVP-19-04 at the water table (PFOA + PFOS = 394 ng/L, sum of the six GW-1 compounds + 607 ng/L, 22-26 ft bgs). The highest concentrations were detected at PWPV-19-04 and -13 west of Cold Spring Brook Pond and at PWVP-19-06 and -11 east of Cold Spring Brook Pond. Based on the AOC 40 RI, groundwater on the west side of Cold Spring Brook Pond is flowing west toward Patton well and groundwater on the east side of Cold Spring Brook Pond is flowing to the east toward Cold Spring Brook. Locations to the north and south of the highest concentrations were less than the EPA LHA. Specifically, PWVP-19-05, -03, -09 and -10 and the irrigation well to the north of Cold Spring Brook Pond and locations PWVP-20-01, PWVP-19-07, and -12 to the south of Cold Spring Brook Pond.

The vertical portion of aquifer with PFAS concentrations greater than the EPA LHA is thickest at PWVP-19-04 with PFAS concentrations greater than the EPA LHA detected from the water table (22-26 ft bgs) to 92-96 ft bgs (although not continuously detected at concentrations above the EPA LHA) and PFAS

concentrations greater than the GW-1 standard detected in every sample interval from the water table to the end of the boring at 106 ft bgs. Downgradient of PWVP-19-04 at PWVP-19-13, the thickness of the aquifer with PFAS concentrations greater than the EPA LHA is thinner (only one sample interval 73-77 ft bgs) but PFAS was detected at concentrations above the GW-1 standard in almost every sample interval at from 43-47 ft bgs to 102-106 ft bgs. To the east of Cold Spring Brook Pond the thickness of the aquifer with higher PFAS concentrations thins at PWVP-19-06 with only sample interval with concentrations greater than the EPA LHA (37-41 ft bgs) and only 40 feet of the aquifer (7-11 ft bgs to 37-41 ft bgs) with PFAS concentrations greater than the GW-1 standard. The thinning of the portion of the aquifer with higher PFAS concentrations continues downgradient at PWVP-19-11 (only one sample interval with PFAS concentrations greater than the EPA LHA and two sample intervals with PFAS concentrations greater than the GW-1 standard).

To the west of the Patton well where groundwater is flowing to the east, PFAS was not detected at concentrations greater than the EPA LHA and was detected at concentrations above the GW-1 standard in multiple sample intervals. To the northwest at PWVP-19-01 and -08, both locations had only three sample intervals and all samples had concentrations greater than the GW-1 standard, with a maximum concentration of 82.4 ng/L (PWVP-19-08, 23-27 ft bgs). Closer to Patton well the overburden is thicker and the thickness of the aquifer with PFAS concentrations greater than the GW-1 standard varied from 14 feet at PWVP-19-05 (maximum 25.2 ng/L, sum of the six GW-1 compounds), to 34feet at PWVP-19-02 (maximum 36.2 ng/L, sum of the six GW-1 compounds), to 52 feet at PWVP-19-03 (maximum 37.9 ng/L, sum of the six GW-1 compounds).

7.5.2 Soil

At AOC 40, four soil borings were advanced to a maximum depth of 21.5 ft bgs. Three of the locations had one or more sample intervals with detections of PFAS compounds greater than the S-1/GW-1 standards (Figure 7-8, Appendix H). At PWXB-19-04, PFAS compounds were not detected at concentrations greater than the S-1/GW-1 standards. Five of the PFAS compounds with S-1/GW-1 standards were detected at concentrations above the S-1/GW-1 standards. The locations west of the debris removal area at AOC 40 had lower PFAs concentrations and only one sample had PFDA at a concentration that was greater than the S-1/GW-1 standards. The two soil borings east of the debris removal area only had one soil sample collected at each location due to the shallow water table. The maximum concentrations of the five PFAS compounds with concentrations above the S-1/GW-1 standards detected at AOC 40 are below:

- PFDA = 0.630J µg/kg at PWSB-19-03
- PFHxS = 1.70 µg/kg at PWSB-19-03
- PFNA = 0.510J µg/kg at PWSB-19-03
- PFOS = 4.30 µg/kg at PWSB-19-02
- PFOA = 1.30 µg/kg at PWSB-19-03

These data suggest there are potential sources of PFAS in the soil east of the debris removal area at AOC 40.

7.5.3 Surface Water and Sediment

All of the detections in surface water and sediment in Cold Spring Brook, Cold Spring Brook Pond, and Mirror Lake were below the EPA SSSLs for PFAS at former Fort Devens (Table 1-1). The sampling locations and data are summarized on Figure 7-9 and the data are presented in Appendix H.

Three surface water and sediment samples were collected in Cold Spring Brook Pond, one in the upper reaches of Cold Spring Brook (sampling in the lower reaches of Cold Spring Brook are discussed in Sections 3, 4, and 5), and one in Mirror Lake. The PFOA concentrations in the surface water in Cold Spring Brook Pond ranged from 57.0 ng/L to 67.0 ng/L, the PFOS concentrations ranged from 5.50 ng/L to 7.70 ng/L, and the PFBS concentrations ranged from 1.80 ng/L to 2.60 ng/L. The PFOA and PFOS

concentrations were lower in Cold Spring Brook (PFOA = 8.60 ng/L, PFOS = 2.20J ng/L), and the PFBS concentrations were higher in the brook (PFBS = 3.20 ng/L). The higher PFAS concentrations in Cold Spring Brook Pond compared to Cold Spring Brook, suggest a potential source of PFAS in the vicinity of Cold Spring Brook Pond.

The PFAS concentrations in Mirror Lake surface water were PFOA = 12.0 ng/L, PFOS = 11.0 ng/L, PFBS = 1.10J ng/L.

In the sediment samples, PFAS compounds were also detected at higher concentration in the Cold Spring Brook Pond versus the Cold Spring Brook location. The maximum PFOS concentration was 1.00J µg/kg (CP-20-01), the maximum PFOA concentration was 0.400 µg/kg (CP-20-01), and PFBS was not detected in any of the four locations.

There were no detections of PFAS in the sediment sample collected from Mirror Lake.

8.0 SHABOKIN WATER SUPPLY WELL AREA PRELIMINARY SITE CHARACTERIZATION SUMMARY

8.1 Site Description

MassDevelopment operates the Shabokin water supply well as part of the Devens municipal water supply. The well is located south of Mirror Lake (Figure 8-1). The well screen is set at 55 to 85 ft bgs and is operated at 500 gpm.

Shabokin well is located on property owned by MassDevelopment, is undeveloped, and is zoned Open Space/Recreational. The land south and west of the Shabokin well is generally flat, but the land north and east has steep hills and farther north is Mirror Lake.

8.2 Facility History and Utilities

MassDevelopment first sampled the Shabokin well for PFAS in July 2016.

The current and previous subsurface features in the area are shown on Figures 8-2 and 8-3.

8.3 Remedial Status

MassDevelopment installed a GAC treatment system at the Shabokin well to remove PFAS in September 2019. MassDevelopment is planning a permanent treatment system of GAC followed by ion exchange that would treat water from Patton and Shabokin wells. MassDevelopment is also planning permanent treatment for iron and manganese using green sand filters. The permanent treatment plant for Patton and Shabokin water supply wells is planned to be online in early 2022.

8.4 PFAS Field Investigation

The RI field investigation at Shabokin well area included DPT groundwater vertical profiling, piezometer installation, monitoring well installation, sampling of the new monitoring well, and synoptic water level measurements. The methods used to complete the work are detailed in the *Area 1 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018b) and *Area 1 Field Sampling Plan – Monitoring Well Plan Addendum Remedial Investigation Work Plan for PFAS* (KGS, 2019b). Surface water and sediment were sampled, and a staff gauge was installed at Mirror Lake and are addressed as part of the Patton well area. Field activities were added as the data was received and reviewed. Sampling locations are presented on Figure 8-4 and summarized in Table 8-1. The results are discussed in Section 8.5.

8.4.1 DPT Vertical Profiles

Two phases of DPT vertical profiles were conducted at the Shabokin well area. As results were received and reviewed, additional profiles were conducted to better delineate the PFAS contamination. The DPT vertical profiles are described below, are shown on Figure 8-4, and are summarized in Table 8-1.

An initial series of five vertical profiles (SWVP-19-01 through -05) was conducted in May and June 2019. The vertical profiles were sited based on review of historical aerial photography and were located west and east of the Shabokin well. The locations were chosen focusing on groundwater coming to the Shabokin well from areas of previous Army activities. Water was not encountered at vertical profile SWVP-19-02.

Results from the initial series of vertical profiles indicated a greater impact of PFAS in groundwater was located to the southwest of the Shabokin well at SWVP-19-04 and to the north at SWVP-19-01. Five additional vertical profiles (SWVP-19-06, SWVP-20-01 through -04) were conducted to gather additional information on the nature and extent of PFAS in groundwater west and north of the Shabokin well. Vertical profile SWVP-19-06 was conducted in October 2019 and vertical profiles SWVP-20-01 through -04 were conducted in February 2020. Water was not encountered at vertical profiles SWVP-20-01 and -02.

8.4.2 Piezometers and Monitoring Well

A series of six piezometers (SWPZ-19-01 through -04, SWPZ-20-01 and -02) were planned to be installed across the Shabokin well area. Water was not encountered when drilling SWPZ-19-02 and thus a piezometer was not installed. The installation effort was started in October 2019 and was complete in February 2020.

Based on the lack of water encountered during drilling vertical profile SWVP-20-02, subsequent drilling was conducted at this location using MacroCore to collect soils to bedrock and drive and wash drilling to advance casing. A monitoring well (SWMW-20-01A) was installed and sampled for PFAS.

8.4.3 Synoptic Water Level Survey

An Area 1 synoptic water level monitoring event, that encompassed all of the area piezometers and monitoring wells, was conducted on March 13, 2020 (Figure 2-9).

8.5 Nature and Extent

Groundwater analytical results are presented on Figure 8-5 and in cross section (Figures 8-6 through 8-8). All of the results are presented in Appendix H. The discussions below are focused on results with respect to the media specific criteria (Table 1-1).

8.5.1 Groundwater

There were no detections of PFAS in groundwater that were greater than the EPA LHA or the GW-3 standard (protective of surface water). Most of the locations where PFAS was sampled in the overburden in the Shabokin well area had PFAS concentrations greater than the GW-1 standard. The only location with concentrations less than the GW-1 standard was SWVP-19-03.

Ten vertical profiles were attempted, water was only recovered at seven of the vertical profiles. A total of 46 vertical profile samples were collected. Table 8-2 provides summary statistics of the results of the vertical profile samples. Of those samples, no samples had concentrations greater than the EPA LHA and 19 samples (41%) had concentrations greater than the GW-1 standard. One sample was collected from one new monitoring well (SWMW-20-01A); the sample did not have PFAS concentrations above the EPA LHA and did have PFAS concentrations greater than the GW-1 standard (35.4 ng/L) (Table 8-3). The maximum concentrations were detected at SWVP-20-04 (48.3 ng/L, sum of the six GW-1 compounds, 64-68 ft bgs).

To the northeast of the Shabokin well, PFAS was detected at concentrations greater than the GW-1 standard at SWVP-19-05 in the shallowest two sample intervals with approximately 80 feet of aquifer with lesser PFAS concentrations deeper in the aquifer.

To the northwest of Shabokin well, the locations farthest away from the Shabokin wells had the higher PFAS detects shallowest in the aquifer. At the farthest northwest location considered as part of the Shabokin area, SWMW-20-01A, PFAS was detected in the well set at the water table at concentrations greater than the GW-1 standard (35.3 ng/L, sum of the six GW-1 compounds, 5-15 ft bgs). The groundwater is flowing to the east toward Mirror Lake and may be a result of groundwater flowing to the southeast from AOC 43J. At SWVP-20-03, PFAS was detected at concentrations greater than the GW-1 standard in the shallowest sample interval and the deeper sample interval had lower concentrations.

Closer to the Shabokin well, locations SWVP-19-06, -19-01, -19-04 and SWVP-20-04 had PFAS at concentrations greater than the GW-1 standard in the middle and deeper portions of the aquifer with approximately 25 to 60 feet thick of aquifer with PFAS concentrations greater than the GW-1 standard. These data suggest the source of PFAS in the groundwater at these areas is a result of activities that occurred upgradient of these locations.

Based on the lack of any knowledge of historic AFFF use, storage, disposal in areas around the Shabokin well, and the broad occurrence of lower PFAS concentrations (below the EPA LHA and below 50 ng/L for

the sum of the six GW-1 compounds) around the Shabokin well a primary source of the PFAS impact to the Shabokin well has not been identified.

9.0 AOC 43J PRELIMINARY SITE CHARACTERIZATION SUMMARY

9.1 Site Description

AOC 43J is located in the northwest quadrant of the Queenstown Street and Patton Road intersection (Figure 8-1). The area is developed and currently used for parking and storage. The property is currently owned by Bristol Meyers Squibb. The area is flat, developed currently used for parking and storage. The property is zoned as Innovation & Technology Business.

9.2 Facility History and Utilities

The Army historically used AOC 43J as a gas station/motor pool and subsequently as a vehicle storage yard and maintenance facility for Fort Devens. The property at AOC 43J was transferred to MassDevelopment in 2006 as a condition of Bristol Meyers Squibb's commitment to develop facilities at Devens. USEPA and the MassDEP currently administer AOC 43J jointly (Haley and Aldrich, 2017).

AOC 43J was first identified as a possible source of contamination in 1988 (Argonne National Laboratory, 1992). The Army identified several leaking USTs which held gasoline, waste oil, and diesel. At the time of base closure in 1996, the area around AOC 43J was used as a vehicle storage yard and maintenance facility (former Buildings T-2446 and T-2479) for a Special Forces Unit of the Army. The former maintenance facility used a 1,000-gallon UST for storage of maintenance wastes. This UST was located just south of former Building T-2446 (Figure 9-1) (Haley and Aldrich, 2017).

Prior to construction of the vehicle maintenance facility, this area had been used as a gas station/motor pool (gas station J) during the 1940s and 1950s. The structures of this historical gas station consisted of a pump island and a small gasoline pump house. This gas station was reported to be a Type A station, with one 5,000-gallon UST located between the gasoline pump house and pump island. The station was used during World War II as a vehicle motor pool to support military operations. The motor pool operations were discontinued during the late 1940s or early 1950s. No records were available on the decommissioning of this motor pool or the removal of the associated UST (Haley and Aldrich, 2017).

The current and previous subsurface features for the area are shown on Figures 8-2 and 8-3.

9.3 Remedial Status

In 1991, Site Investigations were conducted at 13 SAs at Devens including historical gas stations [ABB Environmental Services, Inc (ABB), 1993a]. Based on the results of the SIs at these SAs, the Army decided to conduct SSIs at 14 of the original 32 SAs (ABB, 1996a). Upon completion of the Supplemental Data Package, it was recommended that three SAs (SA 41, 43G, and 43J) should progress to the RI and FS phase. The name designation for each of these SAs were administratively changed to AOCs (i.e., AOC 43J).

During the 1992 SI, an abandoned 5,000-gallon UST was found in the area of the historical gas station J. This UST was added to the Devens UST removal program and removed in August 1992. The former waste oil UST was also removed during May of the same year. During both UST removals, contaminated soil was removed and disposed of by the Army. Based on the data and the findings of the 1992 SI, additional investigation was recommended (ABB, 1996c).

The RI was conducted to evaluate the nature and distribution of the contamination in soil and groundwater downgradient and cross-gradient of the former waste oil and historical gas station USTs. Based on the results and interpretations of the RI and the human health risk assessment, it was recommended that a FS be performed to evaluate alternatives to reduce potential human health risks associated with potential future exposure to groundwater at the source area directly downgradient of the former UST locations.

The FS Report identified and screened response actions and potential remedial technologies that were capable of attaining the remedial action objectives (ABB, 1996b) and the preferred alternatives was presented in a proposed plan. The ROD documented the final choice of remedy as Intrinsic Bioremediation,

which included: intrinsic bioremediation [i.e., monitored natural attenuation (MNA)], intrinsic bioremediation assessment data collection and groundwater modeling, installing additional groundwater monitoring wells, long-term groundwater monitoring, annual data reports to USEPA and MassDEP, and five-year reviews (ABB, 1996d).

An Intrinsic Remediation Assessment was completed in 1999 to assess the effectiveness of the selected alternative (Intrinsic Bioremediation) at AOC 43J (S&W, 1999). The assessment concluded that intrinsic remediation was demonstrated to be an effective remedial action at AOC 43J, and no contingency action was required at that time. Future actions would consist of implementing the remaining components as specified in the ROD (including a long-term monitoring program, annual reporting, and 5-year reviews) (S&W, 1999).

In 2006, an Explanation of Significant Differences (ESD) (U.S. Department of Army, 2006) was completed following a Finding of Suitability for Early Transfer (FOSET) that addresses the changes that are necessary for the remedy to remain protective of human health and the environment. The purpose of the ESD was to allow land use controls to be implemented to allow the property to be transferred from Army to MassDevelopment. AOC 43J property was transferred from the Army to MassDevelopment in June 2006. The land use controls were detailed in a June 2006 Grant of Environmental Restriction and Easement (GERE) issued by MassDEP (MassDEP, 2006).

It was noted during a five-year review that MNA would not reach the ROD goals within the required 30-year performance period. Subsequent pilot testing of remedial-amendment injections was performed using two separate pilot tests. A sulfate injection pilot study was conducted in December 2009. The effects of the initial injection test were unclear, so an additional sulfate injection was performed in 2010 followed by the annual groundwater monitoring event. After evaluation of the 2009 and 2010 results, it was concluded that enhanced anaerobic degradation by sulfate was a slow process that showed minimal effects on residual concentrations of volatile petroleum hydrocarbons. An alternate amendment (OBC™, a proprietary sodium persulfate/calcium peroxide product manufactured by Redox Tech, LLC) was injected during 2012. Subsequent groundwater sampling conducted in 2013 and 2014 indicated that benzene, toluene, ethylbenzene, and xylene (BTEX) concentrations had generally decreased over time in most monitoring wells; however, continued monitoring was recommended (Haley and Aldrich, 2015 and 2017). Annual LTM sampling events continue to evaluate the effects of the OBC™ treatment (Haley and Aldrich, 2017).

9.4 PFAS Field Investigation

The RI field investigation at AOC 43J included sampling existing monitoring wells. The work was completed in general accordance with the *Area 2 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018c). Field activities were added as the data was received and reviewed. Sampling locations are presented on Figure 9-1 and summarized in Table 9-1. The results are discussed in Section 9.5.

9.4.1 Existing Wells

Groundwater samples were collected from existing monitoring wells at AOC 43J in December 2018 through January 2019 in accordance with the *Area 2 Field Sampling Plan Addendum to Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018c) (Table 9-1, Figure 9-1).

Groundwater samples were collected from an additional three existing monitoring in March 2020. All of the results are discussed in Section 9.5.

9.5 Nature and Extent

Groundwater results are presented on Figure 9-2 and in cross section (Figures 8-6 and 8-7). All of the results are presented in Appendix H. The discussions below are focused on results with respect to the media specific criteria (Table 1-1).

9.5.1 Groundwater

Groundwater samples were collected from 14 existing monitoring wells at AOC 43J. Table 9-2 provides summary statistics of the results of the vertical profile samples. None of the samples had PFAS concentrations greater than the EPA LHA. One monitoring well (XJM-94-07X) (7%) had PFAS concentrations (51.0 ng/L, sum of the six GW-1 compounds) greater than the GW-1 standard. The wells at AOC 43J are located in overburden and shallow bedrock. Groundwater flows from AOC 43J in an easterly direction on the eastern side of the site and in a more southeasterly direction on the southern part of the site (Haley and Aldrich, 2017). The PFAS observed in downgradient location SWMW-20-01A (35.3 ng/L, sum of the six GW-1 compounds) may be related to the PFAS observed at AOC 43J. SWMW-20-01A is associated with the Shabokin Well area and is discussed in Section 8.5.

10.0 REFERENCES

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FIGURES

SHIRLEY
GROTON

GROTON
AYER

AOC 30 - Drum Storage Area

AOC 31 - Firefighting Training Area

AOC 50 - Former Moore Army Airfield

Former
North Post

AOC 20 - WWTP Sand Infiltration Beds

AOC 21 - WWTP Sludge Beds

SHIRLEY
AYER

MacPherson Well

AOC 5 - Shepleys Hill Landfill

Grove Pond Supply Wells

Former
Main Post

AOC 32/43A - Former DRMO Yard/POL Storage Area

AYER
HARVARD

AOC 74 - Barnum Road Firefighting Exercise Site

Former
Main Post

AOC 76 - Devens Fire Station

AOC 57 - Building
3713 Fuel Oil Spill

AOC 75 - Building
T-1445 Warehouse Fire

SHIRLEY
HARVARD

AOC 43G - Former AAFES Gas Station

Former
Main Post

AOC 40 - Cold Spring Brook Landfill

AOC 43J - Former Gas Station

Patton Well

SHIRLEY
LANCASTER

Shabokin Well

South Post

N
W
E
S

Legend

- Area 1 - Grove Pond Supply Wells, AOCs 57, 74, and 75
- Area 2 - MacPherson, Patton and Shabokin Water Supply Wells, SHL, AOCs 32/43A, 40, 43G, 43J and 76
- Area 3 - AOCs 20, 21, 30, 31, and 50
- Devens Regional Enterprise Zone
- City/Town Boundary
- Former Fort Devens Boundary

Devens PFAS Remedial Investigation Areas
Devens PFAS RI - Area 1 PSCS

Former Army Installation Devens
Devens, Massachusetts

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

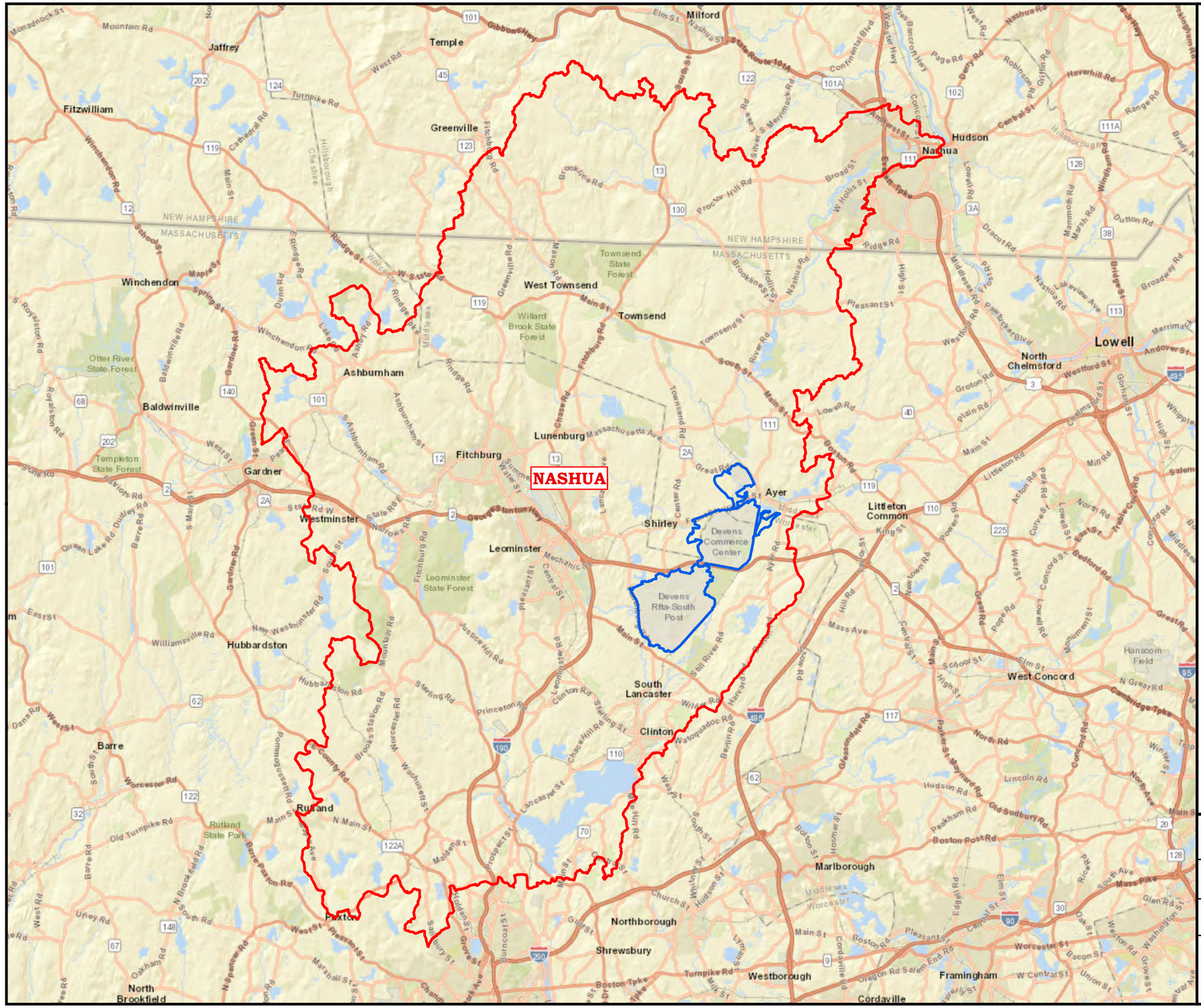
0 1,500 3,000
Feet

Date:
03/10/2020

Figure
1-1

KGS

File: PFAS2018_RI_WP_F1-2_Areas.mxd



Legend

- Watershed Boundary
- Former Fort Devens Boundary

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Nashua River Watershed
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC
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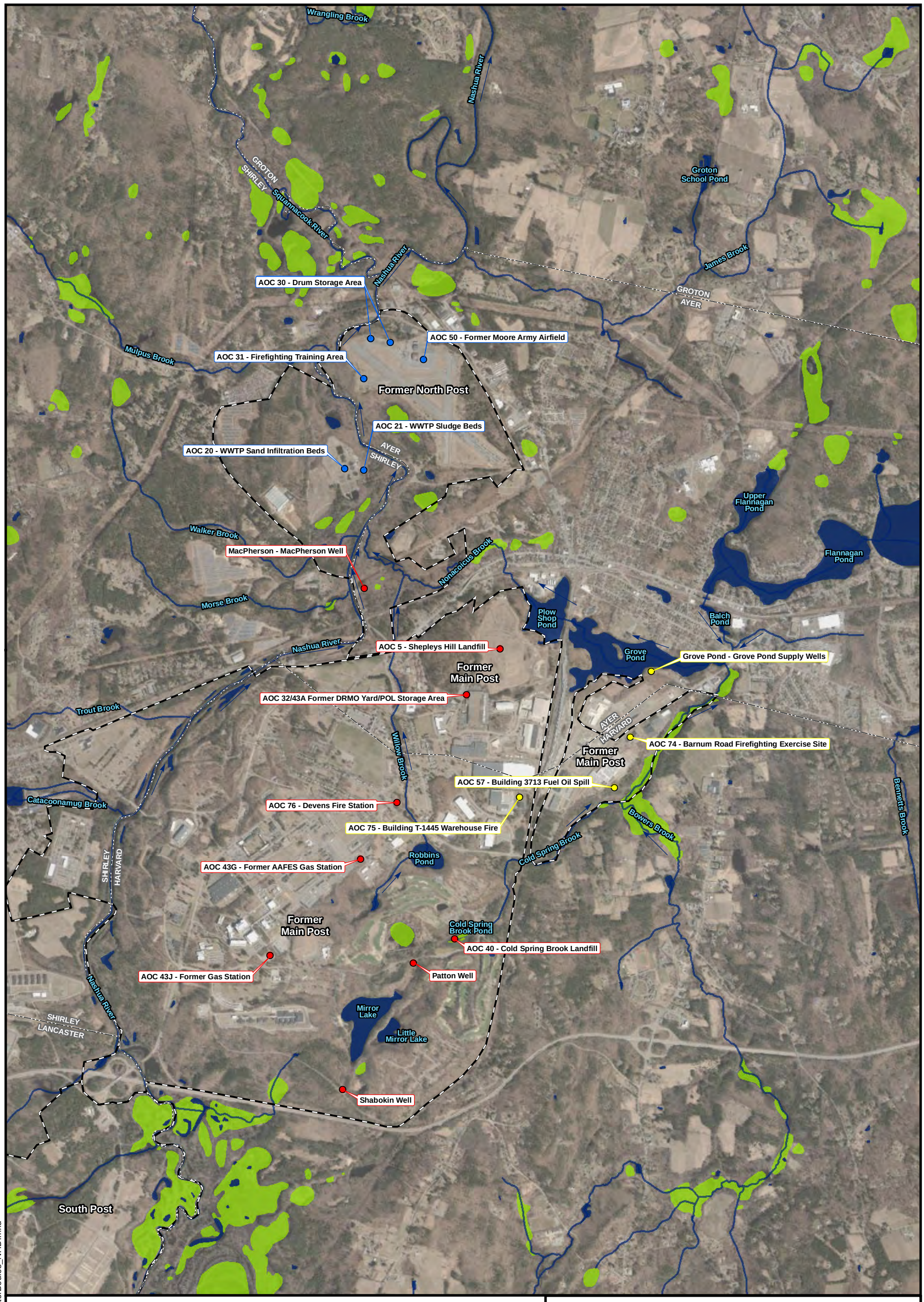
0 2 4
Miles

Date: 05/28/2020

Figure 2-1

File: PFAS_RI_A1_PSC_F_NashuaRiverBasin.mxd



Legend

- Area 1 - Grove Pond Supply Wells, AOCs 57, 74, and 75
- Area 2 - MacPherson, Patton, Shabokin Water Supply Wells, SHL, AOCs 32/43A, 40, 43G, 43J and 76
- Area 3 - AOCs 20, 21, 30, 31, and 50
- Surface Water Flow Direction
- City/Town Boundary
- Former Fort Devens Boundary

National Hydrography Dataset

- Stream/River
- Lake/Pond
- Swamp/Marsh

N W E S

0 1,250 2,500 Feet

Surface Water Bodies
Devens PFAS RI - Area 1 PSCS

Former Army Installation Devens
Devens, Massachusetts

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

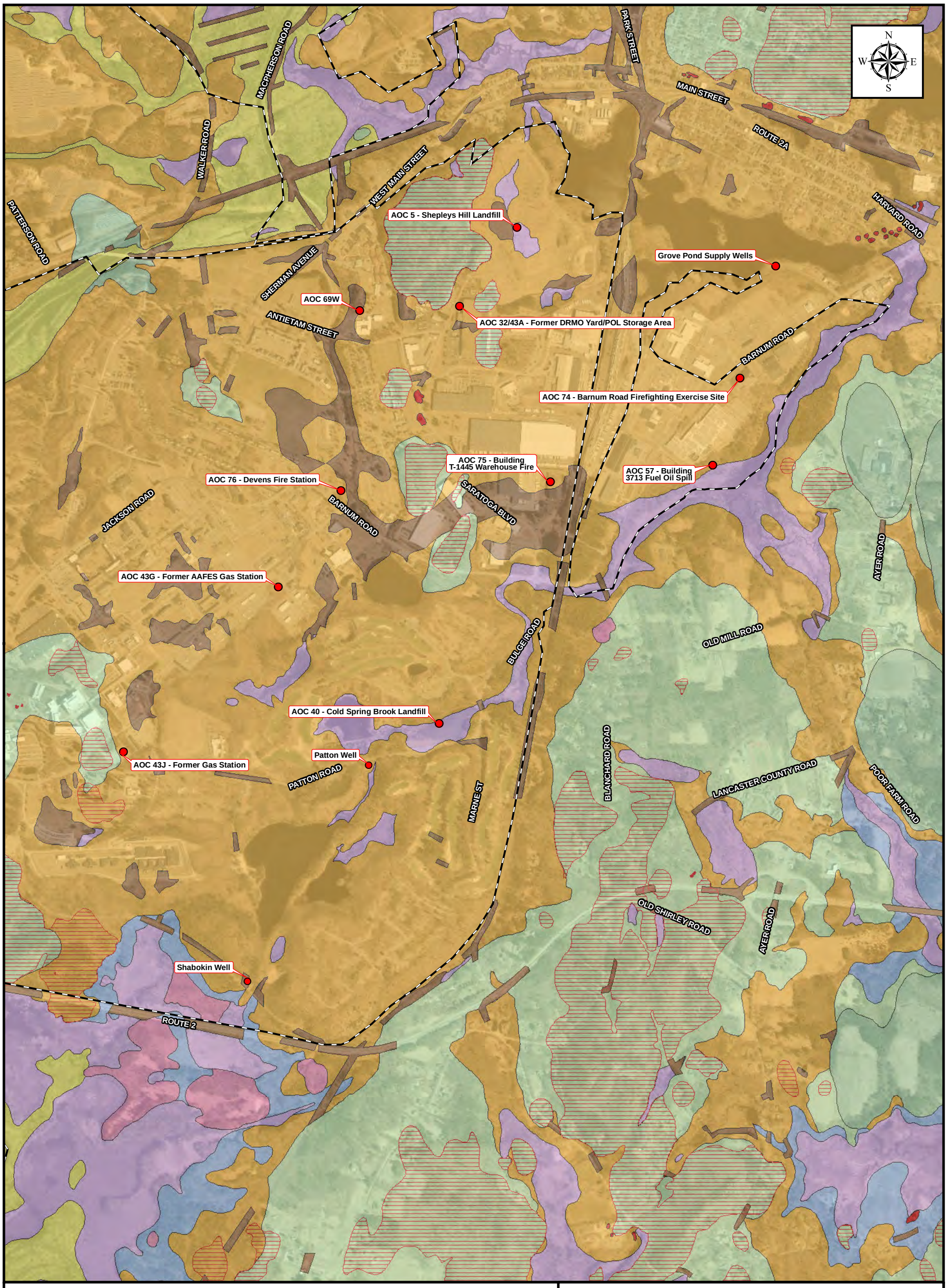
Date: 05/14/2020

Figure 2-2

KGS

File: PFAS_RI_A1_PSC_F1-2_SurfaceWaterBodies_NHD.mxd

Aerial Source: USGS, MassGIS Orthoimagery 2019



Legend

AOC Location

Former Fort Devens Boundary

Surficial Geology (1:24,000)

- Abundant Outcrop and Shallow Bedrock
- Artificial Fill
- Swamp and Marsh Deposits
- Alluvium
- Inland Dune
- Coarse
- Glaciolacustrine Fine
- Thick Till
- Bedrock Outcrop
- Thin Till

USGS Overburden Geology
Devens PFAS RI - Area 1 PSCS

Former Army Installation Devens
Devens, Massachusetts

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

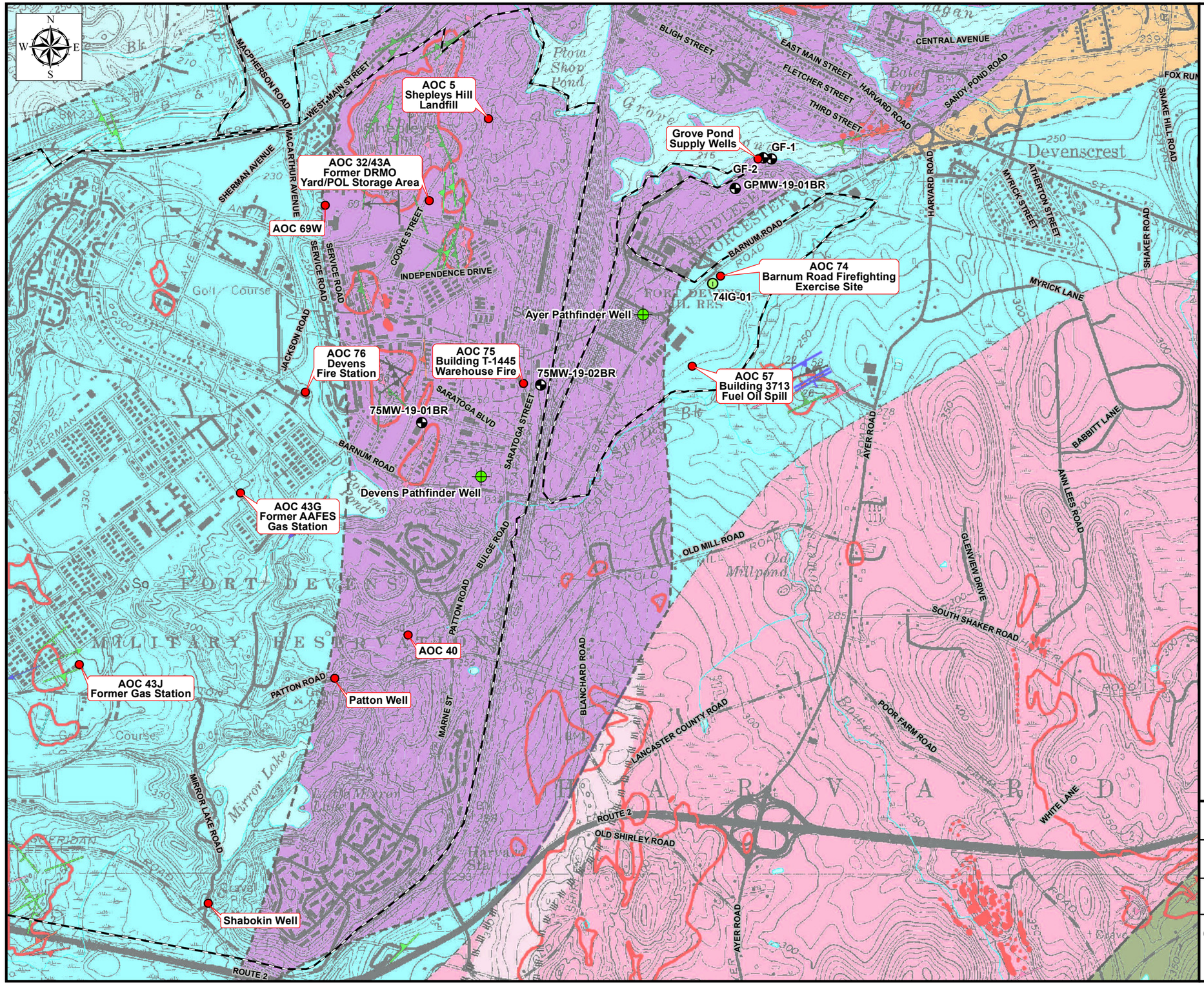
0 750 1,500
Feet

Date: 04/17/2020

Figure 2-3

File: PFAS_RI_A1_PSC_USGS_OverburdenGeol.mxd

Aerial Source: 2019, USGS, MassGIS



Legend

- AOC Location
- Shallow Bedrock Monitoring Well
- Irrigation Well (Approximate Location)
- Pathfinder Well
- Former Fort Devens Boundary

Lithologic Units

- Sb / Sbbks — Berwick Formation (Silurian)
- So — Oakdale Formation (Silurian)
- Dcgrm / Dcgr / Dcgm — Chelmsford Granite (Devonian)
- Saygj / Saygp — Ayer Granite (Silurian)
- Sdge — Devens gneiss complex (Silurian(?))
- OZtb — Tadmuck Brook schist
- Bedrock outcrop
- Area where bedrock is shallow (<3 meters below surface) and/or outcrop is extensive

Map Reference: Preliminary Fracture Characterization Map of the Ayer Quadrangle Massachusetts Hydrostructural Domain Map Sheet 1

Bedrock Geology
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

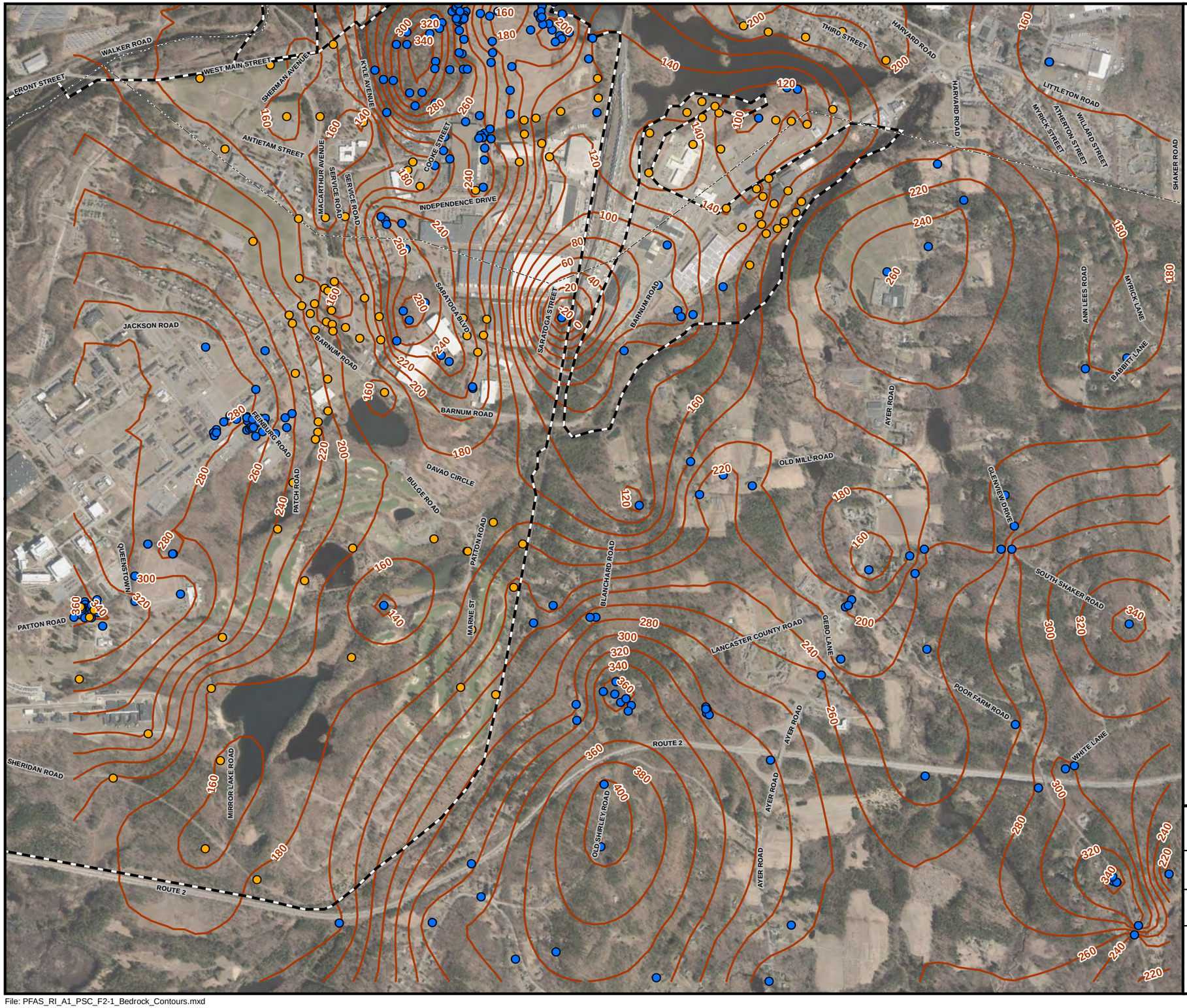
0 750 1,500
Feet

Date: 05/29/2020

Figure 2-4

KGS

File: PFAS_RI_A1_PSC_BedGeology_JPG.mxd



Legend

- Bedrock confirmed
- Refusal
- Bedrock Elevation Contour (ft NAVD88)
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Bedrock Contours
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 750 1,500
Feet

Date: 05/28/2020

Figure 2-5

File: PFAS_RI_A1_PSC_F2-1_Bedrock_Contours.mxd

Legend

- Monitoring Well
- Public Water Supply Well
- (219.21) Groundwater Elevation (Feet)
- Groundwater Contour (ft NAVD 88) (Contour Interval = 1 Foot)
- Former Fort Devens Boundary

Notes:

Well 92-2 is bent and unable to provide an accurate reading

Aerial Source: USGS, MassGIS Orthoimagery 2019

Groundwater Elevation Contours
Grove Pond Area
October 2, 2018
Devens PFAS RI - Area 1 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: 05/12/2020

Figure 2-6

KGS

File: PFAS_RI_A1_PSC_GrovePond_GWC.mxd

Legend

- Public Water Supply Well
- Monitoring Well/Piezometer
- Vertical Profiling Location
- Irrigation Well (Approximate Location)
- Groundwater Contours (March 19, 2019) Contour Elevation is in Ft NAVD88
- (214.91) Groundwater Elevation
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Groundwater Elevation Contours AOC 74/Grove Pond Area
March 19, 2019
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

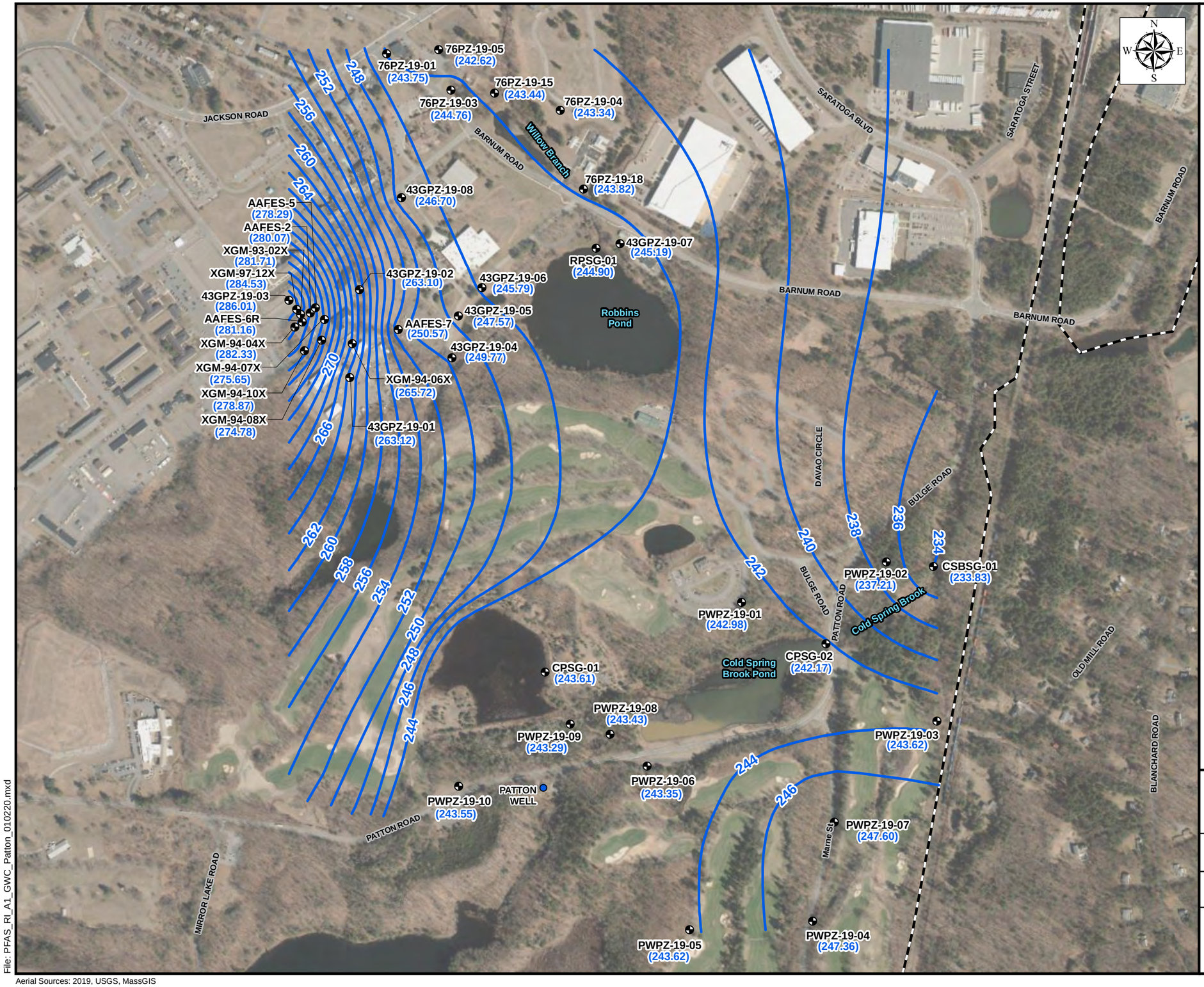
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 150 300
Feet

Date: 05/12/2020

Figure 2-7

File: PFAS_RI_A1_PSC_AOC74_GWC031919.mxd



Legend

- Public Water Supply Well
- Monitoring Well/Piezometer
- **AAFES-2** Well Identification
- Groundwater Elevation Contour (ft NAVD 88) (Contour Interval = 2 ft) January 2-3, 2020
- **(245.79)** Groundwater Elevation (ft NAVD 88)
- Former Fort Devens Boundary

Note: The Patton water supply well was not operating at the time these measurements were recorded.

Aerial Source: USGS, MassGIS Orthoimagery 2019

Groundwater Elevation Contours - Patton Well Area/AOC 40
January 2-3, 2020
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

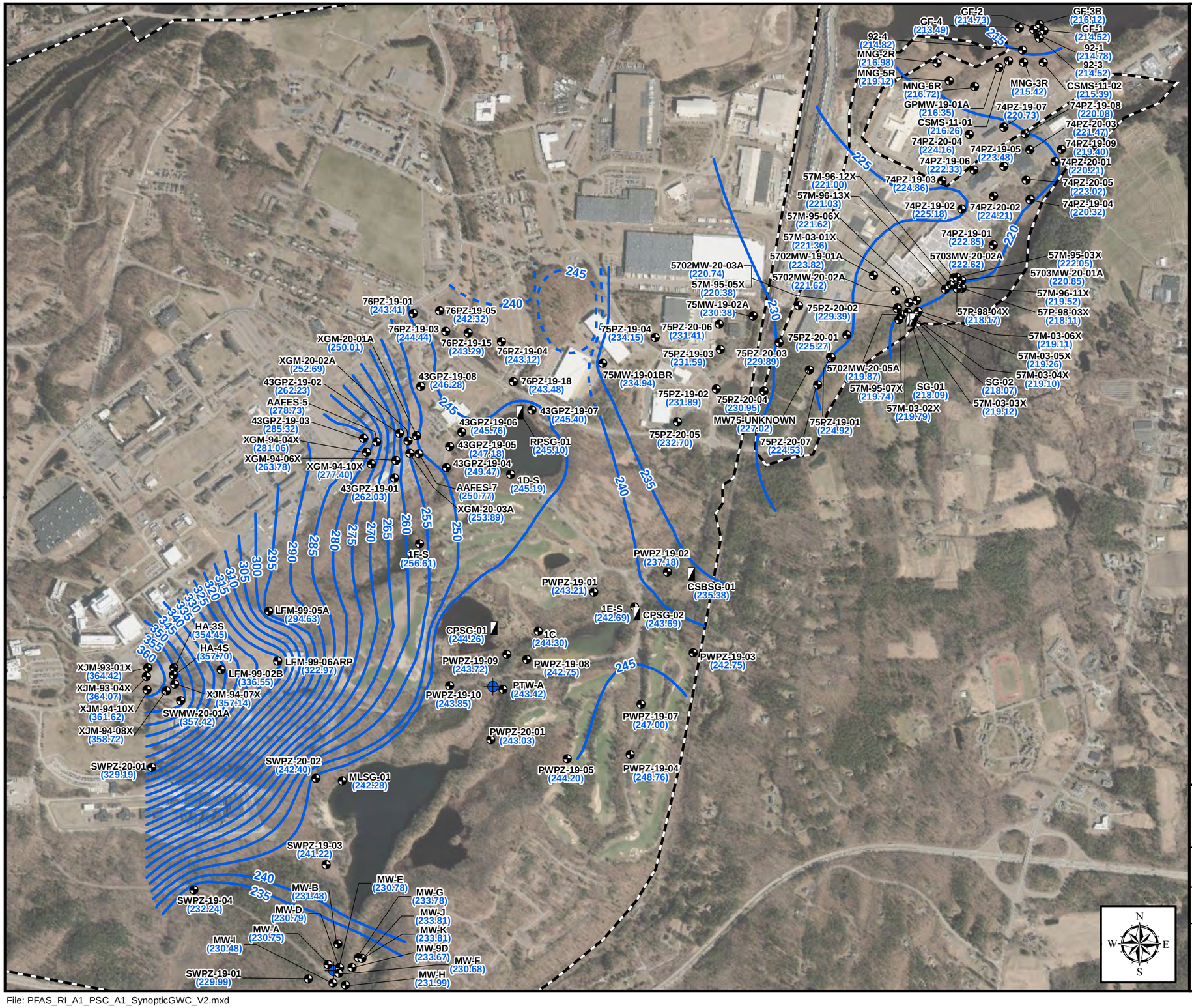
0 300 600
Feet

Date: 05/12/2020

Figure 2-8

File: PFAS_RI_A1_GWC_Patton_010220.mxd

Aerial Sources: 2019, USGS, MassGIS



Legend

- Monitoring Well/Piezometer
- Staff Gauge
- Public Water Supply Well
- Groundwater Contour (ft NAVD 88) (Contour Interval = 5 Feet)
- Inferred Groundwater Contour (ft NAVD 88) (Contour Interval = 5 Feet)
- (357.14) Groundwater Elevation (Feet)
- Former Fort Devens Boundary

Note: The Patton water supply well was operating at the time of these measurements were recorded.

Aerial Source: USGS, MassGIS Orthoimagery 2019

Groundwater Elevations Contours
March 12-13, 2020
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

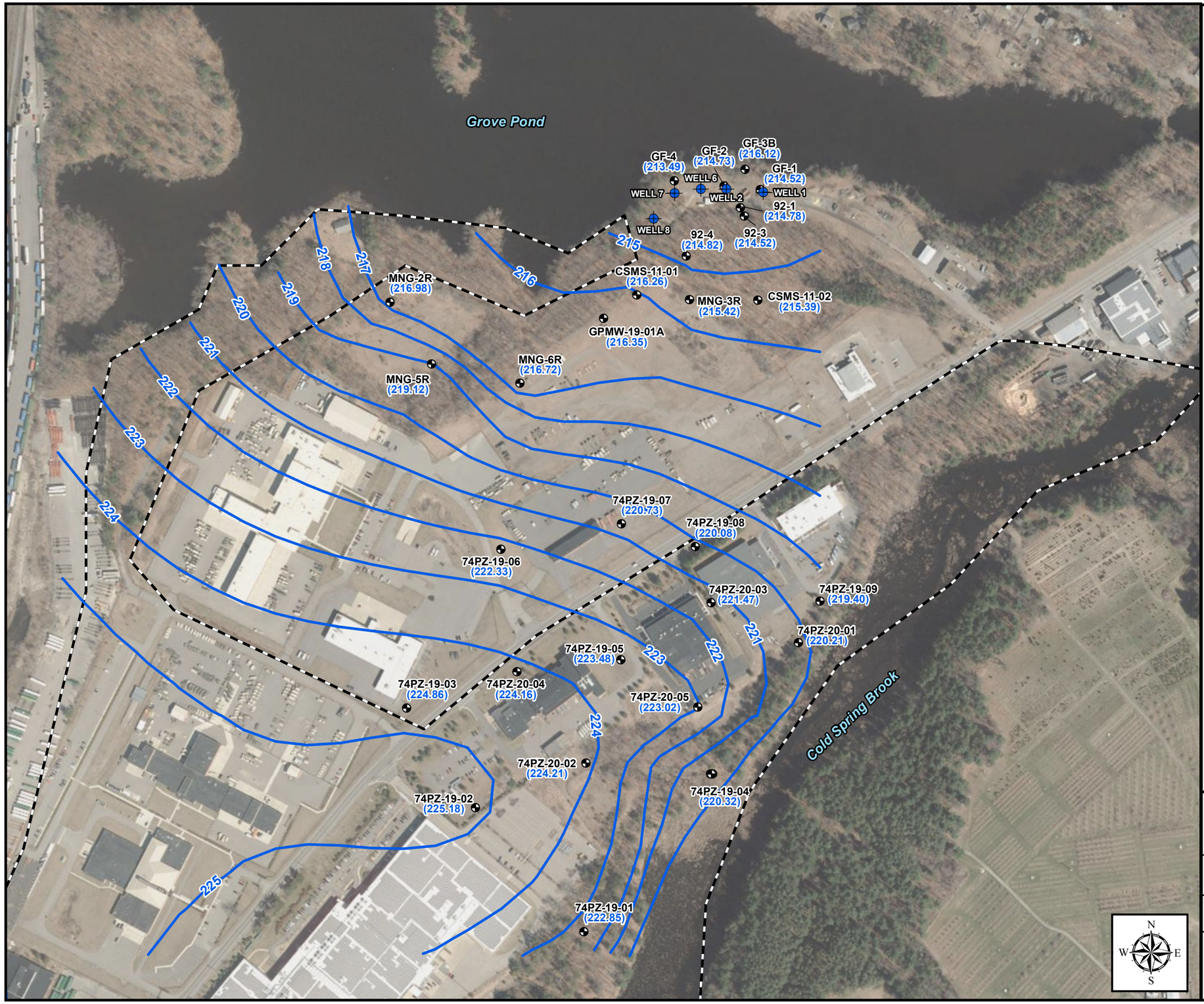
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 600 1,200
Feet

Date: 05/27/2020

Figure 2-9

File: PFAS_RI_A1_PSC_A1_SynopticGWC_V2.mxd



Legend

- Public Water Supply Well
- Monitoring Well/Piezometer
- Groundwater Contour (ft NAVD 88) (Contour Interal = 1 Foot)
- (357.14) Groundwater Elevation (Feet)
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Groundwater Elevations Contours AOC 74/Grove Pond Area
March 12-13, 2020
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 175 350
Feet

Date: 05/27/2020

Figure 2-10

File: PFAS_RI_A1_PSC_AOC74_Grove_SynopticGWC.mxd

Legend

- Monitoring Well/Piezometer
- Groundwater Contour (ft NAVD 88) (Contour Interval = 1 Foot)
- (231.41) Groundwater Elevation (Feet)
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Groundwater Elevations Contours AOC 75
March 12-13, 2020
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 150 300
Feet

Date: 05/27/2020

Figure 2-11

KGS

File: PFAS_RI_A1_PSC_AOC75_SynopticGWC.mxd

Legend

- Monitoring Well Location
- Staff Gauge
- (219.52) Shallow Groundwater Elevation (Feet)
- Shallow Groundwater Contour (ft NAVD88) (Contour Interval = 1 ft)
- Inferred Shallow Groundwater Contour (ft NAVD88) (Contour Interval = 1 ft)
- Stream
- Topographic Contour (Ft
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Shallow Water Table Elevation
Area of Contamination 57 - Area 2
March 2020
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 30 60
Feet

Date: 05/27/2020

Figure 2-12

KGS

File: PFAS_RI_A1_PSC_AOC57-2_Shallow_GWC0320.mxd

Legend

- Monitoring Well Location
- (232.84) Deep Groundwater Elevation (Feet)
- Deep Groundwater Contour (ft NAVD88) (Contour Interval = 0.5 ft)
- Inferred Deep Groundwater Contour (ft NAVD88) (Contour Interval = 0.5 ft)
- Stream
- Topographic Contour (Ft
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Deep Water Table Elevation
Area of Contamination 57 - Area 2
March 2020
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 30 60
Feet

Date: 05/27/2020

Figure 2-13

KGS

File: PFAS_RI_A1_PSC_AOC57-2_Deep_GWC0320.mxd

Legend

- Monitoring Well Location
- (219.52) Shallow Groundwater Elevation (Feet)
- Shallow Groundwater Contour (ft NAVD88) (Contour Interval = 1 ft)
- Inferred Shallow Groundwater Contour (ft NAVD88) (Contour Interval = 1 ft)
- Stream
- Topographic Contour (Ft AMSL)

Aerial Sources: UGSS, MassGIS Orthoimagery 2019

Shallow Water Table Elevation
Area of Contamination 57 - Area 3
March 2020
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 30 60
Feet

Date: 05/12/2020

Figure 2-14

File: PFAS_RI_A1_PSC_AOC57-3_Shallow_GWC0320.mxd

Legend

- Monitoring Well Location
- (232.84) Deep Groundwater Elevation (Feet)
- Deep Groundwater Contour (ft NAVD88) (Contour Interval = 0.5 ft)
- Inferred Deep Groundwater Contour (ft NAVD88) (Contour Interval = 0.5 ft)
- Stream
- Topographic Contour (Ft AMSL)
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Deep Water Table Elevation
Area of Contamination 57 - Area 3
March 2020
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

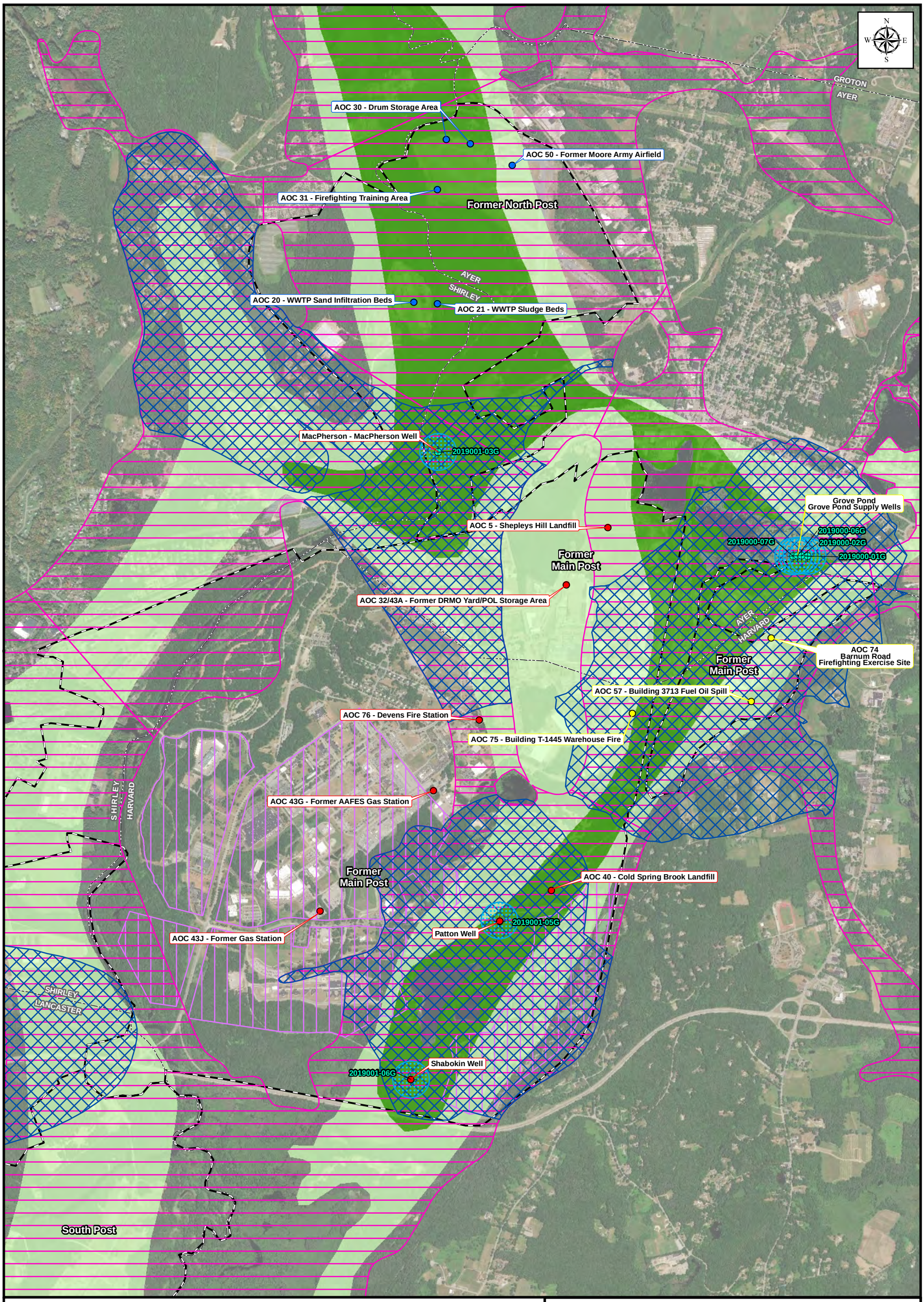
0 30 60
Feet

Date: 05/27/2020

Figure 2-15

KGS

File: PFAS_RI_A1_PSC_AOC57-3_Deep_GWC0320.mxd



Legend

- Public Water Supply Well
- Area 1 - Grove Pond Supply Wells, AOCs 57, 74, and 75
- Area 2 - MacPherson, Patton, Shabokin Water Supply Wells, SHL, AOCs 32/43A, 40, 43G, 43J and 76
- Area 3 - AOCs 20, 21, 30, 31, and 50
- City/Town Boundary
- Former Fort Devens Boundary
- MassDEP Approved Zone I
- MassDEP Approved Zone II
- Devens Watershed Protection District
- Devens Aquifer Protection District

Potentially Productive Aquifers

- High Yield
- Medium Yield

Devens Groundwater
Devens PFAS RI - Area 1 PSCS

Former Army Installation Devens
Devens, Massachusetts

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

0 1,000 2,000
Feet

Date: 05/29/2020

Figure 2-16

File: PFAS_RI_A1_PSC_F_Aquifer.mxd

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Current Road
- Stream
- Former Fort Devens Boundary

Note:

Aerial Source: MassGIS - 1:5,000 Black and White Digital Orthophoto Images - 1992

AOC 57 1992 Aerial Imagery
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC

0 100 200
Feet

Date: 05/12/2020

Figure 3-1

File: PFAS_RI_A1_PSC_2020_AOC57_1992Imagery.mxd

Legend

Historic Subsurface Features

- Communication Line
- Electric
- Electric Line
- UST — Underground Tank
- Steam
- Storm
- Storm Line
- Storm Feature
- Sanitary
- Sanitary Line
- Sanitary Feature
- Water
- Water Line
- Water Feature
- Abandoned Feature
- Abandoned Line
- Gas
- Gas Line
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 57 Area Historic Subsurface Features
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 100 200
Feet

Date: 04/26/2020

Figure 3-2

KGS

File: PFAS_RI_A1_PSC_AOC57_HistoricUtilities.mxd

Legend

Water 01/06/2020
- Hydrant
- Main Fitting
- Service Fitting
- Main Valve
- Service Valve
- Manhole
- Main Line
- Service Line
- Tie

Sewer 01/06/2020
- Force Fitting, Main Fitting, Service Fitting, Manhole
- Force Main, Gravity Main, Service Line, Tie
- DBox, Grease Trap, Lift Station, Oil/Water

Electric 01/07/2020
- Connection Box, Handhole, Junction Box, Manhole, Meter, Switch, or Transformer
- Inservice/Abandoned
- Vault

Gas 01/06/2020
- Main Fitting, Main Valve, Meter, Rectifier, Service Fitting, Service Regulator, Service Valve, Test Station, Anode
- Main, Service, Tie, Cathodic Loop

Stormwater 12/11/2019
- Catch Basin
- Outfall
- Manhole
- Pipe, Culvert
- Detention Pond
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 57 Area Current Subsurface Features
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

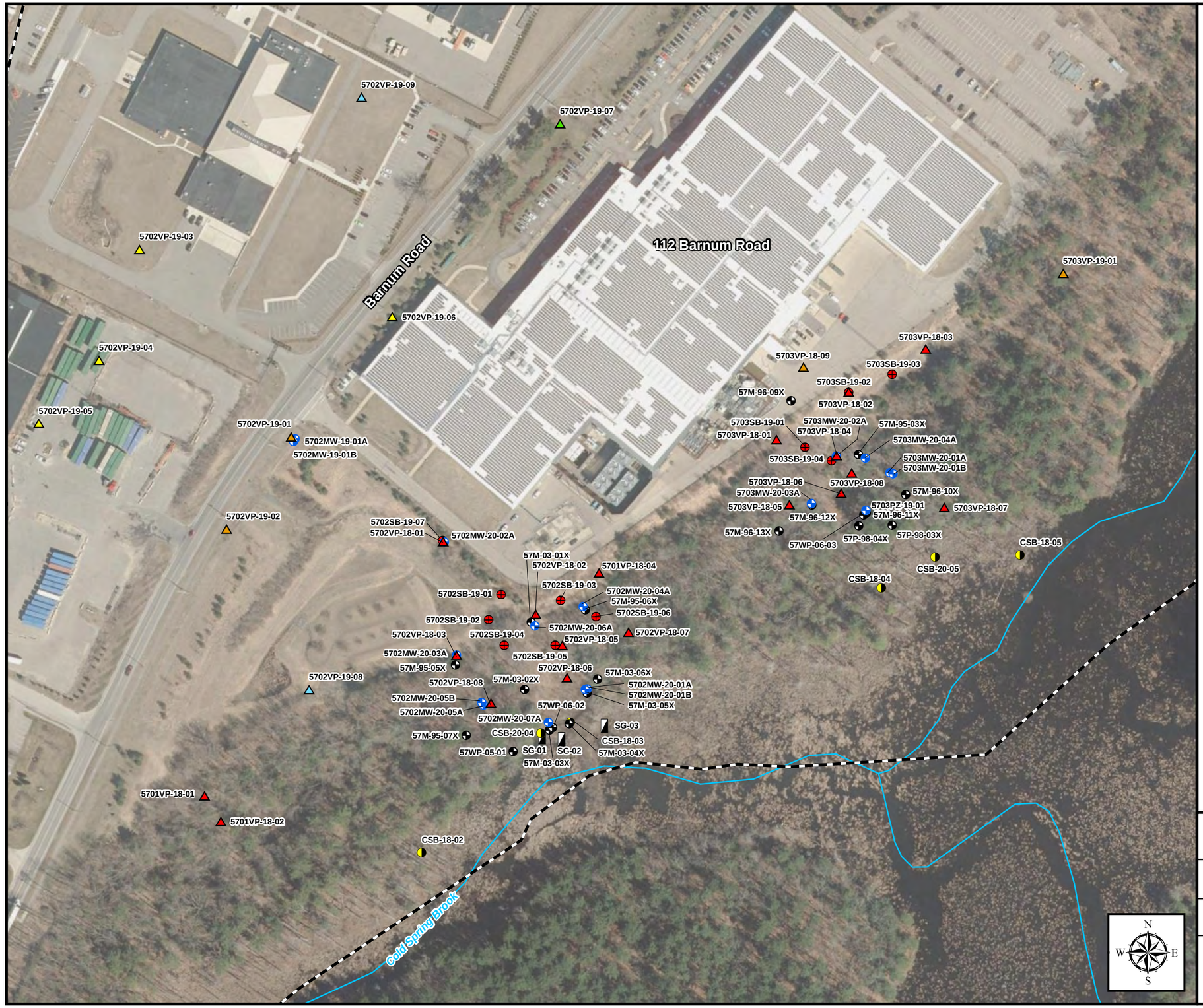
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 100 200
Feet

Date: 04/26/2020

Figure 3-3

File: PFAS_RI_A1_PSC_AOC57_SubsurfaceUtilities.mxd



Legend

- Existing Monitoring Well
- New Monitoring Well
- Surface Water/Sediment Sample
- Soil Boring Location
- Vertical Profiling Location Installation Phase 1
- Vertical Profiling Location Installation Phase 2
- Vertical Profiling Location Installation Phase 3
- Vertical Profiling Location Installation Phase 4
- Vertical Profiling Location Installation Phase 5
- Staff Gauge
- Former Fort Devens Boundary
- Stream

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 57 Field Activities
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

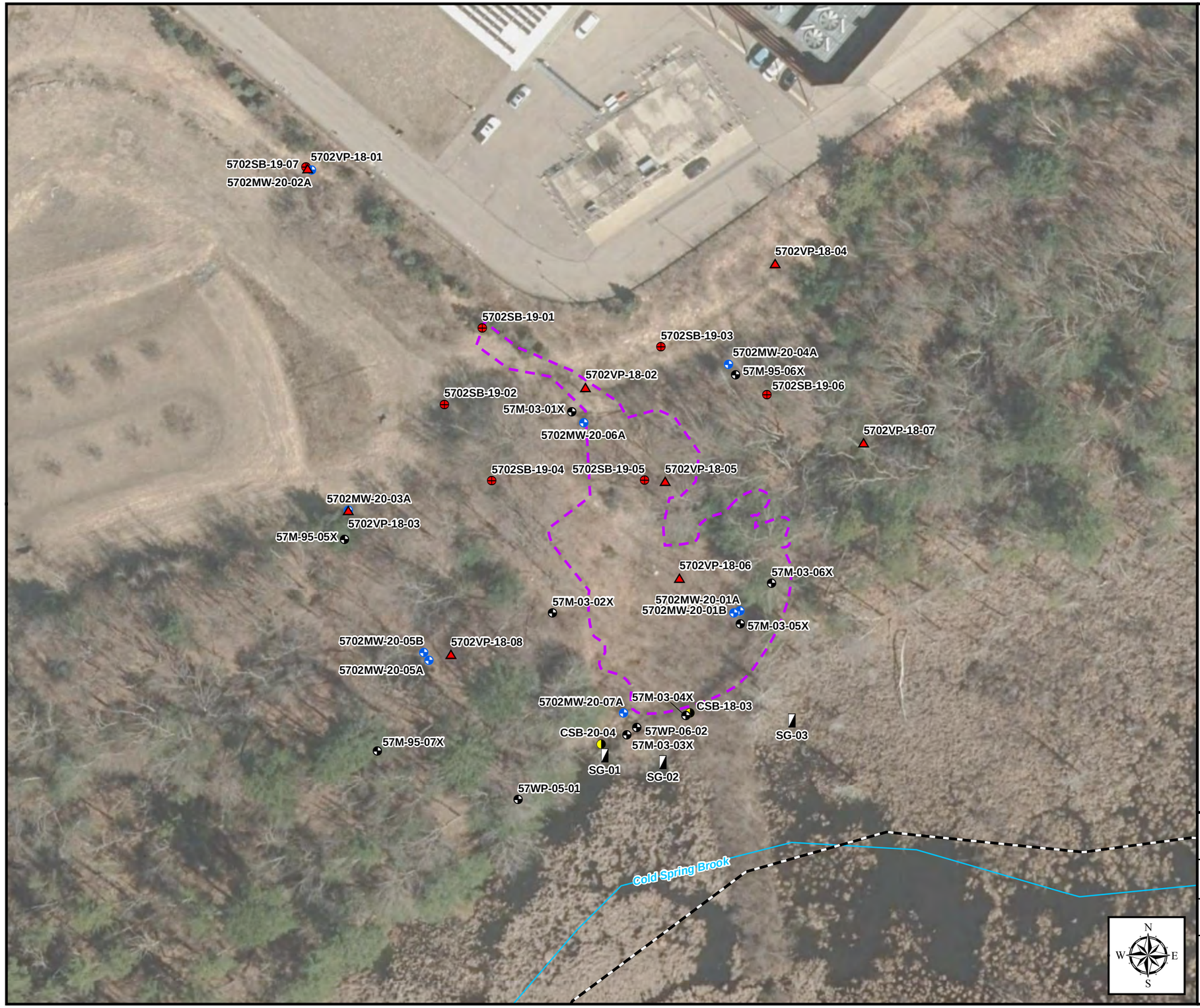
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 90 180
Feet

Date: 05/12/2020

Figure 3-4

File: PFAS_RI_A1_PSC_AOC57_FieldActivities.mxd



Legend

- Existing Monitoring Well
- New Monitoring Well
- Surface Water/Sediment Sample
- Soil Boring Location
- Vertical Profiling Location Installation Phase 1
- Staff Gauge
- Stream
- Approximate Soil Removal
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 57 Area 2 Field Activities
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

Date: 05/28/2020

Figure 3-5

File: PFAS_RI_A1_PSC_AOC57-2_FieldActivities.mxd

Legend

- Existing Monitoring Well
- New Monitoring Well
- Destroyed Monitoring Well
- Surface Water/Sediment Sample
- Soil Boring Location
- Vertical Profiling Location Installation Phase 1
- Vertical Profiling Location Installation Phase 2
- Stream
- Approximate Soil Removal Area
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 57 Area 3 Field Activities
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

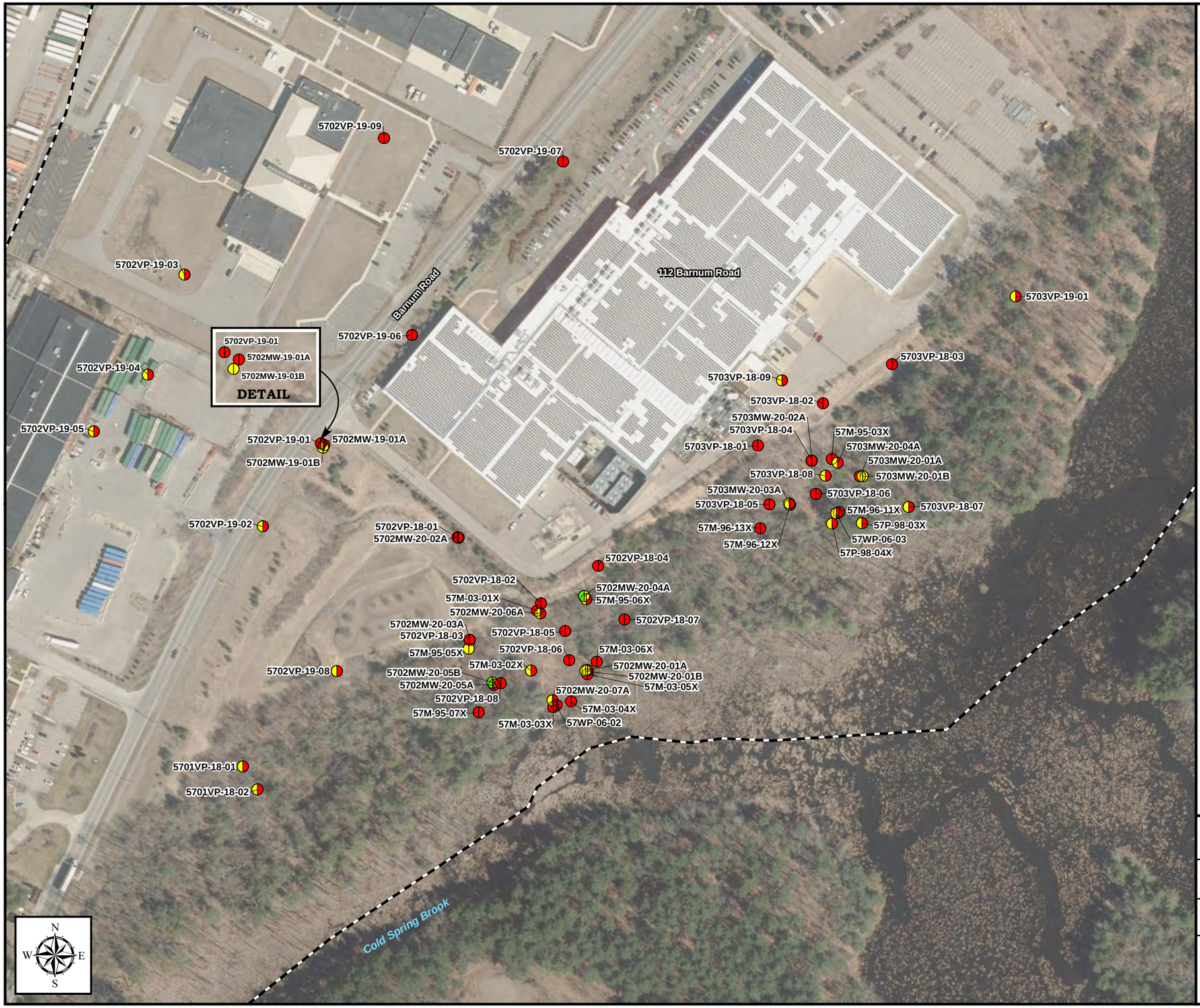
0 30 60
Feet

Date: 05/28/2020

Figure 3-6

KGS

File: PFAS_RI_A1_PSC_AOC57-3_FieldActivities.mxd



Legend

- Monitoring Well/Vertical Profiling Location

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

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

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

- MassDEP ≥ 20 ng/L
- MassDEP < 20ng/L
- 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

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 57 Groundwater Results
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

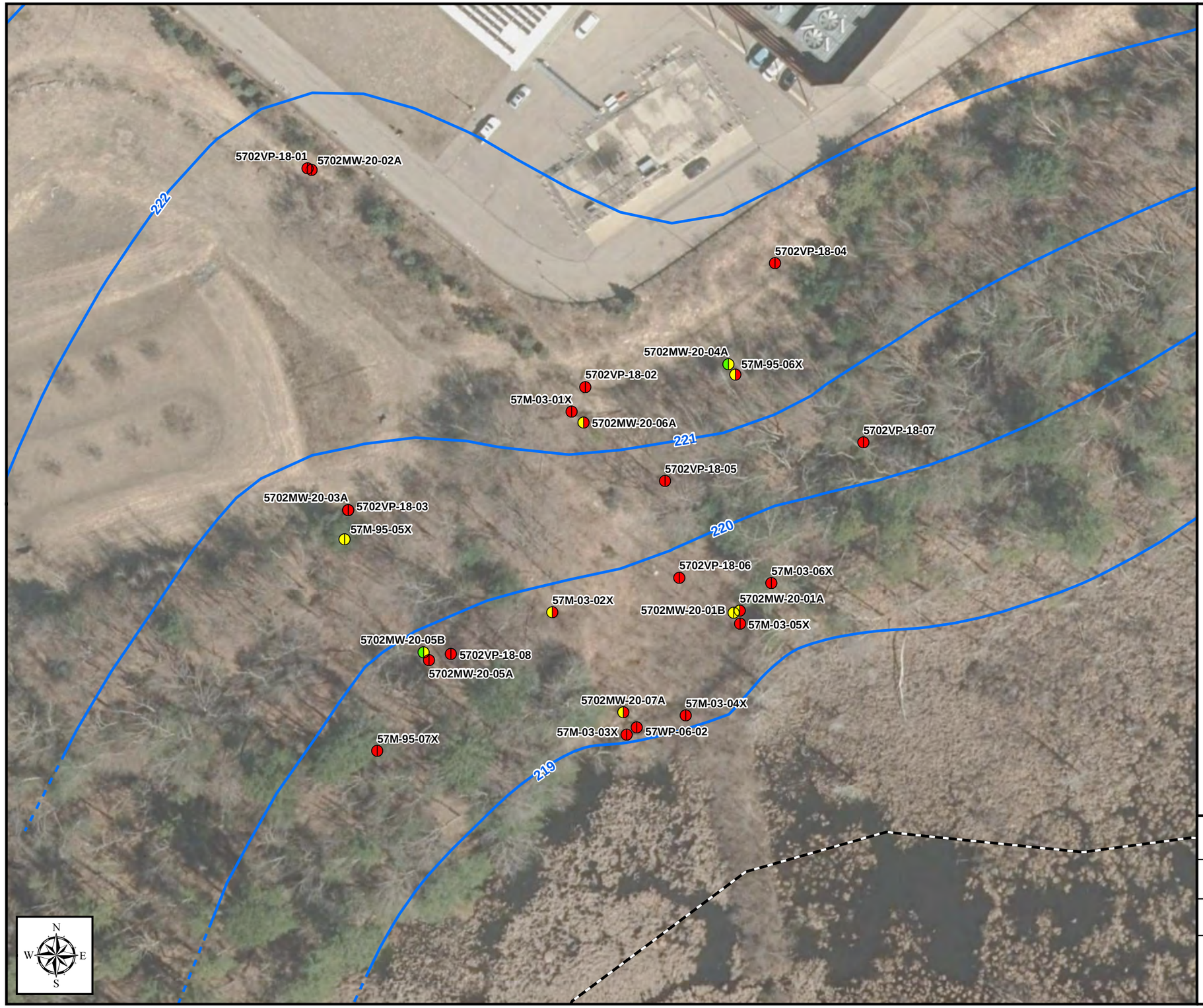
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 100 200
Feet

Date: 05/04/2020

Figure 3-7

File: PFAS_RI_A1_PSC_AOC57_GWResults.mxd



Legend

- Monitoring Well/Vertical Profiling Location

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

- EPA LHA ≥ 70 ng/L
- EPA LHA < 70 ng/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
- Shallow Groundwater Contour - March 2020 (ft NAVD88) (Contour Interval = 1 ft)
- Inferred Shallow Groundwater Contour - March 2020 (ft NAVD88) (Contour Interval = 1 ft)
- 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

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 57 Area 2 Groundwater Results
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 30 60
Feet

Date: 05/28/2020

Figure 3-8

File: PFAS_RI_A1_PSC_AOC57-2_GWResults.mxd

Legend

- Monitoring Well/Vertical Profiling Location

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

- EPA LHA ≥ 70 ng/L
- EPA LHA < 70 ng/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
- Shallow Groundwater Contour - March 2020 (ft NAVD88) (Contour Interval = 1 ft)
- Inferred Shallow Groundwater Contour - March 2020 (ft NAVD88) (Contour Interval = 1 ft)
- 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

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 57 Area 3 Groundwater Results
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

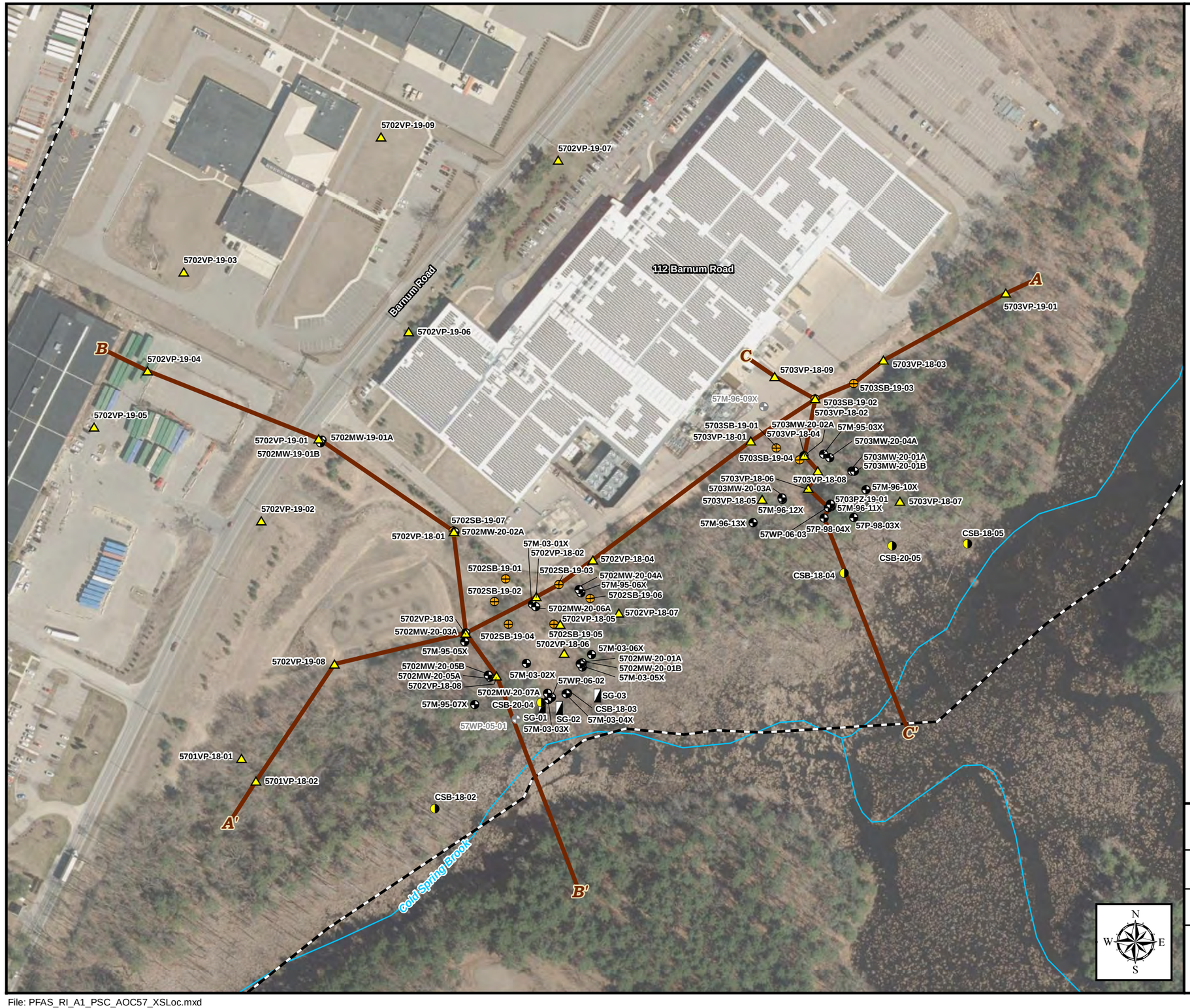
0 30 60
Feet

Date: 05/28/2020

Figure 3-9

KGS

File: PFAS_RI_A1_PSC_AOC57-3_GWResults.mxd



Legend

- Vertical Profiling Location
- Soil Boring Location
- Surface Water/Sediment Sample
- Monitoring Well
- Abandoned or Unlocated Monitoring Well
- Staff Gauge
- Cross Section Location
- Former Fort Devens Boundary
- Stream

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 57 Cross Section Location Map
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

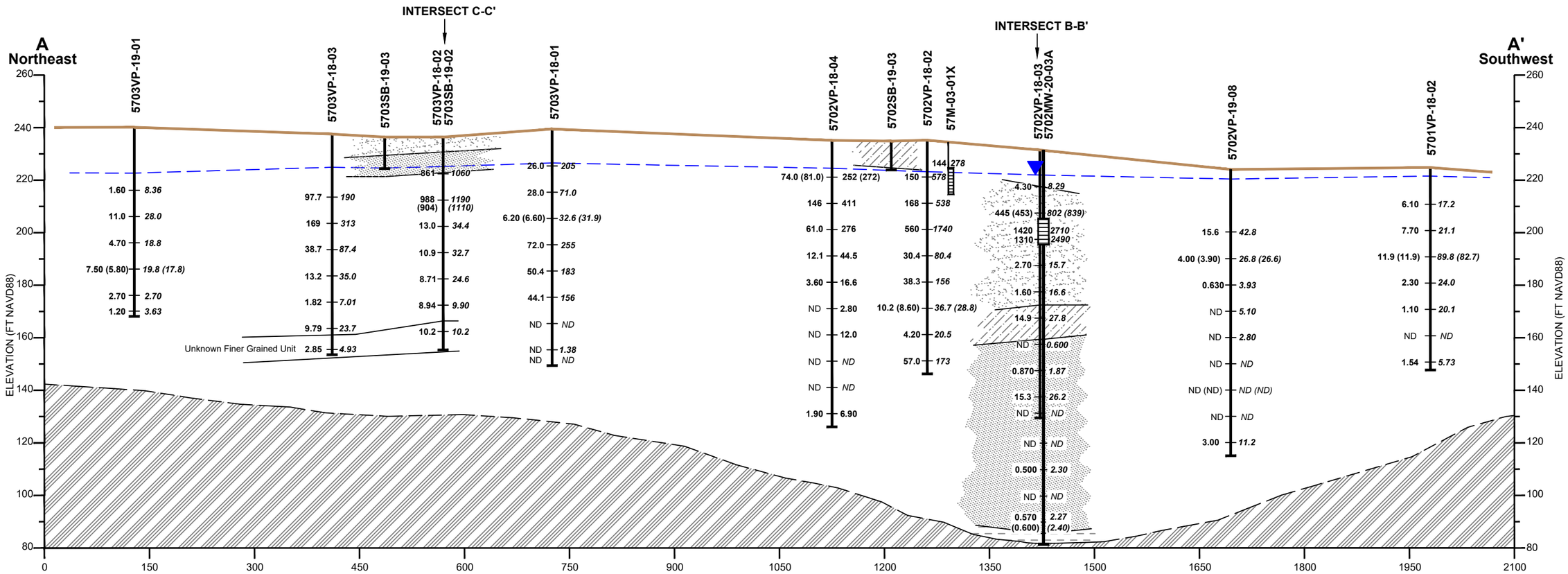
0 100 200
Feet

Date: 05/15/2020

Figure 3-10

KGS

File: PFAS_RI_A1_PSC_AOC57_XSLoc.mxd



Legend

Vertical Profile

1.39 U
EPA LHA
Concentration
(sum of PFOA
and PFOS)

2.59 U
MassDEP
Concentration
(sum of PFOS + PFOA
+ PFDA + PFHpA +
PFHxS + PFNA)

Monitoring Well

Screened
Interval

- Sand with Gravel/Sand
- Sand with Silt/Silty Sand
- Silt
- Silt, Sand, Gravel, with Clay
- Till
- Weathered Bedrock
- Bedrock
- Unknown
- Water Table

Notes:

All results in ng/L
ng/L = nanograms per liter
ND = non-detect
( ) = field duplicate

Perfluorooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorodecanoic acid (PFDA)
Perfluoroheptanoic acid (PFHpA)
Perfluorohexanesulfonic acid (PFHxS)
Perfluorononanoic acid (PFNA)

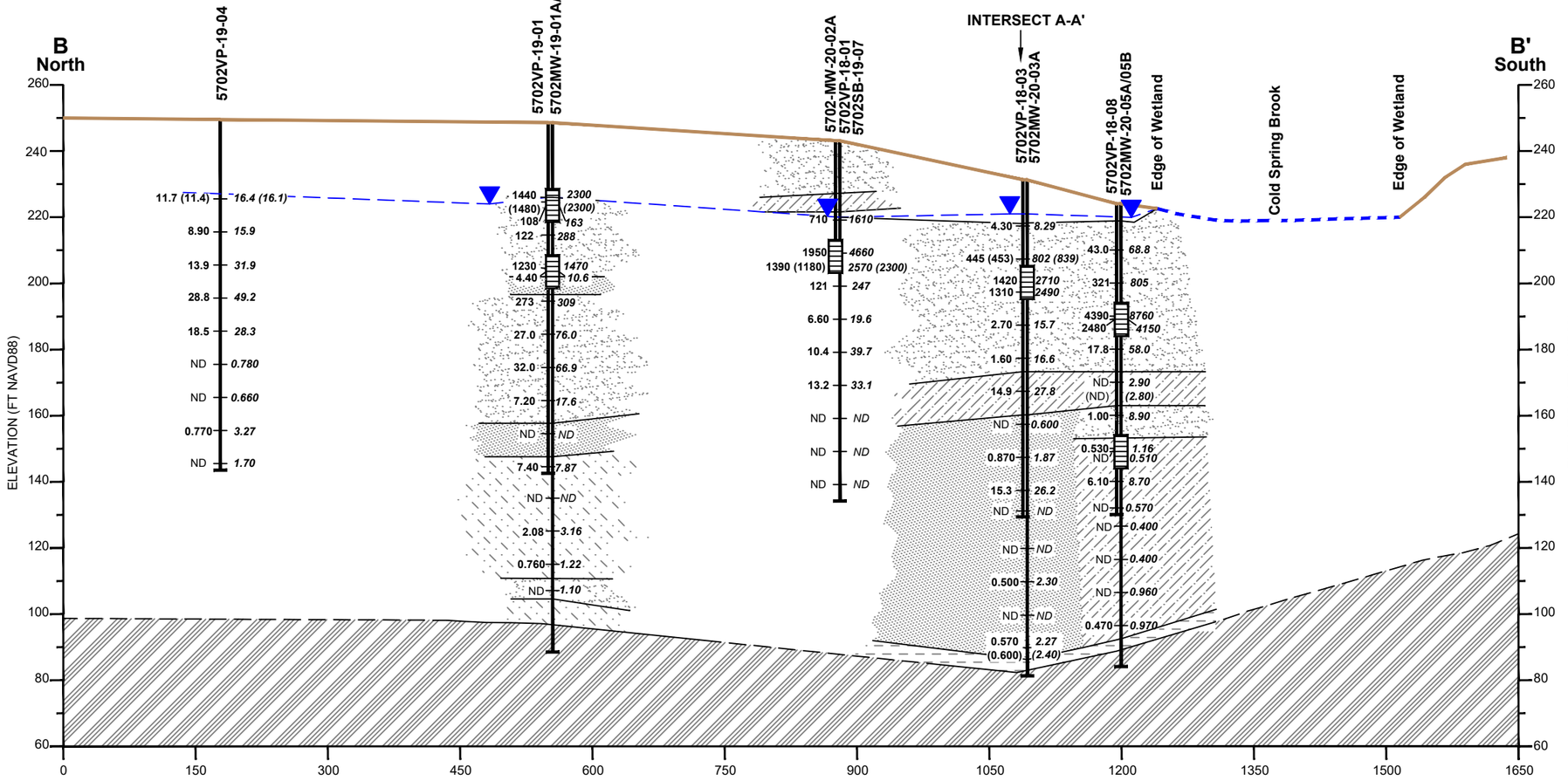
VERTICAL SCALE IN FEET: 40
HORIZONTAL SCALE IN FEET: 150

AOC 57 - Cross Section, A-A'
Devens PFAS RI - Area I PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

Scale as Shown	Date: 05/27/2020	Figure 3-11	KGS



Legend

Vertical Profile

1.39 U
EPA LHA
Concentration
(sum of PFOA
and PFOS)

2.59 U
MassDEP
Concentration
(sum of PFOS + PFOA
+ PFDA + PFHpA +
PFHxS + PFNA)

Monitoring Well

Screened
Interval

- Sand with Gravel/Sand
- Sand with Silt/Silty Sand
- Silt
- Silt, Sand, Gravel, with Clay
- Till
- Weathered Bedrock
- Bedrock
- Unknown
- Water Table

Notes:

All results in ng/L
ng/L = nanograms per liter
ND = non-detect
( ) = field duplicate

Perfluorooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorodecanoic acid (PFDA)
Perfluoroheptanoic acid (PFHpA)
Perfluorohexanesulfonic acid (PFHxS)
Perfluorononanoic acid (PFNA)

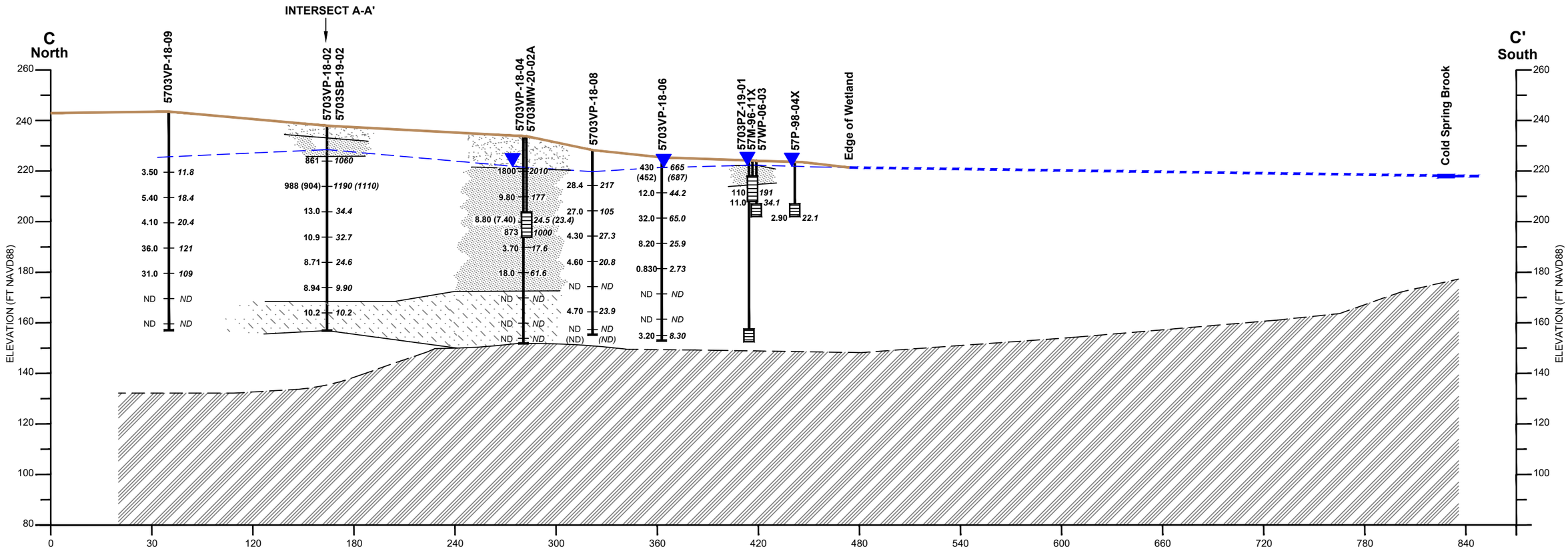
VERTICAL SCALE IN FEET: 40
HORIZONTAL SCALE IN FEET: 150

AOC 57 - Cross Section, B-B'
Devens PFAS RI - Area I PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

Scale as Shown	Date: 05/27/2020	Figure 3-12	KGS



Legend

Vertical Profile

1.39 U
EPA LHA
Concentration
(sum of PFOA
and PFOS)

2.59 U
MassDEP
Concentration
(sum of PFOS + PFOA
+ PFDA + PFHpA +
PFHxS + PFNA)

Monitoring Well

Screened
Interval

- Sand with Gravel/Sand
- Sand with Silt/Silty Sand
- Silt
- Silt, Sand, Gravel, with Clay
- Till
- Weathered Bedrock
- Bedrock
- Unknown
- Water Table

Notes:

All results in ng/L
ng/L = nanograms per liter
ND = non-detect
( ) = field duplicate

Perfluorooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorodecanoic acid (PFDA)
Perfluoroheptanoic acid (PFHpA)
Perfluorohexanesulfonic acid (PFHxS)
Perfluorononanoic acid (PFNA)

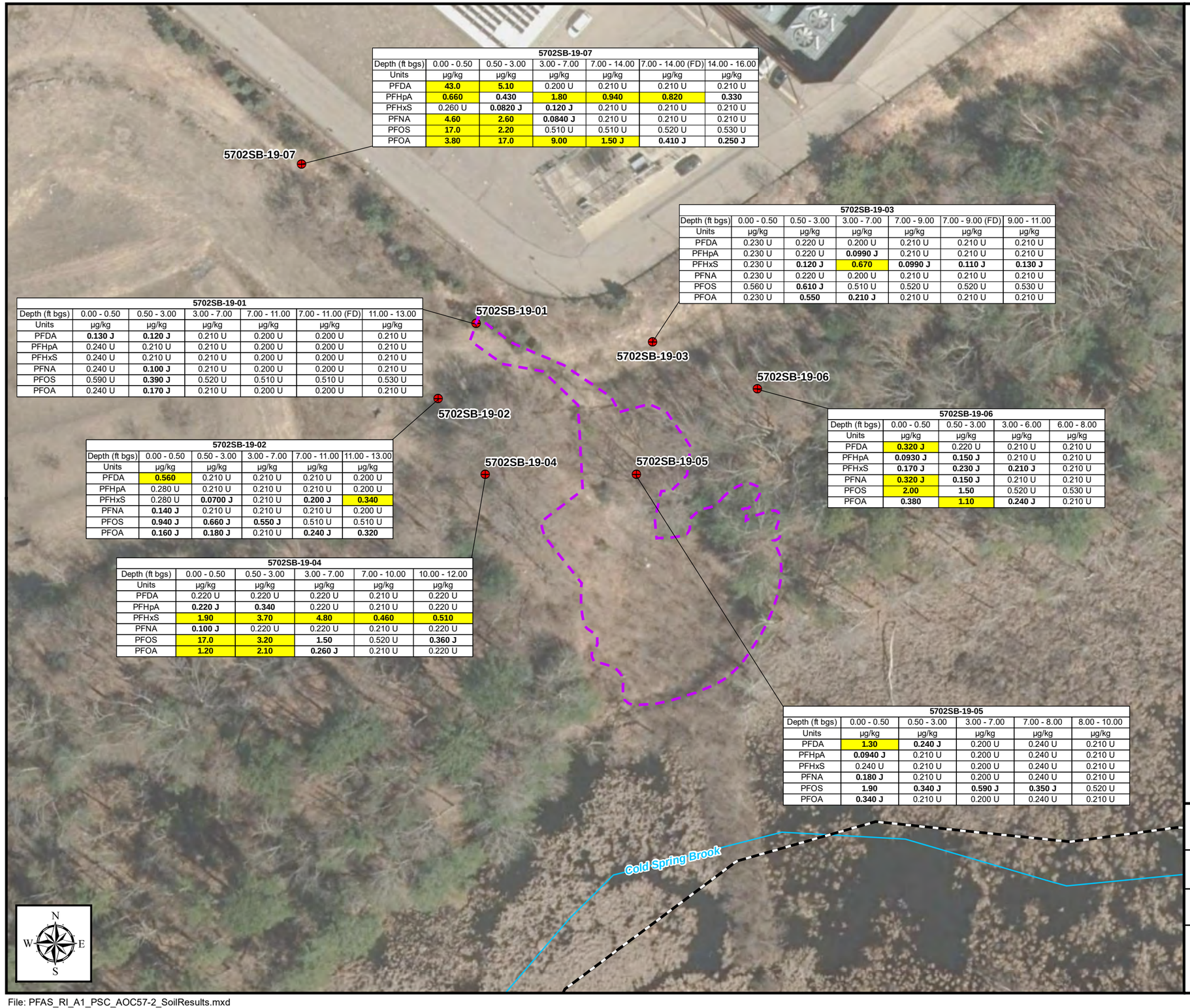
VERTICAL SCALE IN FEET: 40
HORIZONTAL SCALE IN FEET: 60

AOC 57 - Cross Section, C-C'
Devens PFAS RI - Area I PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

Scale as Shown	Date: 05/27/2020	Figure 3-13	KGS



5702SB-19-07

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 14.00	7.00 - 14.00 (FD)	14.00 - 16.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**43.0**	**5.10**	0.200 U	0.210 U	0.210 U	0.210 U
PFHpA	**0.660**	**0.430**	**1.80**	**0.940**	**0.820**	**0.330**
PFHxS	0.260 U	**0.0820 J**	**0.120 J**	0.210 U	0.210 U	0.210 U
PFNA	**4.60**	**2.60**	**0.0840 J**	0.210 U	0.210 U	0.210 U
PFOS	**17.0**	**2.20**	0.510 U	0.510 U	0.520 U	0.530 U
PFOA	**3.80**	**17.0**	**9.00**	**1.50 J**	**0.410 J**	**0.250 J**

5702SB-19-03

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 9.00	7.00 - 9.00 (FD)	9.00 - 11.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	0.230 U	0.220 U	0.200 U	0.210 U	0.210 U	0.210 U
PFHpA	0.230 U	0.220 U	**0.0990 J**	0.210 U	0.210 U	0.210 U
PFHxS	0.230 U	**0.120 J**	**0.670**	**0.0990 J**	**0.110 J**	**0.130 J**
PFNA	0.230 U	0.220 U	0.200 U	0.210 U	0.210 U	0.210 U
PFOS	0.560 U	**0.610 J**	0.510 U	0.520 U	0.520 U	0.530 U
PFOA	0.230 U	**0.550**	**0.210 J**	0.210 U	0.210 U	0.210 U

5702SB-19-01

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 11.00	7.00 - 11.00 (FD)	11.00 - 13.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.130 J**	**0.120 J**	0.210 U	0.200 U	0.200 U	0.210 U
PFHpA	0.240 U	0.210 U	0.210 U	0.200 U	0.200 U	0.210 U
PFHxS	0.240 U	0.210 U	0.210 U	0.200 U	0.200 U	0.210 U
PFNA	0.240 U	**0.100 J**	0.210 U	0.200 U	0.200 U	0.210 U
PFOS	0.590 U	**0.390 J**	0.520 U	0.510 U	0.510 U	0.530 U
PFOA	0.240 U	**0.170 J**	0.210 U	0.200 U	0.200 U	0.210 U

5702SB-19-06

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 6.00	6.00 - 8.00
Units	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.320 J**	0.220 U	0.210 U	0.210 U
PFHpA	**0.0930 J**	**0.150 J**	0.210 U	0.210 U
PFHxS	**0.170 J**	**0.230 J**	**0.210 J**	0.210 U
PFNA	**0.320 J**	**0.150 J**	0.210 U	0.210 U
PFOS	**2.00**	**1.50**	0.520 U	0.530 U
PFOA	**0.380**	**1.10**	**0.240 J**	0.210 U

5702SB-19-02

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 11.00	11.00 - 13.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.560**	0.210 U	0.210 U	0.210 U	0.200 U
PFHpA	0.280 U	0.210 U	0.210 U	0.210 U	0.200 U
PFHxS	0.280 U	**0.0700 J**	0.210 U	**0.200 J**	**0.340**
PFNA	**0.140 J**	0.210 U	0.210 U	0.210 U	0.200 U
PFOS	**0.940 J**	**0.660 J**	**0.550 J**	0.510 U	0.510 U
PFOA	**0.160 J**	**0.180 J**	0.210 U	**0.240 J**	**0.320**

5702SB-19-04

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 10.00	10.00 - 12.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	0.220 U	0.220 U	0.220 U	0.210 U	0.220 U
PFHpA	**0.220 J**	**0.340**	0.220 U	0.210 U	0.220 U
PFHxS	**1.90**	**3.70**	**4.80**	**0.460**	**0.510**
PFNA	**0.100 J**	0.220 U	0.220 U	0.210 U	0.220 U
PFOS	**17.0**	**3.20**	**1.50**	0.520 U	**0.360 J**
PFOA	**1.20**	**2.10**	**0.260 J**	0.210 U	0.220 U

5702SB-19-05

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 8.00	8.00 - 10.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**1.30**	**0.240 J**	0.200 U	0.240 U	0.210 U
PFHpA	**0.0940 J**	0.210 U	0.200 U	0.240 U	0.210 U
PFHxS	0.240 U	0.210 U	0.200 U	0.240 U	0.210 U
PFNA	**0.180 J**	0.210 U	0.200 U	0.240 U	0.210 U
PFOS	**1.90**	**0.340 J**	**0.590 J**	**0.350 J**	0.520 U
PFOA	**0.340 J**	0.210 U	0.200 U	0.240 U	0.210 U

Legend

- Soil Boring Location
- Approximate Soil Removal Area
- Former Fort Devens Boundary
- Stream

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

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 57 Area 2 Soil Sampling Results
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 30 60
Feet

Date: 05/06/2020

Figure 3-14

KGS

File: PFAS_RI_A1_PSC_AOC57-2_SoilResults.mxd

5703SB-19-03					
Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 10.00	10.00 - 12.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	0.230 U	0.200 U	0.200 U	0.210 U	0.210 U
PFHpA	0.230 U	0.200 U	0.200 U	0.210 U	0.210 U
PFHxS	0.230 U	0.200 U	0.200 U	0.210 U	0.210 U
PFNA	**0.240 J**	0.200 U	0.200 U	0.210 U	0.210 U
PFOS	0.570 U	0.510 U	0.500 U	0.520 U	0.530 U
PFOA	0.230 U	**0.160 J**	0.200 U	0.210 U	0.210 U

5703SB-19-02						
Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 10.00	7.00 - 10.00 (FD)	10.00 - 12.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**5.60**	**5.00**	**0.530**	**0.410**	**0.430**	**0.320**
PFHpA	**0.170 J**	0.210 U	0.200 U	**0.100 J**	**0.0980 J**	**0.0910 J**
PFHxS	0.240 U	0.210 U	0.200 U	0.210 U	0.200 U	0.210 U
PFNA	**0.480**	**0.560**	**2.10**	**0.140 J**	**0.110 J**	**0.200 J**
PFOS	**0.800 J**	**2.70**	**0.870 J**	0.510 U	0.510 U	**0.250 J**
PFOA	**0.490**	**0.140 J**	**0.350**	**0.850**	**0.800**	**1.00**

5703SB-19-01				
Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 6.00	6.00 - 8.00
Units	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.120 J**	0.220 U	0.210 U	0.210 U
PFHpA	0.210 U	0.220 U	0.210 U	0.210 U
PFHxS	0.210 U	0.220 U	0.210 U	0.210 U
PFNA	**0.0950 J**	**0.160 J**	0.210 U	0.210 U
PFOS	**0.340 J**	**0.380 J**	0.530 U	0.530 U
PFOA	0.210 U	**0.220 J**	**0.150 J**	**0.160 J**

5703SB-19-04					
Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 8.00	8.00 - 10.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**1.90**	**0.200 J**	0.200 U	0.210 U	0.210 U
PFHpA	**0.190 J**	**0.100 J**	**0.110 J**	**0.100 J**	**0.140 J**
PFHxS	0.230 U	0.210 U	0.200 U	0.210 U	0.210 U
PFNA	**0.220 J**	**0.150 J**	0.200 U	0.210 U	0.210 U
PFOS	**2.20**	**1.30**	0.510 U	**0.260 J**	0.520 U
PFOA	**0.430**	**0.230 J**	**0.370**	**0.360**	**0.220 J**

5703SB-19-03
5703SB-19-02
5703SB-19-01
5703SB-19-04

N
W
E
S

Legend

- Soil Boring Location
- Approximate Soil Removal Area
- Former Fort Devens Boundary
- Stream

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

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 57 Area 3 Soil Results
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

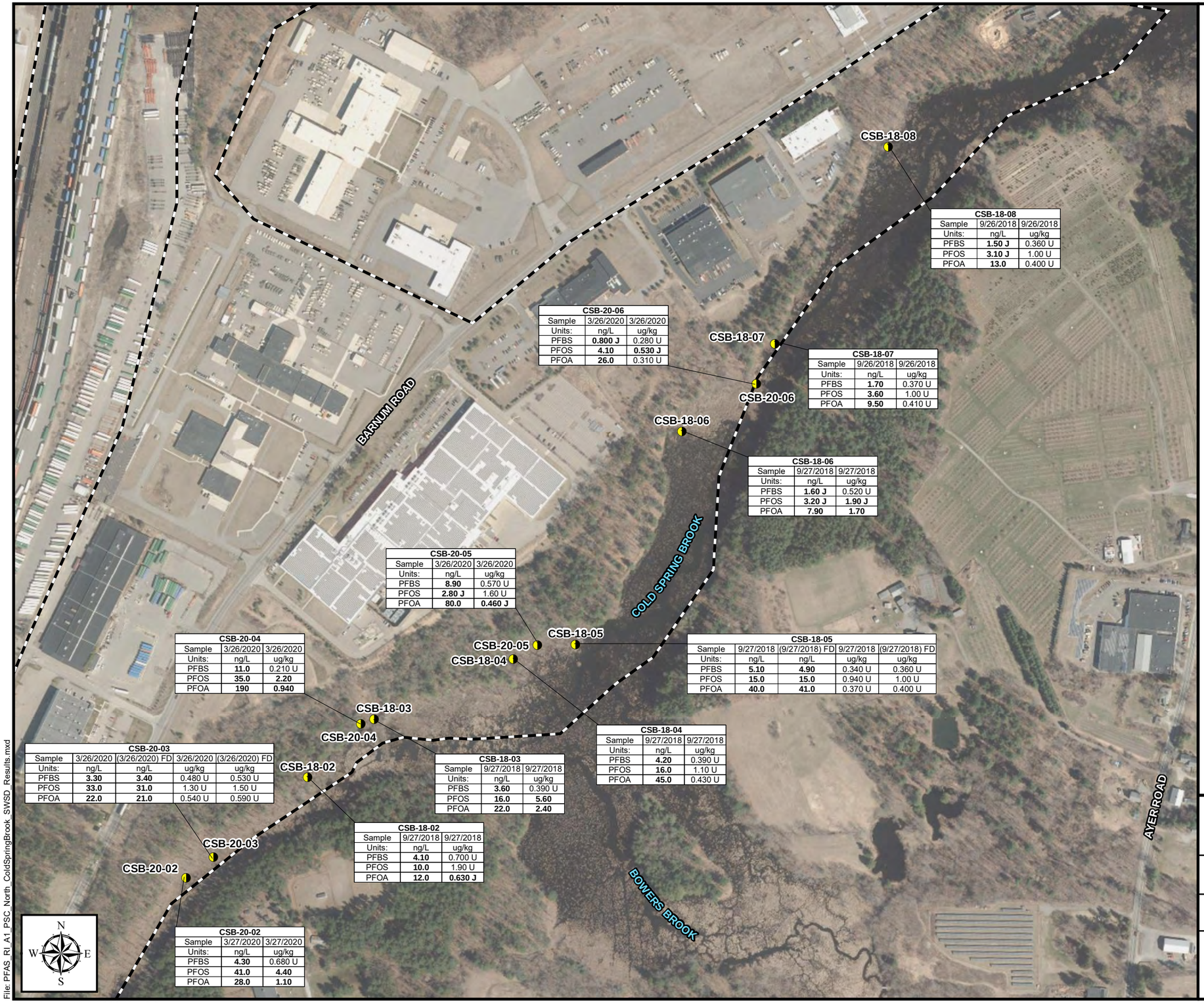
0 30 60
Feet

Date: 05/06/2020

Figure 3-15

KGS

File: PFAS_RI_A1_PSC_AOC57-3_SoilResults.mxd



CSB-18-08		
Sample	9/26/2018	9/26/2018
Units:	ng/L	ug/kg
PFBS	**1.50 J**	0.360 U
PFOS	**3.10 J**	1.00 U
PFOA	**13.0**	0.400 U

CSB-20-06		
Sample	3/26/2020	3/26/2020
Units:	ng/L	ug/kg
PFBS	**0.800 J**	0.280 U
PFOS	**4.10**	**0.530 J**
PFOA	**26.0**	0.310 U

CSB-18-07		
Sample	9/26/2018	9/26/2018
Units:	ng/L	ug/kg
PFBS	**1.70**	0.370 U
PFOS	**3.60**	1.00 U
PFOA	**9.50**	0.410 U

CSB-18-06		
Sample	9/27/2018	9/27/2018
Units:	ng/L	ug/kg
PFBS	**1.60 J**	0.520 U
PFOS	**3.20 J**	**1.90 J**
PFOA	**7.90**	**1.70**

CSB-20-05		
Sample	3/26/2020	3/26/2020
Units:	ng/L	ug/kg
PFBS	**8.90**	0.570 U
PFOS	**2.80 J**	1.60 U
PFOA	**80.0**	**0.460 J**

CSB-18-05			
Sample	9/27/2018	(9/27/2018) FD	9/27/2018	(9/27/2018) FD
Units:	ng/L	ng/L	ug/kg	ug/kg
PFBS	**5.10**	**4.90**	0.340 U	0.360 U
PFOS	**15.0**	**15.0**	0.940 U	1.00 U
PFOA	**40.0**	**41.0**	0.370 U	0.400 U

CSB-20-04		
Sample	3/26/2020	3/26/2020
Units:	ng/L	ug/kg
PFBS	**11.0**	0.210 U
PFOS	**35.0**	**2.20**
PFOA	**190**	**0.940**

CSB-18-04		
Sample	9/27/2018	9/27/2018
Units:	ng/L	ug/kg
PFBS	**4.20**	0.390 U
PFOS	**16.0**	1.10 U
PFOA	**45.0**	0.430 U

CSB-18-03		
Sample	9/27/2018	9/27/2018
Units:	ng/L	ug/kg
PFBS	**3.60**	0.390 U
PFOS	**16.0**	**5.60**
PFOA	**22.0**	**2.40**

CSB-20-03				
Sample	3/26/2020	(3/26/2020) FD	3/26/2020	(3/26/2020) FD
Units:	ng/L	ng/L	ug/kg	ug/kg
PFBS	**3.30**	**3.40**	0.480 U	0.530 U
PFOS	**33.0**	**31.0**	1.30 U	1.50 U
PFOA	**22.0**	**21.0**	0.540 U	0.590 U

CSB-18-02		
Sample	9/27/2018	9/27/2018
Units:	ng/L	ug/kg
PFBS	**4.10**	0.700 U
PFOS	**10.0**	1.90 U
PFOA	**12.0**	**0.630 J**

CSB-20-02		
Sample	3/27/2020	3/27/2020
Units:	ng/L	ug/kg
PFBS	**4.30**	0.680 U
PFOS	**41.0**	**4.40**
PFOA	**28.0**	**1.10**

Legend

- Surface Water and Sediment Sample Location
- Former Fort Devens Boundary

EPA PFAS Site Specific Screening Levels for Former Fort Devens

Surface Water		Sediment	
Units:	ng/L	Units:	µg/kg
PFOA	2,030	PFOA	609
PFOS	2,030	PFOS	609
PFBS	2,030,000	PFBS	609,000

Notes:

Perfluorooctane Sulfonic Acid (PFOS)
Perfluorooctanoic Acid (PFOA)
Perfluorobutanesulfonic acid (PFBS)
ng/L = nanograms per liter (Surface Water Result Value)
µg/kg = microgram per kilogram (Sediment Result value)

J = estimated result
U= not detected above the reported sample quantitation limit
Bold = detection

Northern Extent Cold Spring Brook
PFAS Results in Surface Water and Sediment Samples
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

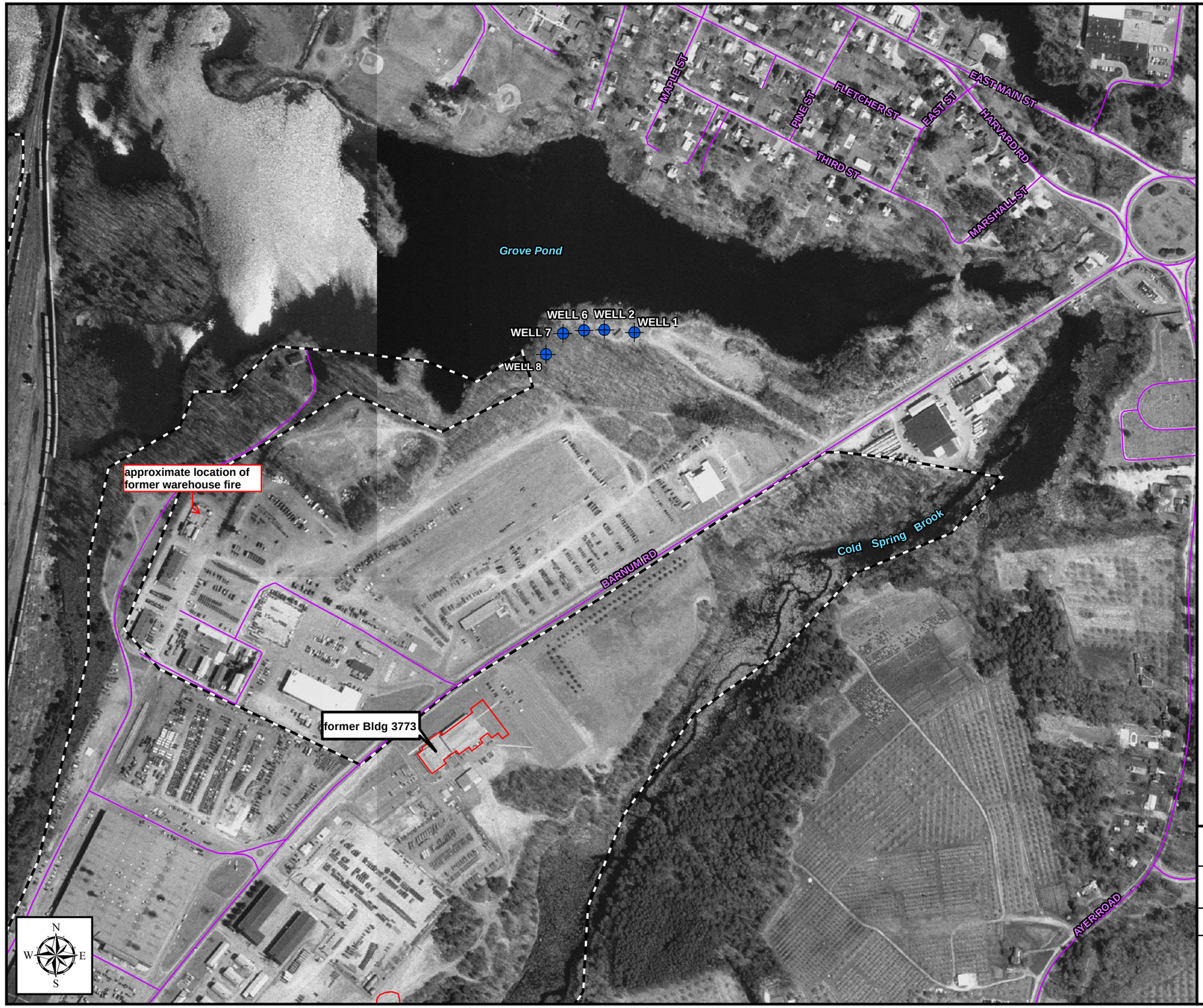
0 200 400
Feet

Date: 05/05/2020

Figure 3-16

File: PFAS_RI_A1_PSC_North_ColdSpringBrook_SWSD_Results.mxd

Aerial Sources: 2019, USGS, MassGIS



Legend

- Public Water Supply Well
- Current Road
- Former Fort Devens Boundary

Note:

Aerial Source: MassGIS - 1:5,000 Black and White Digital Orthophoto Images - 1992

Grove Pond Area/AOC 74 1992 Aerial Imagery
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC

0 200 400
Feet

Date: 04/02/2020

Figure 4-1

File: PFAS_IDE_2020_GrovePond_AOC74_1992Imagery.mxd

Legend

Historic Subsurface Features

- Communication Line
- Electric
- Electric Line

ufueltank_ful.dwg Point

RefName

- UST — Underground Tank
- Steam
- Storm
- Storm Line
- Storm Feature
- Sanitary
- Sanitary Line
- Sanitary Feature
- Water
- Water Line
- Water Feature
- Abandoned Feature
- Abandoned Line
- Gas
- Gas Line
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Grove Pond and AOC 74 Area Historic Subsurface Features
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

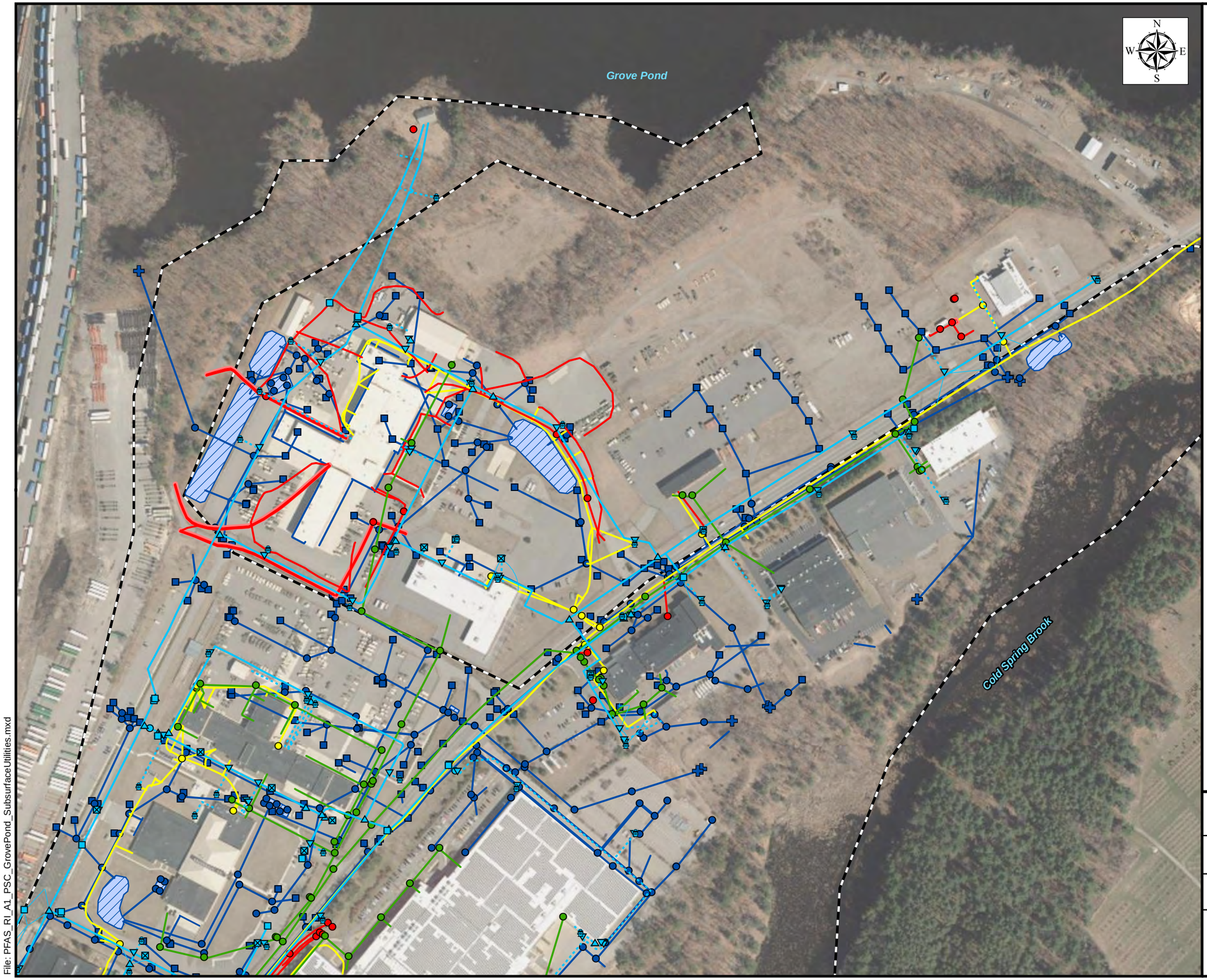
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 150 300
Feet

Date: 04/26/2020

Figure 4-2

File: PFAS_RI_A1_PSC_GrovePond_HistoricUtilities.mxd



Legend

Water 01/06/2020
- Hydrant
- Main Fitting
- Service Fitting
- Main Valve
- Service Valve
- Manhole
- Main Line
- Service Line
- Tie

Sewer 01/06/2020
- Force Fitting, Main Fitting, Service Fitting, Manhole
- Force Main, Gravity Main, Service Line, Tie
- DBox, Grease Trap, Lift Station, Oil/Water

Electric 01/07/2020
- Connection Box, Handhole, Junction Box, Manhole, Meter, Switch, or Transformer
- Inservice/Abandoned
- Vault

Gas 01/06/2020
- Main Fitting, Main Valve, Meter, Rectifier, Service Fitting, Service Regulator, Service Valve, Test Station, Anode
- Main, Service, Tie, Cathodic Loop

Stormwater 12/11/2019
- Catch Basin
- Outfall
- Manhole
- Pipe, Culvert
- Detention Pond
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Grove Pond and AOC 74 Area Current Subsurface Features
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 150 300
Feet

Date: 04/26/2020

Figure 4-3

File: PFAS_RI_A1_PSC_GrovePond_SubsurfaceUtilities.mxd

Legend

- Initial Monitoring Well/Piezometer
- New Monitoring Well/Piezometer
- Soil Boring Location
- Vertical Profiling Location Installation Phase 1
- Vertical Profiling Location Installation Phase 2
- Vertical Profiling Location Installation Phase 3
- Vertical Profiling Location Installation Phase 4
- Vertical Profiling Location Installation Phase 5
- Grove Pond Vertical Profiling Location
- Surface Water and Sediment Sampling Location
- Irrigation Well (Approximate Location)
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 74 Field Activities
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

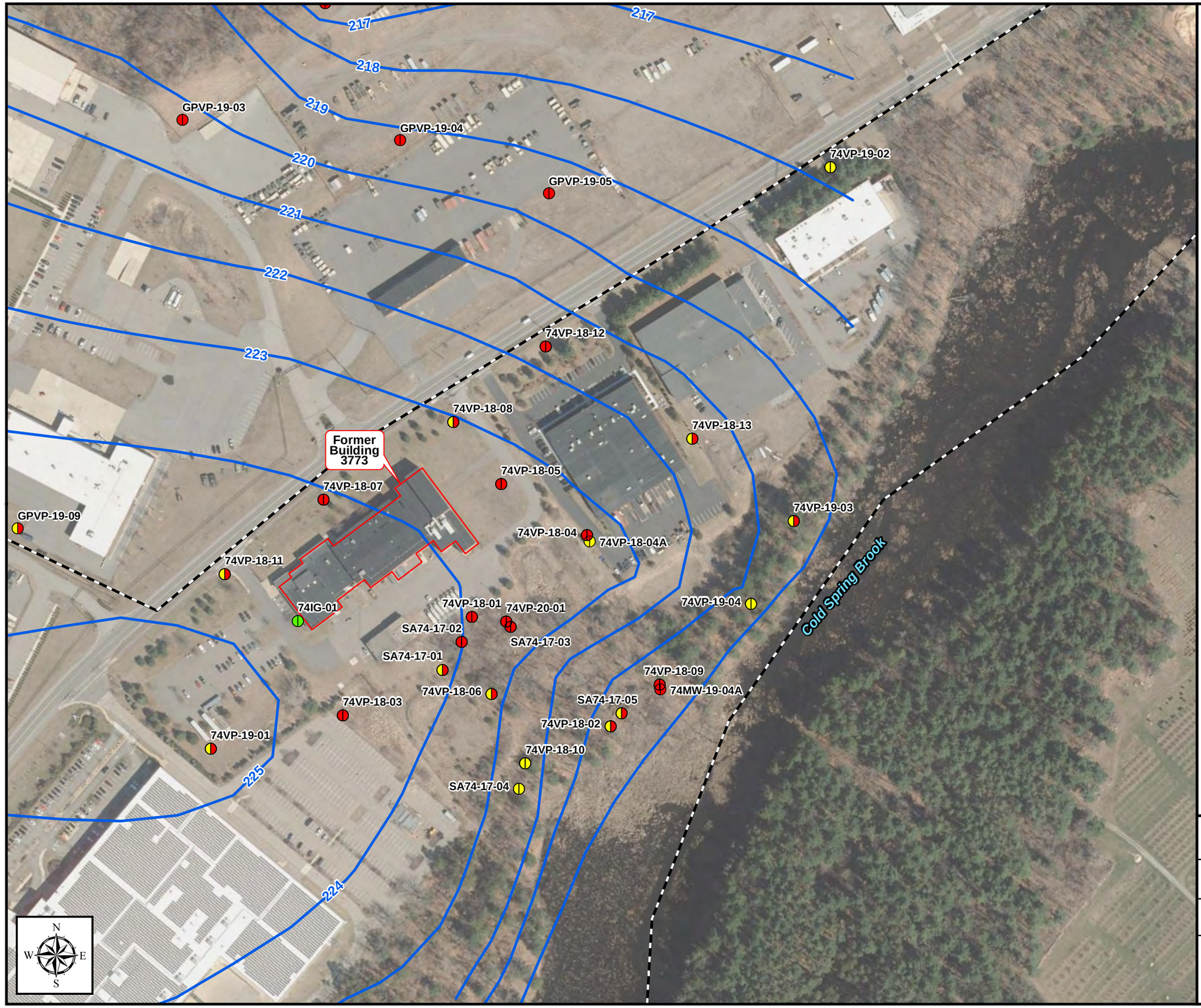
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 100 200
Feet

Date: 05/12/2020

Figure 4-4

File: PFAS_RI_A1_PSC_AOC74_FieldActivities.mxd



Legend

- Monitoring Well/Vertical Profiling Location

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

- EPA LHA ≥ 70 ng/L
- EPA LHA < 70 ng/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 (ft NAVD 88)
  (Contour Interal = 1 Foot) - March 2020
- Former Fort Devens Boundary

Notes:

Samples collected during the PFAS SI (e.g., SA74-17-01 through -05) were not analyzed for PFDA.

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

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 74 Groundwater Results
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 100 200
Feet

Date: 05/28/2020

Figure 4-5

KGS

File: PFAS_RI_A1_PSC_AOC74_GWResults.mxd

Legend

- Monitoring Well/Piezometer
- Vertical Profiling Location
- Soil Boring Location
- Surface Water and Sediment Sampling Location
- Irrigation Well (Approximate Location)
- Public Water Supply Well
- Temporary Well Location from SI
- Cross Section Location
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 74 Cross Section Location Map
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

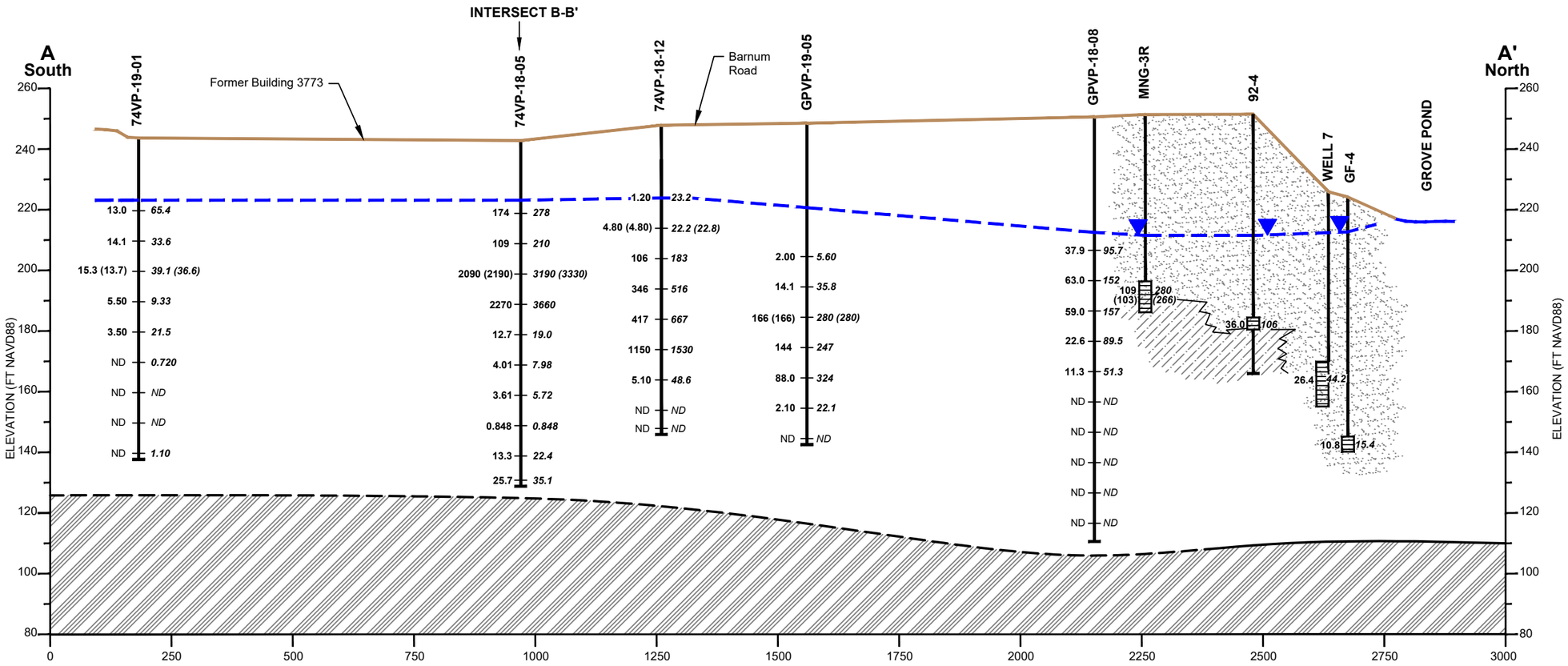
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 150 300
Feet

Date: 05/08/2020

Figure 4-6

KGS



Legend

Vertical Profile

1.39 U — EPA LHA Concentration (sum of PFOA and PFOS)

2.59 U — MassDEP Concentration (sum of PFOS + PFOA + PFDA + PFHpA + PFHxS + PFNA)

Monitoring Well

Screened Interval

- Sand with Gravel/Sand
- Sand with Silt/Silty Sand
- Silt
- Silt, Sand, Gravel, with Clay
- Till
- Weathered Bedrock
- Bedrock
- Unknown
- Water Table

Notes:

All results in ng/L
ng/L = nanograms per liter
ND = non-detect
( ) = field duplicate

Perfluorooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorodecanoic acid (PFDA)
Perfluoroheptanoic acid (PFHpA)
Perfluorohexanesulfonic acid (PFHxS)
Perfluorononanoic acid (PFNA)

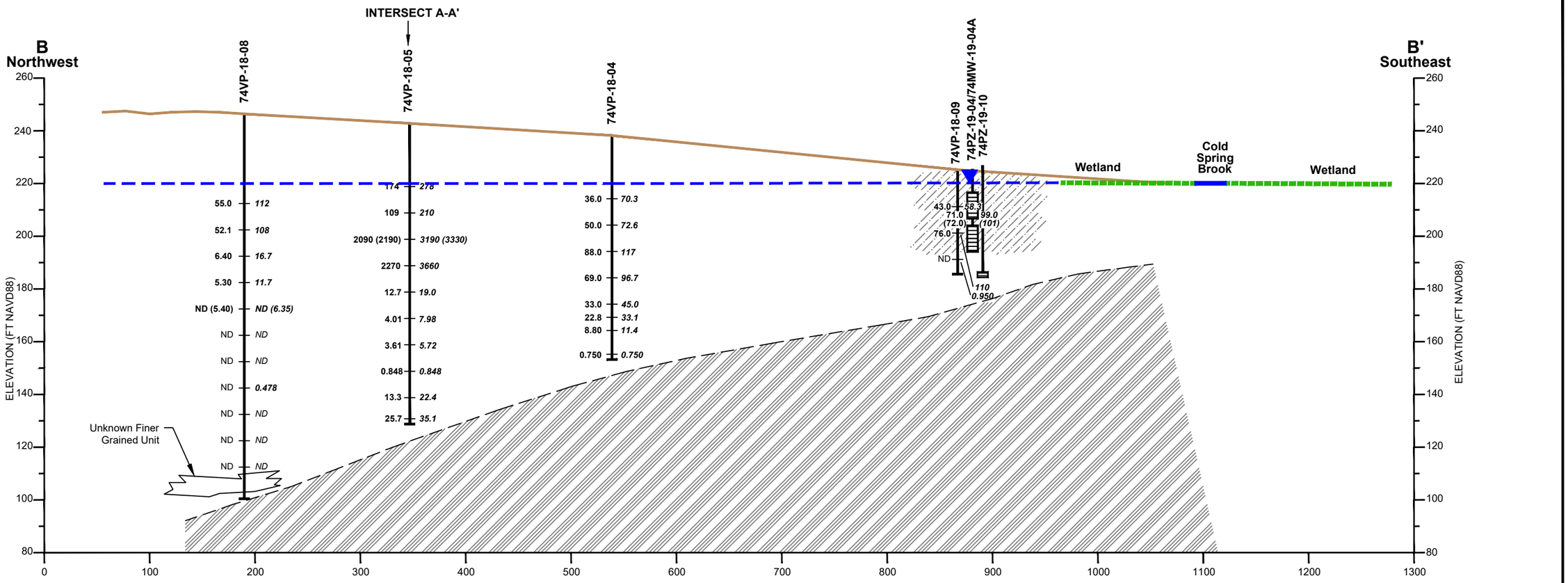
VERTICAL SCALE IN FEET: 40
HORIZONTAL SCALE IN FEET: 250

AOC 74 Cross Section, A-A'
Devens PFAS RI - Area I PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

Scale as Shown	Date: 05/28/2020	Figure 4-7	KGS



Legend

Vertical Profile

1.39 U
EPA LHA
Concentration
(sum of PFOA
and PFOS)

2.59 U
MassDEP
Concentration
(sum of PFOS + PFOA
+ PFDA + PFHpA +
PFHxS + PFNA)

Monitoring Well

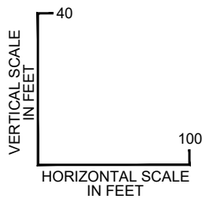
Screened
Interval

- Sand with Gravel/Sand
- Sand with Silt/Silty Sand
- Silt
- Silt, Sand, Gravel, with Clay
- Till
- Weathered Bedrock
- Bedrock
- Unknown
- Water Table

Notes:

All results in ng/L
ng/L = nanograms per liter
ND = non-detect
( ) = field duplicate

Perfluorooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorodecanoic acid (PFDA)
Perfluoroheptanoic acid (PFHpA)
Perfluorohexanesulfonic acid (PFHxS)
Perfluorononanoic acid (PFNA)

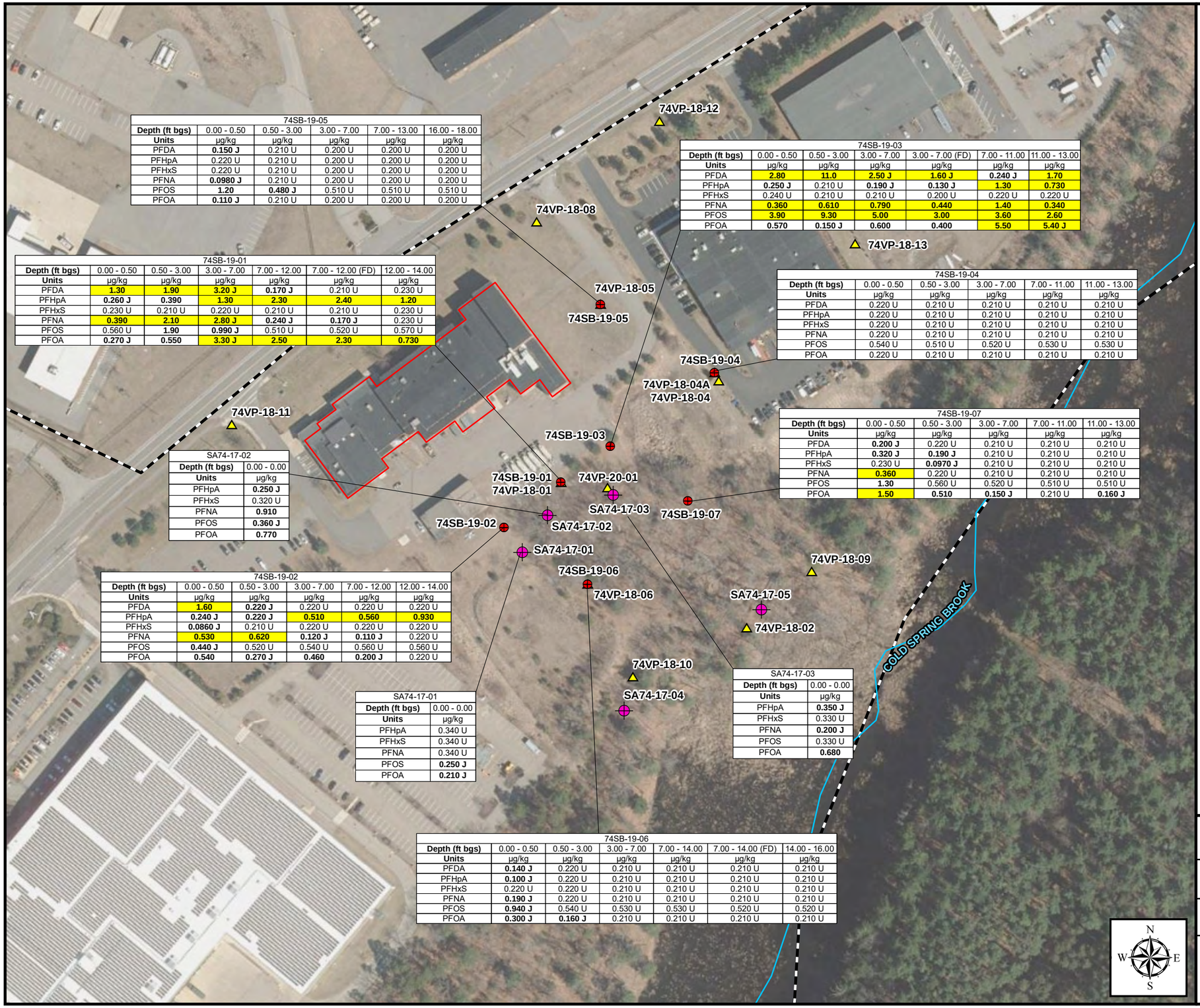


AOC 74 Cross Section, B-B'
Devens PFAS RI - Area I PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

Scale as Shown	Date: 05/28/2020	Figure 4-8	KGS



74SB-19-05

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 13.00	16.00 - 18.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.150 J**	0.210 U	0.200 U	0.200 U	0.200 U
PFHpA	0.220 U	0.210 U	0.200 U	0.200 U	0.200 U
PFHxS	0.220 U	0.210 U	0.200 U	0.200 U	0.200 U
PFNA	**0.0980 J**	0.210 U	0.200 U	0.200 U	0.200 U
PFOS	**1.20**	**0.480 J**	0.510 U	0.510 U	0.510 U
PFOA	**0.110 J**	0.210 U	0.200 U	0.200 U	0.200 U

74SB-19-03

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	3.00 - 7.00 (FD)	7.00 - 11.00	11.00 - 13.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**2.80**	**11.0**	**2.50 J**	**1.60 J**	**0.240 J**	**1.70**
PFHpA	**0.250 J**	0.210 U	**0.190 J**	**0.130 J**	**1.30**	**0.730**
PFHxS	0.240 U	0.210 U	0.210 U	0.200 U	0.220 U	0.220 U
PFNA	**0.360**	**0.610**	**0.790**	**0.440**	**1.40**	**0.340**
PFOS	**3.90**	**9.30**	**5.00**	**3.00**	**3.60**	**2.60**
PFOA	**0.570**	**0.150 J**	**0.600**	**0.400**	**5.50**	**5.40 J**

74SB-19-01

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 12.00	7.00 - 12.00 (FD)	12.00 - 14.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**1.30**	**1.90**	**3.20 J**	**0.170 J**	0.210 U	0.230 U
PFHpA	**0.260 J**	**0.390**	**1.30**	**2.30**	**2.40**	**1.20**
PFHxS	0.230 U	0.210 U	0.220 U	0.210 U	0.210 U	0.230 U
PFNA	**0.390**	**2.10**	**2.80 J**	**0.240 J**	**0.170 J**	0.230 U
PFOS	0.560 U	**1.90**	**0.990 J**	0.510 U	0.520 U	0.570 U
PFOA	**0.270 J**	**0.550**	**3.30 J**	**2.50**	**2.30**	**0.730**

74SB-19-04

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 11.00	11.00 - 13.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	0.220 U	0.210 U	0.210 U	0.210 U	0.210 U
PFHpA	0.220 U	0.210 U	0.210 U	0.210 U	0.210 U
PFHxS	0.220 U	0.210 U	0.210 U	0.210 U	0.210 U
PFNA	0.220 U	0.210 U	0.210 U	0.210 U	0.210 U
PFOS	0.540 U	0.510 U	0.520 U	0.530 U	0.530 U
PFOA	0.220 U	0.210 U	0.210 U	0.210 U	0.210 U

74SB-19-07

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 11.00	11.00 - 13.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.200 J**	0.220 U	0.210 U	0.210 U	0.210 U
PFHpA	**0.320 J**	**0.190 J**	0.210 U	0.210 U	0.210 U
PFHxS	0.230 U	**0.0970 J**	0.210 U	0.210 U	0.210 U
PFNA	**0.360**	0.220 U	0.210 U	0.210 U	0.210 U
PFOS	**1.30**	0.560 U	0.520 U	0.510 U	0.510 U
PFOA	**1.50**	**0.510**	**0.150 J**	0.210 U	**0.160 J**

SA74-17-02

Depth (ft bgs)	0.00 - 0.00
Units	µg/kg
PFHpA	**0.250 J**
PFHxS	0.320 U
PFNA	**0.910**
PFOS	**0.360 J**
PFOA	**0.770**

74SB-19-02

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 12.00	12.00 - 14.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**1.60**	**0.220 J**	0.220 U	0.220 U	0.220 U
PFHpA	**0.240 J**	**0.220 J**	**0.510**	**0.560**	**0.930**
PFHxS	**0.0860 J**	0.210 U	0.220 U	0.220 U	0.220 U
PFNA	**0.530**	**0.620**	**0.120 J**	**0.110 J**	0.220 U
PFOS	**0.440 J**	0.520 U	0.540 U	0.560 U	0.560 U
PFOA	**0.540**	**0.270 J**	**0.460**	**0.200 J**	0.220 U

SA74-17-01

Depth (ft bgs)	0.00 - 0.00
Units	µg/kg
PFHpA	0.340 U
PFHxS	0.340 U
PFNA	0.340 U
PFOS	**0.250 J**
PFOA	**0.210 J**

SA74-17-03

Depth (ft bgs)	0.00 - 0.00
Units	µg/kg
PFHpA	**0.350 J**
PFHxS	0.330 U
PFNA	**0.200 J**
PFOS	0.330 U
PFOA	**0.680**

74SB-19-06

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 14.00	7.00 - 14.00 (FD)	14.00 - 16.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.140 J**	0.220 U	0.210 U	0.210 U	0.210 U	0.210 U
PFHpA	**0.100 J**	0.220 U	0.210 U	0.210 U	0.210 U	0.210 U
PFHxS	0.220 U	0.220 U	0.210 U	0.210 U	0.210 U	0.210 U
PFNA	**0.190 J**	0.220 U	0.210 U	0.210 U	0.210 U	0.210 U
PFOS	**0.940 J**	0.540 U	0.530 U	0.530 U	0.520 U	0.520 U
PFOA	**0.300 J**	**0.160 J**	0.210 U	0.210 U	0.210 U	0.210 U

Legend

- Soil Boring Location
- Vertical Profiling Location
- Temporary Well Location from SI
- Stream
- 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

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 74 Soil Results
Devens PFAS RI - Area 1 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: 05/12/2020

Figure 4-9

File: PFAS_RI_A1_PSC_AOC74_SoilResults.mxd

Legend

- Current Road
- Former Building T-1445 Warehouse Fire
- Former Fort Devens Boundary

Note:

Aerial Source: MassGIS - 1:5,000 Black and White Digital Orthophoto Images - 1992

AOC 75 1992 Aerial Imagery
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

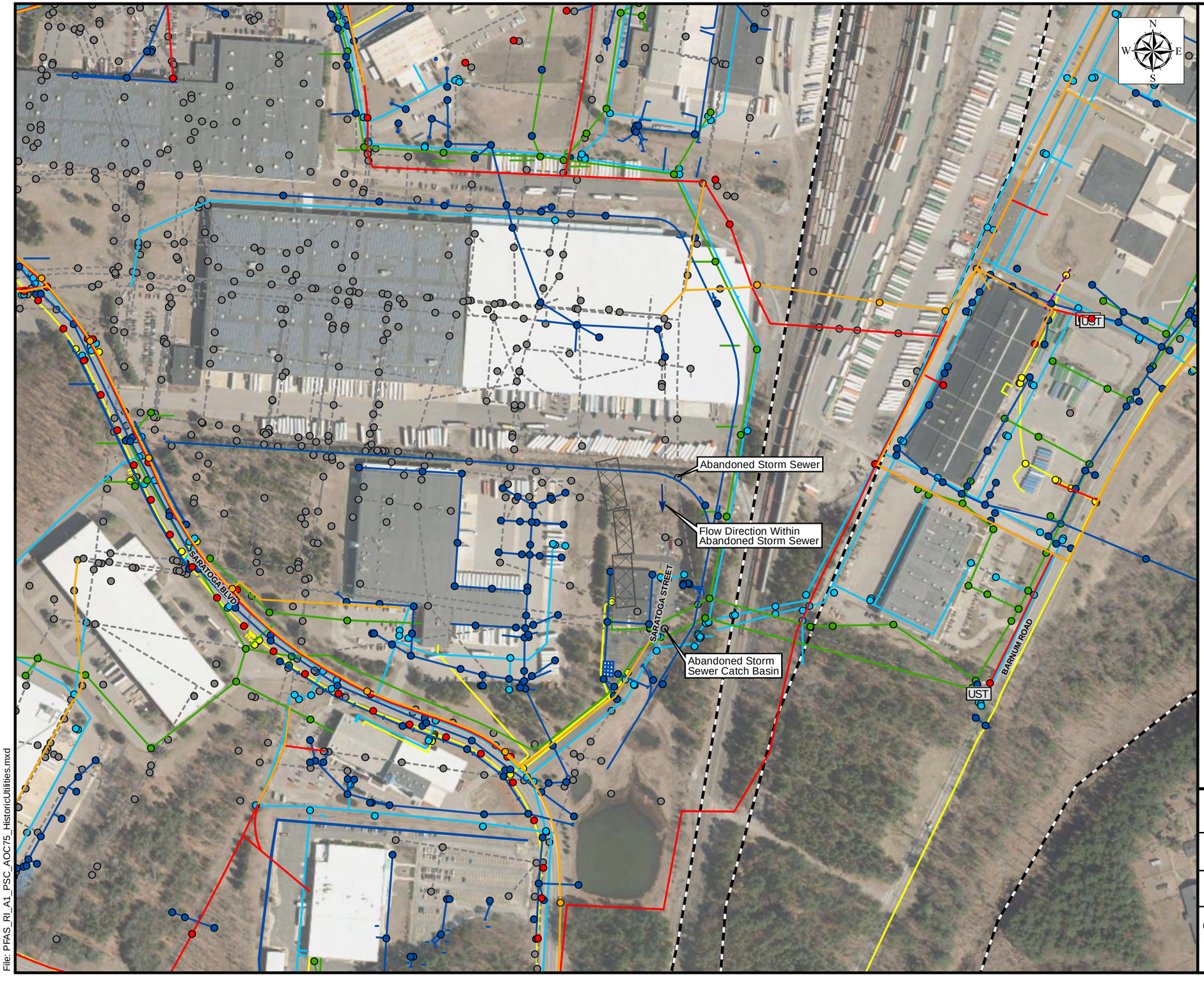
KOMAN Government Solutions, LLC

0 125 250
Feet

Date: 05/12/2020

Figure 5-1

File: PFAS_IDE_2020_AOC75_1992Imagery.mxd



Legend

Historic Subsurface Features

- Communication
- Communication Line
- Electric
- Electric Line
- UST — Underground Tank
- Steam
- Storm
- Storm Line
- Storm Feature
- Sanitary
- Sanitary Line
- Sanitary Feature
- Water
- Water Line
- Water Feature
- Abandoned Feature
- Abandoned Line
- Gas
- Gas Line
- Former Warehouse Building
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 75 Area Historic Subsurface Features
Devens PFAS - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 150 300
Feet

Date: 05/12/2020

Figure 5-2

File: PFAS_RI_A1_PSC_AOC75_HistoricUtilities.mxd

Legend

Water 01/06/2020
- Hydrant
- Main Fitting
- Service Fitting
- Main Valve
- Service Valve
- Manhole
- Main Line
- Service Line
- Tie

Sewer 01/06/2020
- Force Fitting, Main Fitting, Service Fitting, Manhole
- Force Main, Gravity Main, Service Line, Tie
- DBox, Grease Trap, Lift Station, Oil/Water

Electric 01/07/2020
- Connection Box, Handhole, Junction Box, Manhole, Meter, Switch, or Transformer
- Inservice/Abandoned
- Vault

Gas 01/06/2020
- Main Fitting, Main Valve, Meter, Rectifier, Service Fitting, Service Regulator, Service Valve, Test Station, Anode
- Main, Service, Tie, Cathodic Loop

Stormwater 12/11/2019
- Catch Basin
- Outfall
- Manhole
- Pipe, Culvert
- Detention Pond
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 75 Area Current Subsurface Features
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

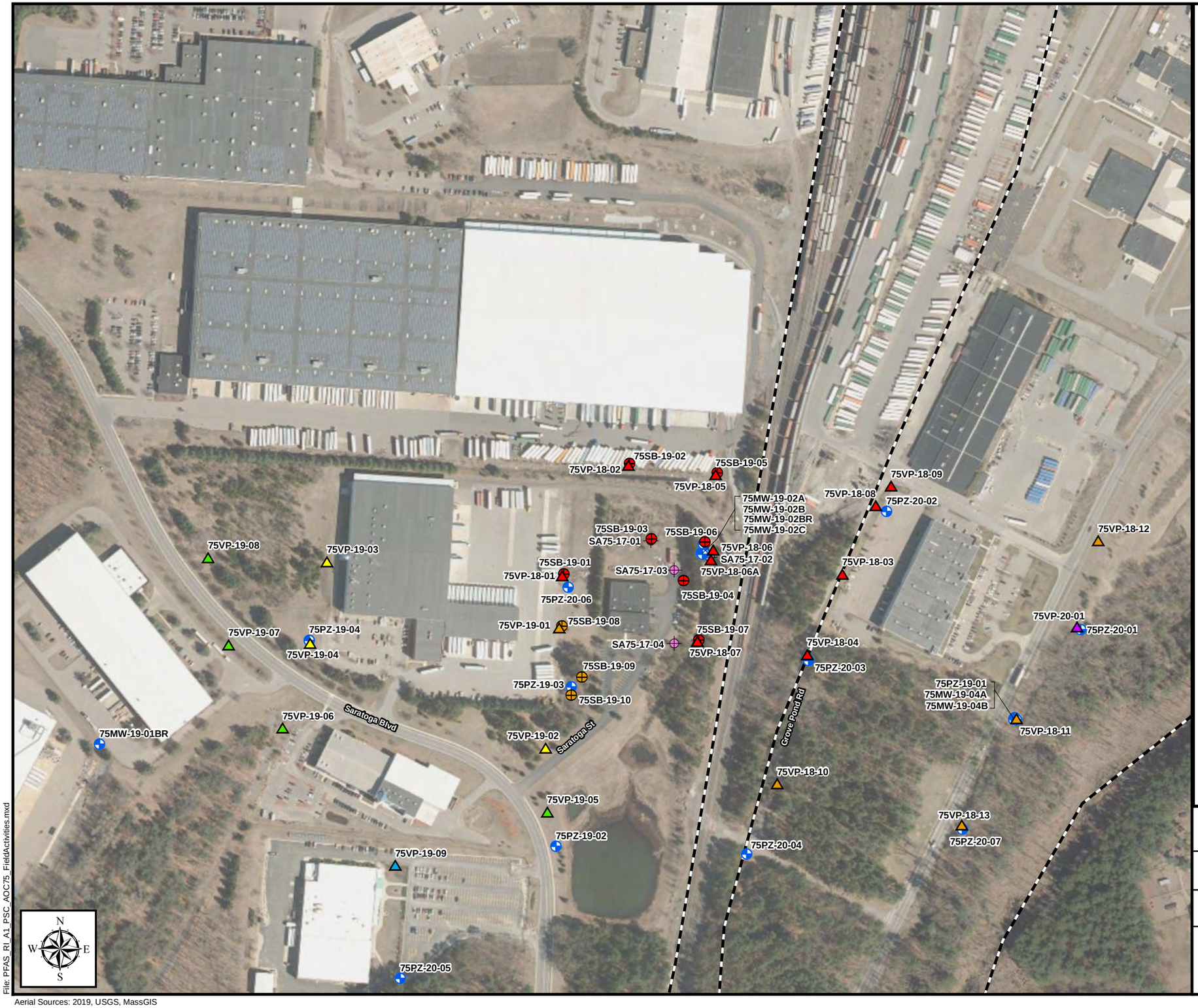
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 150 300
Feet

Date: 04/26/2020

Figure 5-3

File: PFAS_RI_A1_PSC_AOC75_SubsurfaceUtilities.mxd



Legend

- Soil Boring Location Installation Phase 1
- Soil Boring Location Installation Phase 2
- Vertical Profiling Location Installation Phase 1
- Vertical Profiling Location Installation Phase 2
- Vertical Profiling Location Installation Phase 3
- Vertical Profiling Location Installation Phase 4
- Vertical Profiling Location Installation Phase 5
- Vertical Profiling Location Installation Phase 6
- New Monitoring Well/Piezometer
- Temporary Well Location from SI
- Former Fort Devens Boundary

AOC 75 Field Activities
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

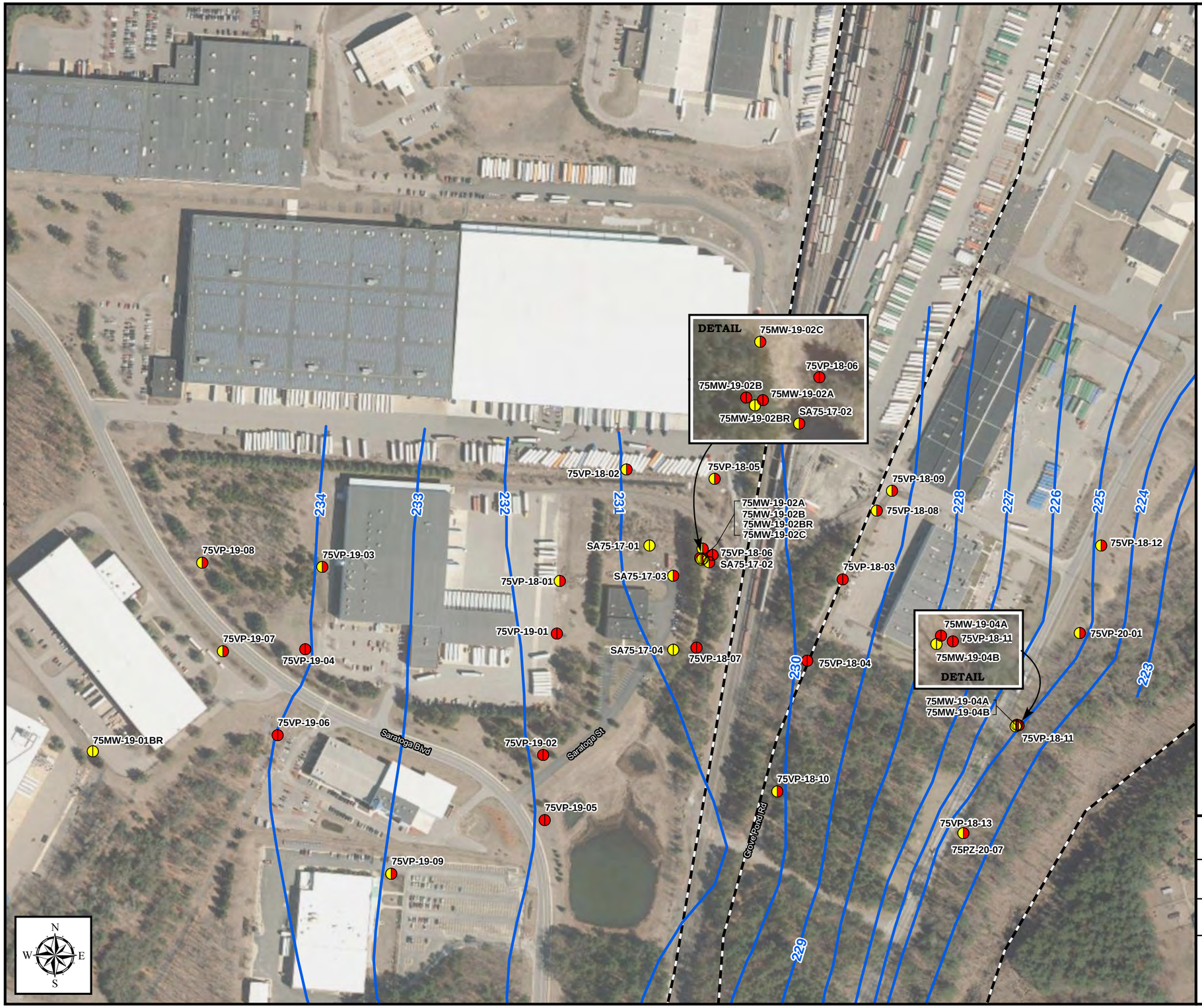
0 150 300
Feet

Date: 05/12/2020

Figure 5-4

File: PFAS_RI_A1_PSC_AOC75_FieldActivities.mxd

Aerial Sources: 2019, USGS, MassGIS



Legend

- Monitoring Well/Vertical Profiling Location

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

- EPA LHA ≥ 70 ng/L
- EPA LHA < 70 ng/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 (ft NAVD 88)
  (Contour Interval = 1 Foot) - March 2020
- Former Fort Devens Boundary

Notes:

Samples collected during the PFAS SI (e.g., SA75-17-01 through -04) were not analyzed for PFDA.

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

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 75 Groundwater Results
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 150 300
Feet

Date: 05/28/2020

Figure 5-5

KGS

File: PFAS_RI_A1_PSC_AOC75_GWResults.mxd

Legend

- Soil Boring Location
- Vertical Profiling Location
- Monitoring Well/Piezometer
- Temporary Well Location from SI
- Cross Section Location
- Former Fort Devens Boundary

Aerial Source: 2019, USGS, MassGIS

AOC 75 Cross Section Location Map
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

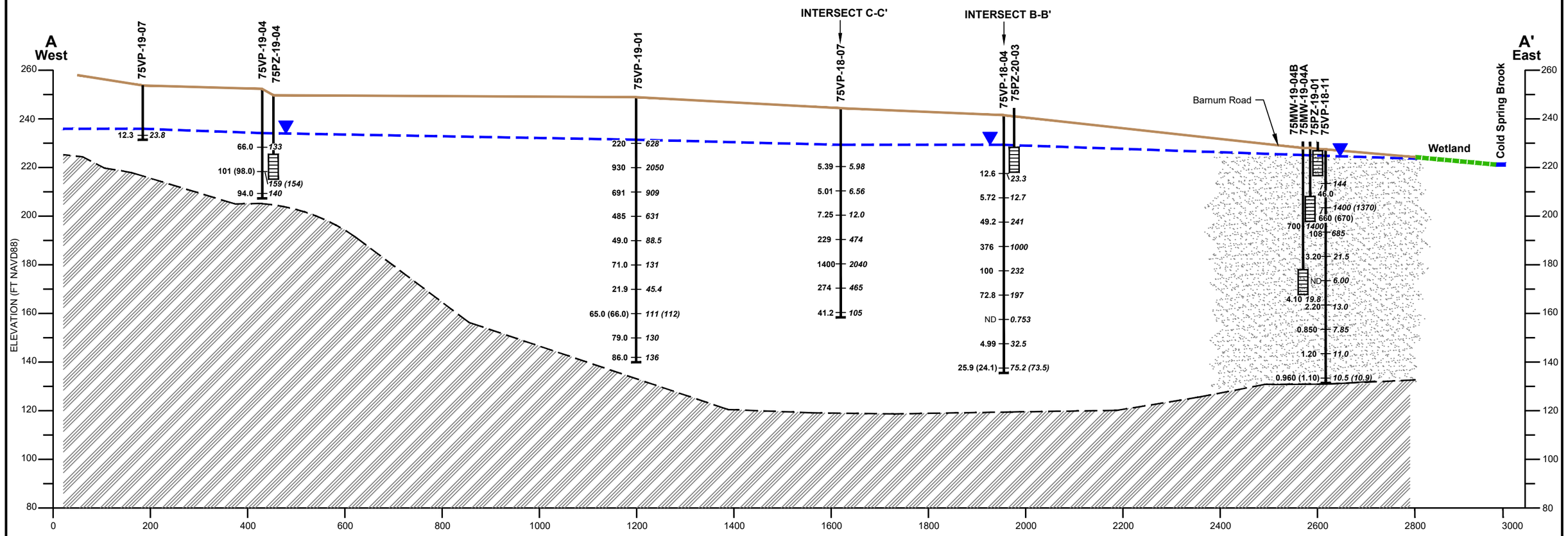
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 150 300
Feet

Date: 05/08/2020

Figure 5-6

File: PFAS_RI_A1_PSC_AOC75_XSLoc.mxd



Legend

Vertical Profile

1.39 U
EPA LHA
Concentration
(sum of PFOA
and PFOS)

2.59 U
MassDEP
Concentration
(sum of PFOS + PFOA
+ PFDA + PFHpA +
PFHxS + PFNA)

Monitoring Well

Screened
Interval

- Sand with Gravel/Sand
- Sand with Silt/Silty Sand
- Silt
- Silt, Sand, Gravel, with Clay
- Till
- Weathered Bedrock
- Bedrock
- Unknown
- Water Table

Notes:

All results in ng/L
ng/L = nanograms per liter
ND = non-detect
( ) = field duplicate

Perfluorooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorodecanoic acid (PFDA)
Perfluoroheptanoic acid (PFHpA)
Perfluorohexanesulfonic acid (PFHxS)
Perfluorononanoic acid (PFNA)

VERTICAL SCALE IN FEET: 40

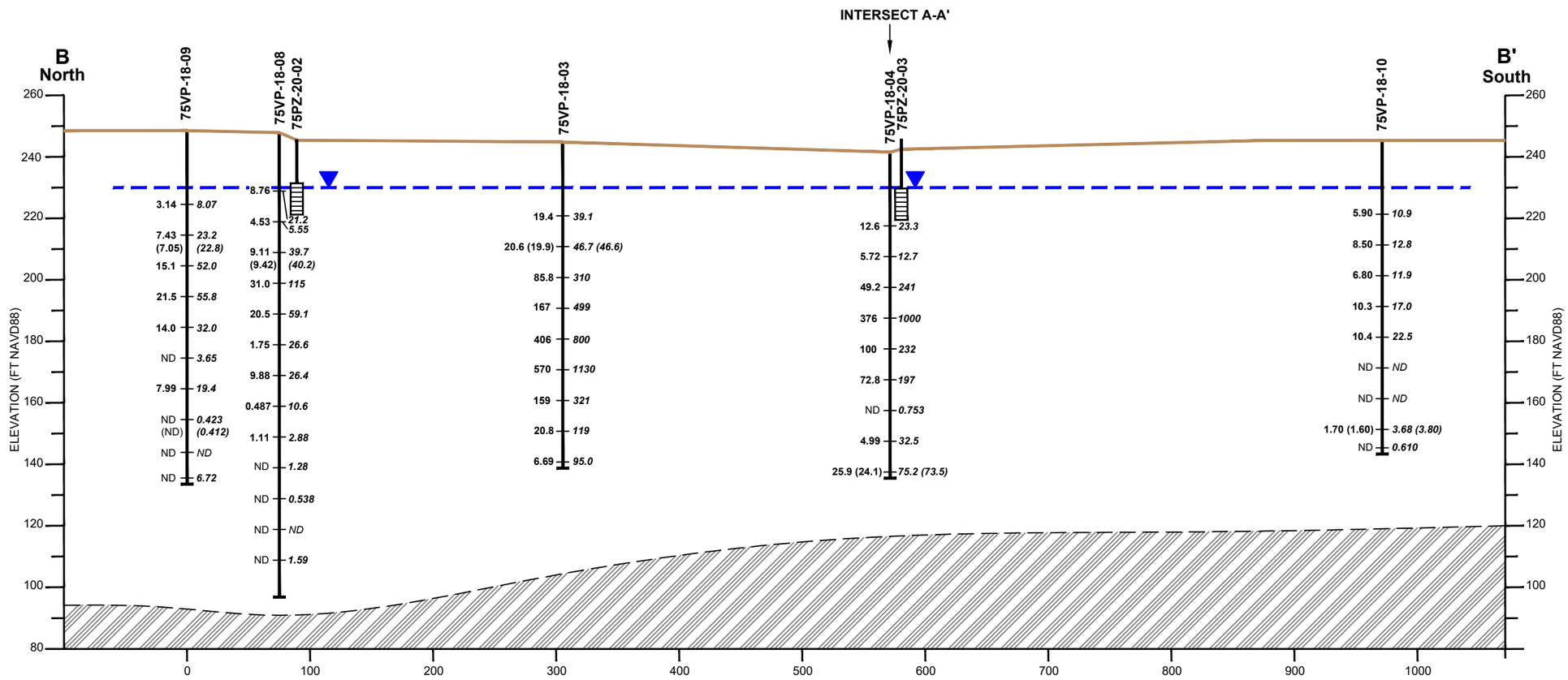
HORIZONTAL SCALE IN FEET: 200

AOC 75 Cross Section A-A'
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

Scale as Shown	Date: 05/28/2020	Figure 5-7	KGS



Legend

Vertical Profile

1.39 U
EPA LHA
Concentration
(sum of PFOA
and PFOS)

2.59 U
MassDEP
Concentration
(sum of PFOS + PFOA
+ PFDA + PFHpA +
PFHxS + PFNA)

Monitoring Well

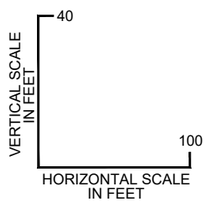
Screened
Interval

- Sand with Gravel/Sand
- Sand with Silt/Silty Sand
- Silt
- Silt, Sand, Gravel, with Clay
- Till
- Weathered Bedrock
- Bedrock
- Unknown
- Water Table

Notes:

All results in ng/L
ng/L = nanograms per liter
ND = non-detect
( ) = field duplicate

Perfluorooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorodecanoic acid (PFDA)
Perfluoroheptanoic acid (PFHpA)
Perfluorohexanesulfonic acid (PFHxS)
Perfluorononanoic acid (PFNA)

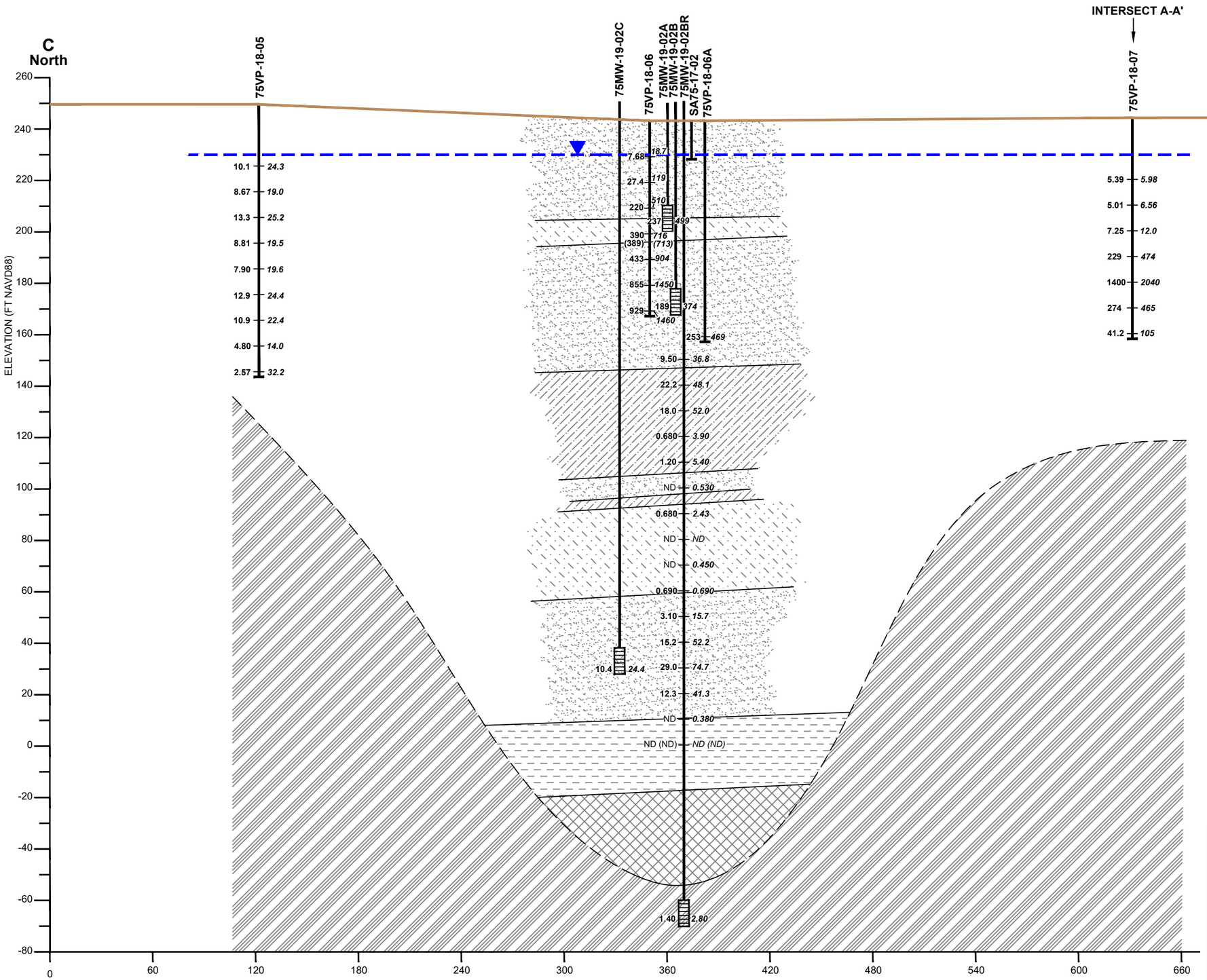


AOC 75 Cross Section B-B'
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

Scale as Shown	Date: 05/28/2020	Figure 5-8	KGS



Legend

Vertical Profile

1.39 U — EPA LHA Concentration (sum of PFOA and PFOS)

2.59 U — MassDEP Concentration (sum of PFOS + PFOA + PFDA + PFHpA + PFHxS + PFNA)

Monitoring Well

Screened Inteval

- Sand with Gravel/Sand
- Sand with Silt/Silty Sand
- Silt
- Silt, Sand, Gravel, with Clay
- Till
- Weathered Bedrock
- Bedrock
- Unknown
- Water Table

Notes:
All results in ng/L
ng/L = nanograms per liter
J = estimated result
U = non-detect
( ) = field duplicate

Perfluorooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorodecanoic acid (PFDA)
Perfluoroheptanoic acid (PFHpA)
Perfluorohexanesulfonic acid (PFHxS)
Perfluorononanoic acid (PFNA)

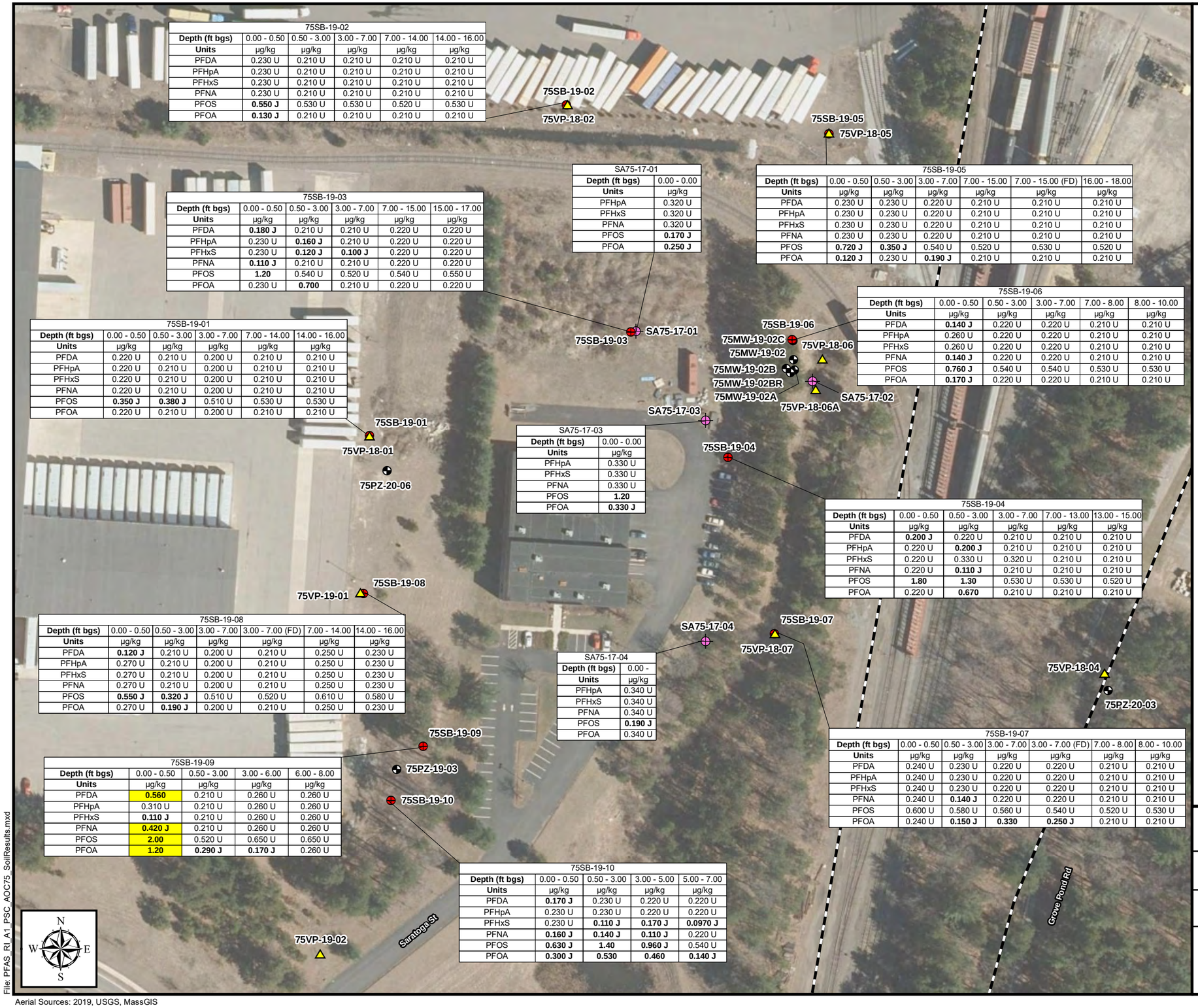
VERTICAL SCALE IN FEET: 40
HORIZONTAL SCALE IN FEET: 60

AOC 75 Cross Section C-C'
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

Scale as Shown	Date: 05/28/2020	Figure 5-9	KGS



75SB-19-02					
Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 14.00	14.00 - 16.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	0.230 U	0.210 U	0.210 U	0.210 U	0.210 U
PFHpA	0.230 U	0.210 U	0.210 U	0.210 U	0.210 U
PFHxS	0.230 U	0.210 U	0.210 U	0.210 U	0.210 U
PFNA	0.230 U	0.210 U	0.210 U	0.210 U	0.210 U
PFOS	**0.550 J**	0.530 U	0.530 U	0.520 U	0.530 U
PFOA	**0.130 J**	0.210 U	0.210 U	0.210 U	0.210 U

SA75-17-01	
Depth (ft bgs)	0.00 - 0.00
Units	µg/kg
PFHpA	0.320 U
PFHxS	0.320 U
PFNA	0.320 U
PFOS	**0.170 J**
PFOA	**0.250 J**

75SB-19-05						
Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 15.00	7.00 - 15.00 (FD)	16.00 - 18.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	0.230 U	0.230 U	0.220 U	0.210 U	0.210 U	0.210 U
PFHpA	0.230 U	0.230 U	0.220 U	0.210 U	0.210 U	0.210 U
PFHxS	0.230 U	0.230 U	0.220 U	0.210 U	0.210 U	0.210 U
PFNA	0.230 U	0.230 U	0.220 U	0.210 U	0.210 U	0.210 U
PFOS	**0.720 J**	**0.350 J**	0.540 U	0.520 U	0.530 U	0.520 U
PFOA	**0.120 J**	0.230 U	**0.190 J**	0.210 U	0.210 U	0.210 U

75SB-19-03					
Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 15.00	15.00 - 17.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.180 J**	0.210 U	0.210 U	0.220 U	0.220 U
PFHpA	0.230 U	**0.160 J**	0.210 U	0.220 U	0.220 U
PFHxS	0.230 U	**0.120 J**	**0.100 J**	0.220 U	0.220 U
PFNA	**0.110 J**	0.210 U	0.210 U	0.220 U	0.220 U
PFOS	**1.20**	0.540 U	0.520 U	0.540 U	0.550 U
PFOA	0.230 U	**0.700**	0.210 U	0.220 U	0.220 U

75SB-19-06					
Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 8.00	8.00 - 10.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.140 J**	0.220 U	0.220 U	0.210 U	0.210 U
PFHpA	0.260 U	0.220 U	0.220 U	0.210 U	0.210 U
PFHxS	0.260 U	0.220 U	0.220 U	0.210 U	0.210 U
PFNA	**0.140 J**	0.220 U	0.220 U	0.210 U	0.210 U
PFOS	**0.760 J**	0.540 U	0.540 U	0.530 U	0.530 U
PFOA	**0.170 J**	0.220 U	0.220 U	0.210 U	0.210 U

75SB-19-01					
Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 14.00	14.00 - 16.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	0.220 U	0.210 U	0.200 U	0.210 U	0.210 U
PFHpA	0.220 U	0.210 U	0.200 U	0.210 U	0.210 U
PFHxS	0.220 U	0.210 U	0.200 U	0.210 U	0.210 U
PFNA	0.220 U	0.210 U	0.200 U	0.210 U	0.210 U
PFOS	**0.350 J**	**0.380 J**	0.510 U	0.530 U	0.530 U
PFOA	0.220 U	0.210 U	0.200 U	0.210 U	0.210 U

SA75-17-03	
Depth (ft bgs)	0.00 - 0.00
Units	µg/kg
PFHpA	0.330 U
PFHxS	0.330 U
PFNA	0.330 U
PFOS	**1.20**
PFOA	**0.330 J**

75SB-19-04					
Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 13.00	13.00 - 15.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.200 J**	0.220 U	0.210 U	0.210 U	0.210 U
PFHpA	0.220 U	**0.200 J**	0.210 U	0.210 U	0.210 U
PFHxS	0.220 U	0.330 U	0.320 U	0.210 U	0.210 U
PFNA	0.220 U	**0.110 J**	0.210 U	0.210 U	0.210 U
PFOS	**1.80**	**1.30**	0.530 U	0.530 U	0.520 U
PFOA	0.220 U	**0.670**	0.210 U	0.210 U	0.210 U

75SB-19-08						
Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	3.00 - 7.00 (FD)	7.00 - 14.00	14.00 - 16.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.120 J**	0.210 U	0.200 U	0.210 U	0.250 U	0.230 U
PFHpA	0.270 U	0.210 U	0.200 U	0.210 U	0.250 U	0.230 U
PFHxS	0.270 U	0.210 U	0.200 U	0.210 U	0.250 U	0.230 U
PFNA	0.270 U	0.210 U	0.200 U	0.210 U	0.250 U	0.230 U
PFOS	**0.550 J**	**0.320 J**	0.510 U	0.520 U	0.610 U	0.580 U
PFOA	0.270 U	**0.190 J**	0.200 U	0.210 U	0.250 U	0.230 U

SA75-17-04	
Depth (ft bgs)	0.00 -
Units	µg/kg
PFHpA	0.340 U
PFHxS	0.340 U
PFNA	0.340 U
PFOS	**0.190 J**
PFOA	0.340 U

75SB-19-07						
Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	3.00 - 7.00 (FD)	7.00 - 8.00	8.00 - 10.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	0.240 U	0.230 U	0.220 U	0.220 U	0.210 U	0.210 U
PFHpA	0.240 U	0.230 U	0.220 U	0.220 U	0.210 U	0.210 U
PFHxS	0.240 U	0.230 U	0.220 U	0.220 U	0.210 U	0.210 U
PFNA	0.240 U	**0.140 J**	0.220 U	0.220 U	0.210 U	0.210 U
PFOS	0.600 U	0.580 U	0.560 U	0.540 U	0.520 U	0.530 U
PFOA	0.240 U	**0.150 J**	**0.330**	**0.250 J**	0.210 U	0.210 U

75SB-19-09				
Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 6.00	6.00 - 8.00
Units	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.560**	0.210 U	0.260 U	0.260 U
PFHpA	0.310 U	0.210 U	0.260 U	0.260 U
PFHxS	**0.110 J**	0.210 U	0.260 U	0.260 U
PFNA	**0.420 J**	0.210 U	0.260 U	0.260 U
PFOS	**2.00**	0.520 U	0.650 U	0.650 U
PFOA	**1.20**	**0.290 J**	**0.170 J**	0.260 U

75SB-19-10				
Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 5.00	5.00 - 7.00
Units	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.170 J**	0.230 U	0.220 U	0.220 U
PFHpA	0.230 U	0.230 U	0.220 U	0.220 U
PFHxS	0.230 U	**0.110 J**	**0.170 J**	**0.0970 J**
PFNA	**0.160 J**	**0.140 J**	**0.110 J**	0.220 U
PFOS	**0.630 J**	**1.40**	**0.960 J**	0.540 U
PFOA	**0.300 J**	**0.530**	**0.460**	**0.140 J**

Legend

- Monitoring Well/Piezometer
- Soil Boring Location
- Vertical Profiling Location
- Temporary Well Location from SI
- Former Fort Devens Boundary

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

PFAS	Limits (ug/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

1.80 = detection of PFAS
1.80 = detection of PFAS above criteria

Data reported to three significant figures

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

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 75 Soil Results
Devens PFAS RI - Area 1 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: 04/30/2020

Figure 5-10

File: PFAS_RI_A1_PSC_AOC75_SoilResults.mxd

Aerial Sources: 2019, USGS, MassGIS

Legend

- Existing Monitoring Well/Piezometer
- New Monitoring Well/Piezometer
- Soil Boring Location
- Vertical Profiling Location Installation Phase 1
- Vertical Profiling Location Installation Phase 2
- Vertical Profiling Location Installation Phase 3
- Vertical Profiling Location Installation Phase 4
- AOC 74 Vertical Profiling Location
- Surface Water and Sediment Sampling Location
- Public Water Supply Well
- Irrigation Well (Approximate Location)
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Grove Pond Area Field Activities
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

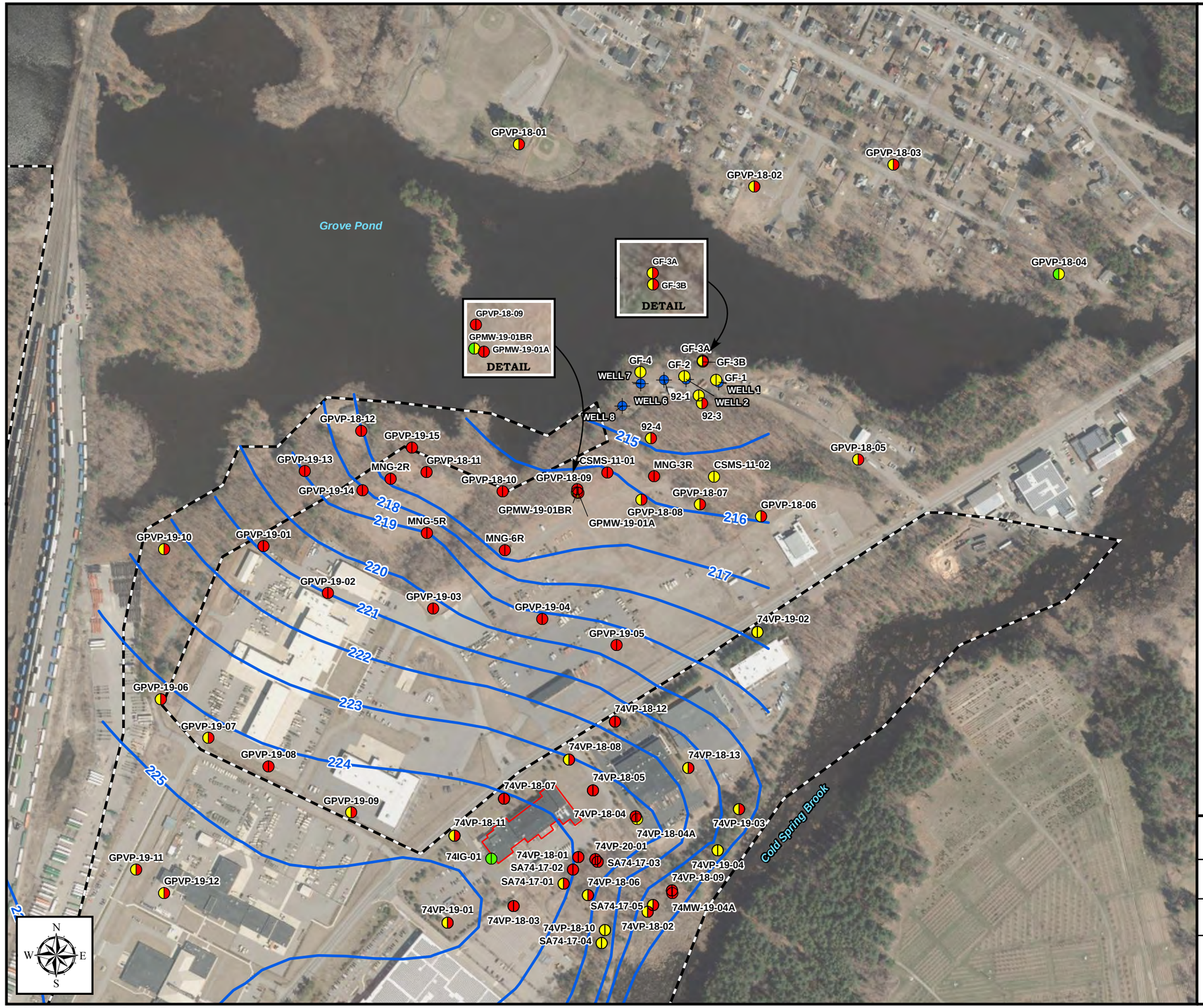
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 200 400
Feet

Date: 04/23/2020

Figure 6-1

File: PFAS_RI_A1_PSC_GrovePond_FieldActivities.mxd



Legend

- Monitoring Well/Vertical Profiling Location

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

- EPA LHA ≥ 70 ng/L
- EPA LHA < 70 ng/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
- Public Water Supply Well
- Groundwater Contour (ft NAVD 88) (Contour Interal = 1 Foot) - March 2020
- 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

Aerial Source: USGS, MassGIS Orthoimagery 2019

Grove Pond Groundwater Results
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

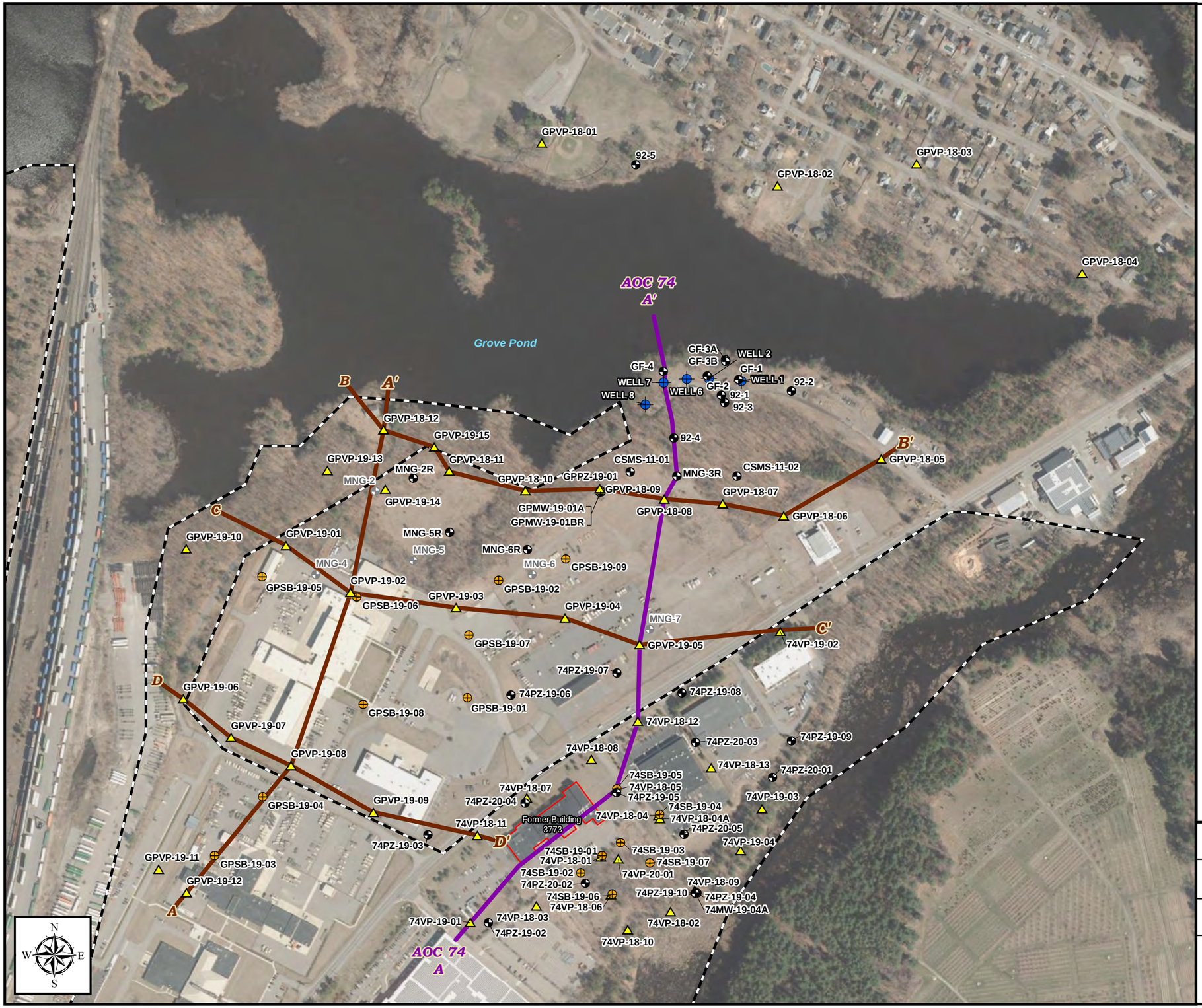
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 200 400
Feet

Date: 05/28/2020

Figure 6-2

File: PFAS_RI_A1_PSC_GrovePond_GWResults.mxd



Legend

- Vertical Profiling Location
- Soil Boring Location
- Monitoring Well
- Abandoned Monitoring Well
- Public Water Supply Well
- Cross Section Location
- AOC 74 Cross Section Location
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Grove Pond Area Cross Section Locations
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

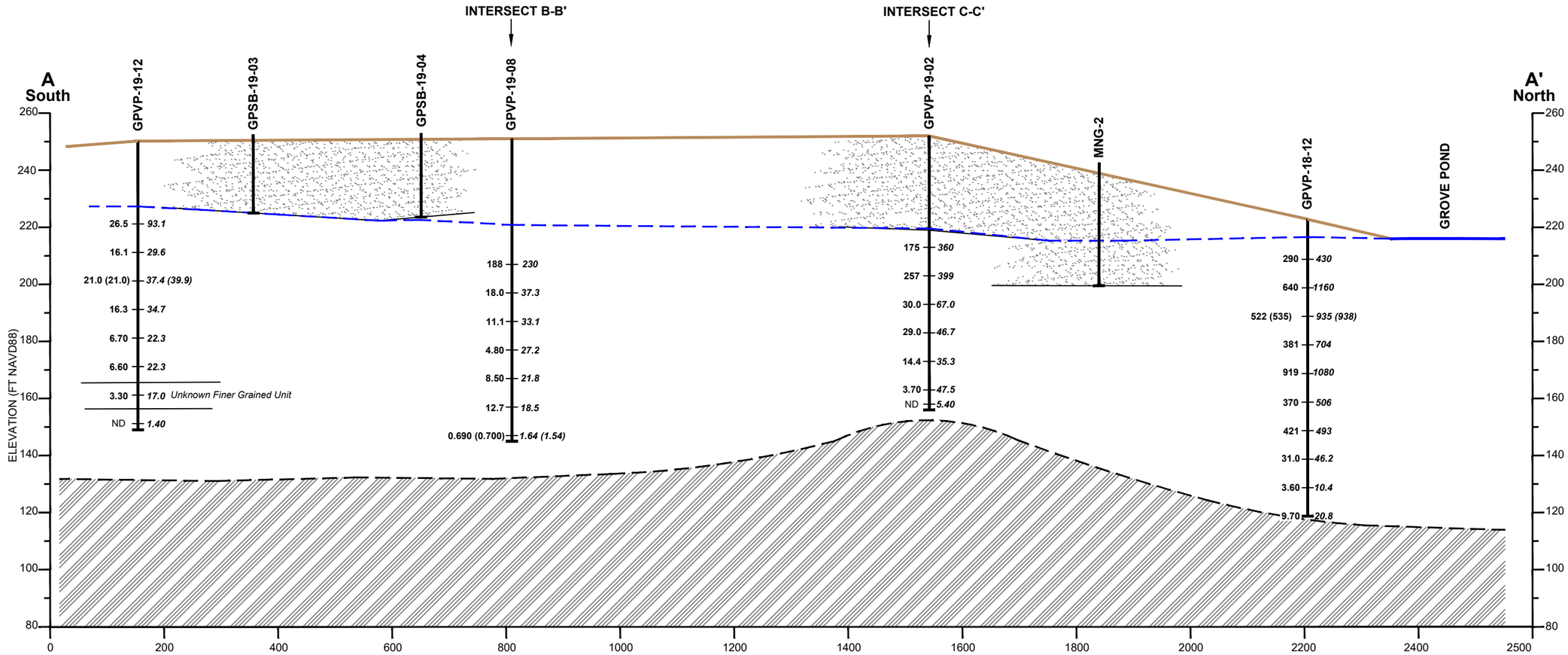
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 200 400
Feet

Date: 05/08/2020

Figure 6-3

File: PFAS_RI_A1_PSC_GrovePond_XSLoc.mxd



Legend

Vertical Profile

1.39 U — EPA LHA Concentration (sum of PFOA and PFOS)

2.59 U — MassDEP Concentration (sum of PFOS + PFOA + PFDA + PFHpA + PFHxS + PFNA)

Monitoring Well

Screened Interval

- Sand with Gravel/Sand
- Sand with Silt/Silty Sand
- Silt
- Silt, Sand, Gravel, with Clay
- Till
- Weathered Bedrock
- Bedrock
- Unknown
- Water Table

Notes:

All results in ng/L
ng/L = nanograms per liter
ND = non-detect
( ) = field duplicate

Perfluorooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorodecanoic acid (PFDA)
Perfluoroheptanoic acid (PFHpA)
Perfluorohexanesulfonic acid (PFHxS)
Perfluorononanoic acid (PFNA)

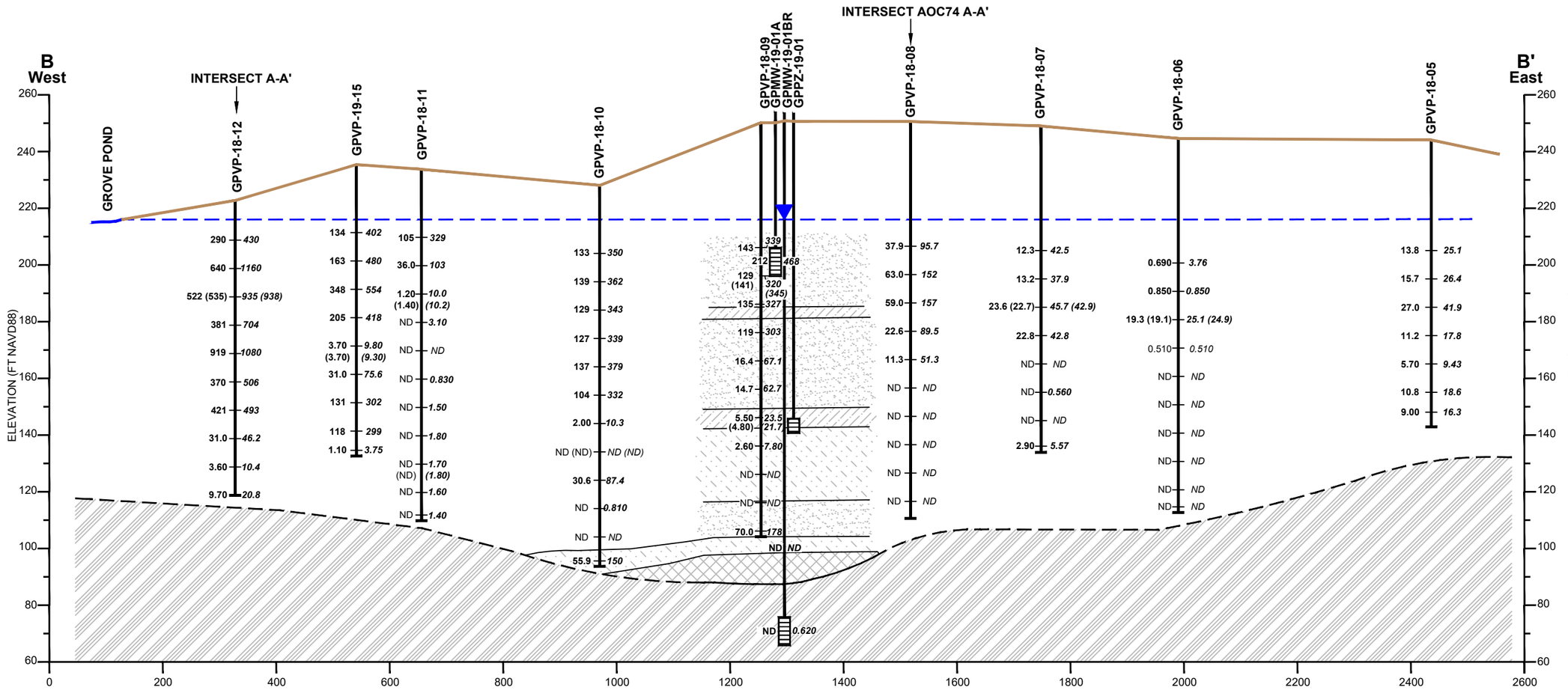
VERTICAL SCALE IN FEET: 40
HORIZONTAL SCALE IN FEET: 200

Grove Pond Area - Cross Section, A-A'
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

Scale as Shown	Date: 05/13/2020	Figure 6-4	KGS



Legend

Vertical Profile

1.39 U
EPA LHA Concentration (sum of PFOA and PFOS)

2.59 U
MassDEP Concentration (sum of PFOS + PFOA + PFDA + PFHpA + PFHxS + PFNA)

Monitoring Well

Screened Interval

- Sand with Gravel/Sand
- Sand with Silt/Silty Sand
- Silt
- Silt, Sand, Gravel, with Clay
- Till
- Weathered Bedrock
- Bedrock
- Unknown
- Water Table

Notes:

All results in ng/L
ng/L = nanograms per liter
ND = non-detect
( ) = field duplicate

Perfluorooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorodecanoic acid (PFDA)
Perfluoroheptanoic acid (PFHpA)
Perfluorohexanesulfonic acid (PFHxS)
Perfluorononanoic acid (PFNA)

VERTICAL SCALE IN FEET: 40
HORIZONTAL SCALE IN FEET: 200

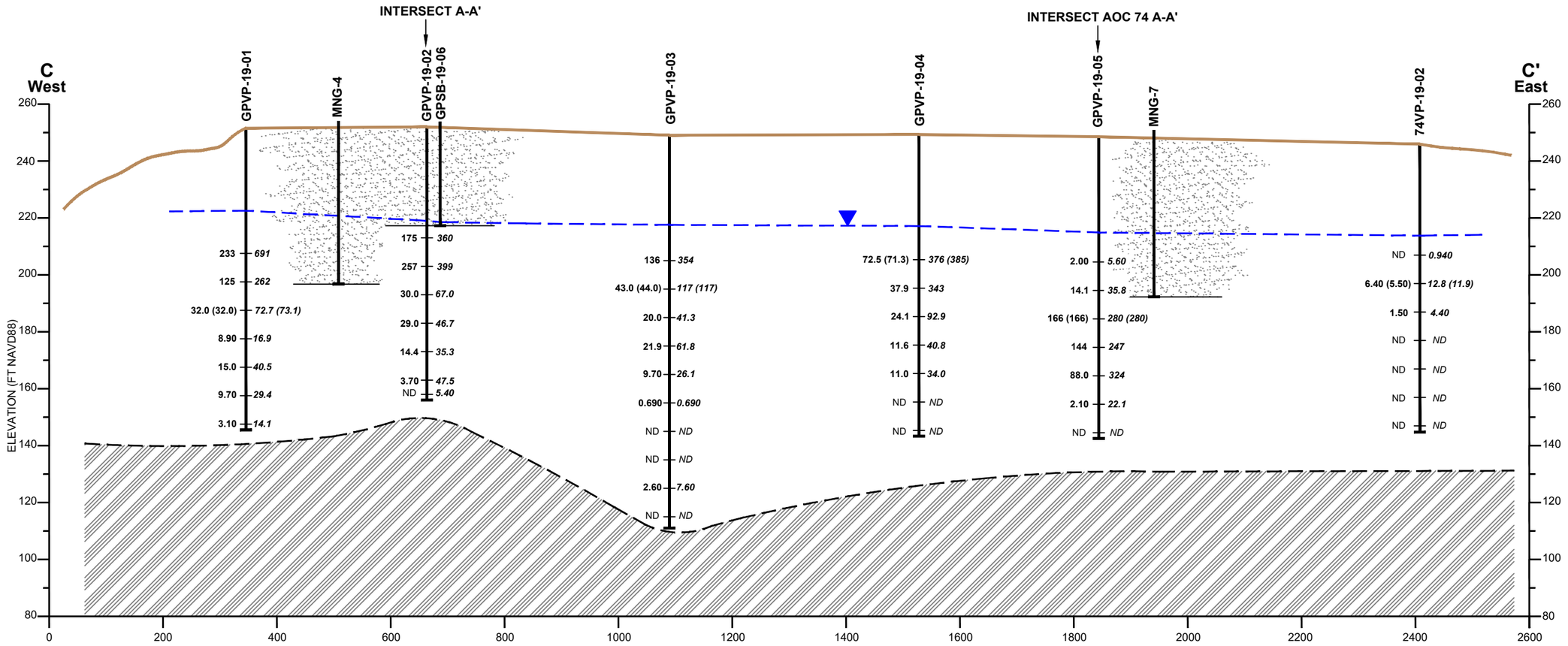
Grove Pond Area - Cross Section, B-B'
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

Scale as Shown	Date: 05/28/2020	Figure 6-5	KGS

File: X:\HS_Environmental\FortDevens_Mass\Drawings\PSC_Report\Area1\PSC_A1_GrovePond_XS.dwg B-B



Legend

Vertical Profile

1.39 U
EPA LHA
Concentration
(sum of PFOA
and PFOS)

2.59 U
MassDEP
Concentration
(sum of PFOS + PFOA
+ PFDA + PFHpA +
PFHxS + PFNA)

Monitoring Well

Screened
Interval

- Sand with Gravel/Sand
- Sand with Silt/Silty Sand
- Silt
- Silt, Sand, Gravel, with Clay
- Till
- Weathered Bedrock
- Bedrock
- Unknown
- Water Table

Notes:

All results in ng/L
ng/L = nanograms per liter
ND = non-detect
( ) = field duplicate

Perfluorooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorodecanoic acid (PFDA)
Perfluoroheptanoic acid (PFHpA)
Perfluorohexanesulfonic acid (PFHxS)
Perfluorononanoic acid (PFNA)

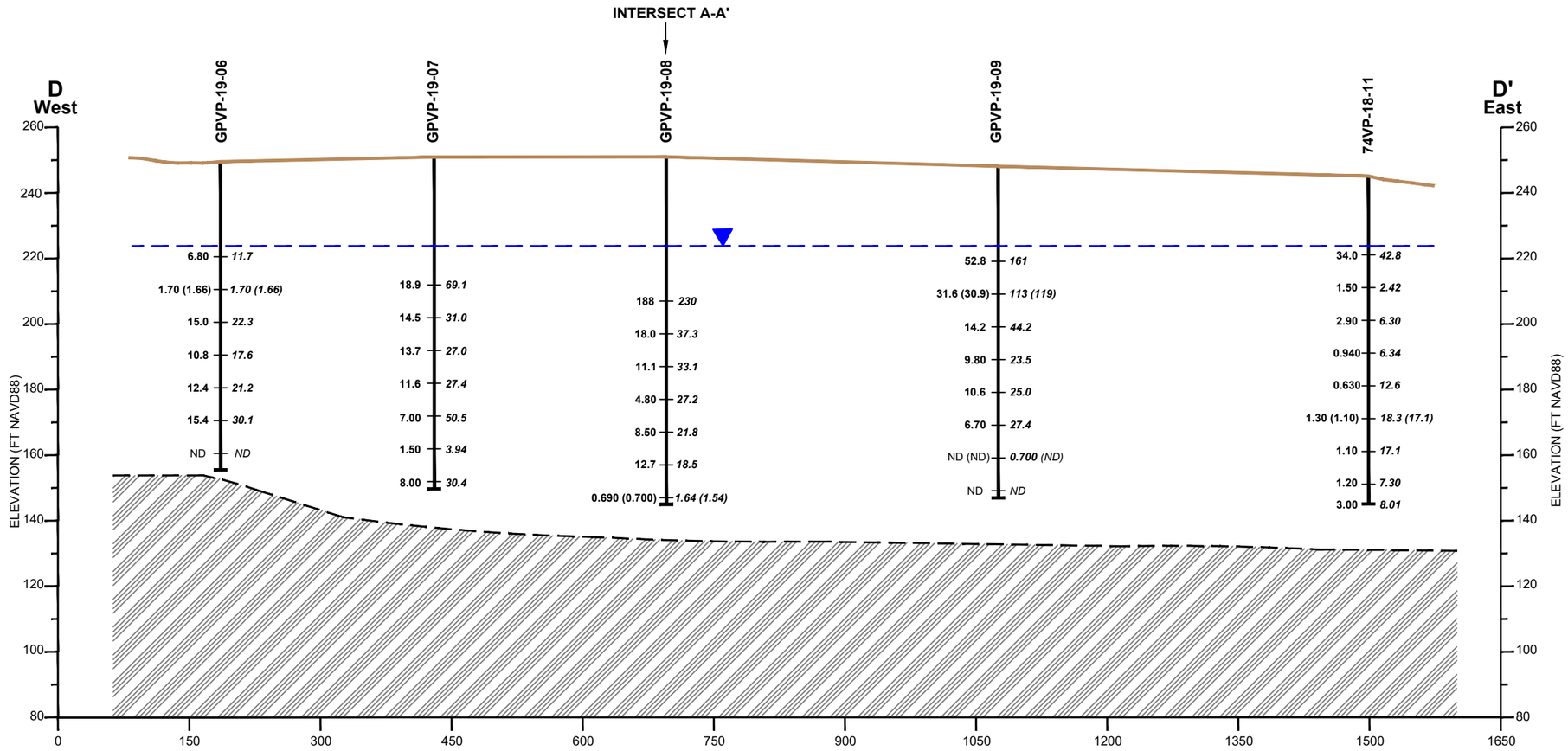
VERTICAL SCALE IN FEET: 40
HORIZONTAL SCALE IN FEET: 200

Grove Pond Area - Cross Section, C-C'
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

Scale as Shown	Date: 05/28/2020	Figure 6-6	KGS



Legend

Vertical Profile

1.39 U EPA LHA Concentration (sum of PFOA and PFOS)

2.59 U MassDEP Concentration (sum of PFOS + PFOA + PFDA + PFHpA + PFHxS + PFNA)

Monitoring Well

Screened Interval

- Sand with Gravel/Sand
- Sand with Silt/Silty Sand
- Silt
- Silt, Sand, Gravel, with Clay
- Till
- Weathered Bedrock
- Bedrock
- Unknown
- Water Table

Notes:

All results in ng/L
ng/L = nanograms per liter
ND = non-detect
( ) = field duplicate

Perfluorooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorodecanoic acid (PFDA)
Perfluoroheptanoic acid (PFHpA)
Perfluorohexanesulfonic acid (PFHxS)
Perfluorononanoic acid (PFNA)

VERTICAL SCALE IN FEET: 40
HORIZONTAL SCALE IN FEET: 150

Grove Pond Area - Cross Section, D-D'
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC
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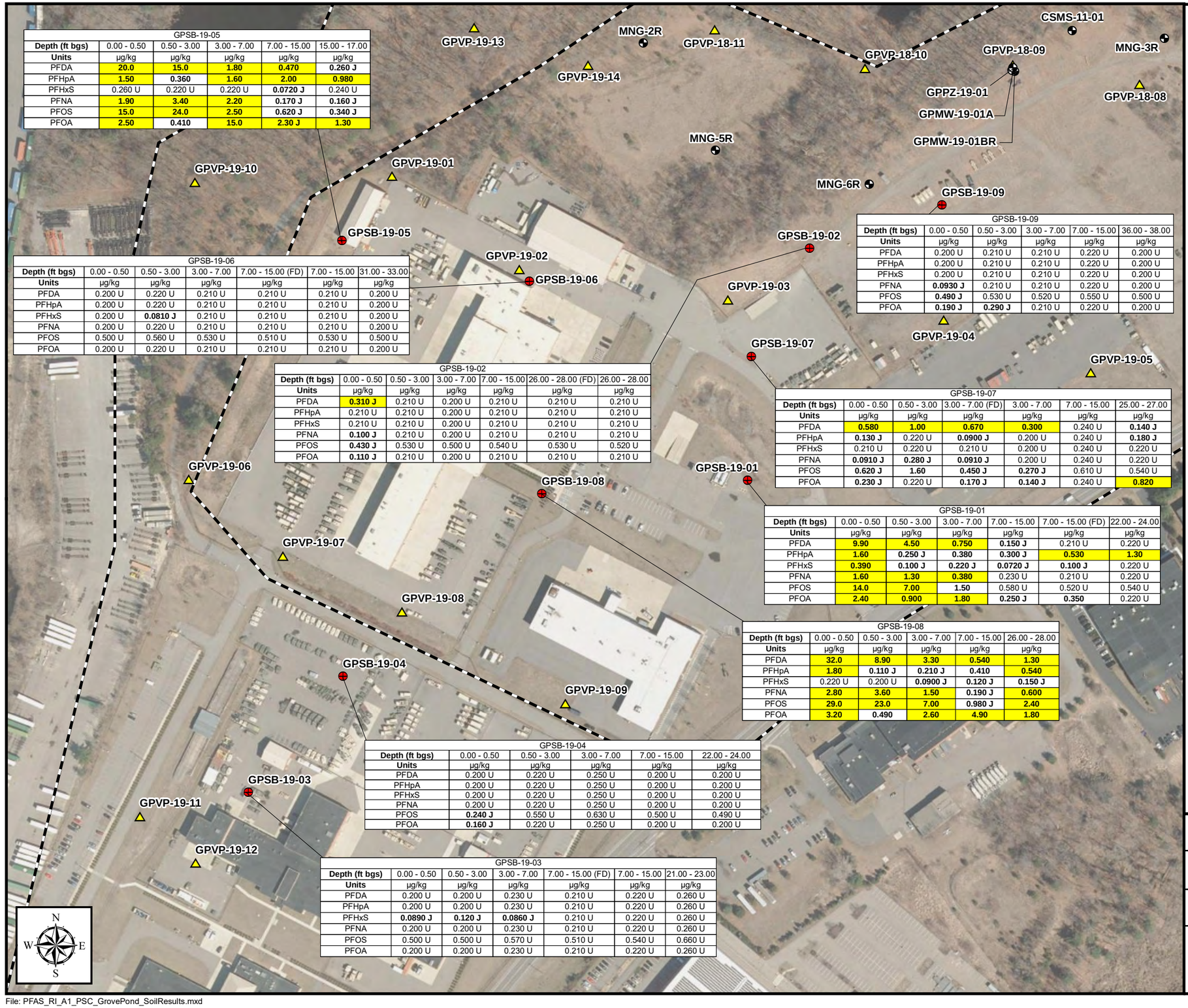
Scale as Shown	Date: 05/28/2020	Figure 6-7	KGS



GPSB-19-05

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 15.00	15.00 - 17.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**20.0**	**15.0**	**1.80**	**0.470**	**0.260 J**
PFHpA	**1.50**	**0.360**	**1.60**	**2.00**	**0.980**
PFHxS	0.260 U	0.220 U	0.220 U	**0.0720 J**	0.240 U
PFNA	**1.90**	**3.40**	**2.20**	**0.170 J**	**0.160 J**
PFOS	**15.0**	**24.0**	**2.50**	**0.620 J**	**0.340 J**
PFOA	**2.50**	**0.410**	**15.0**	**2.30 J**	**1.30**

GPSB-19-09

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 15.00	36.00 - 38.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	0.200 U	0.210 U	0.210 U	0.220 U	0.200 U
PFHpA	0.200 U	0.210 U	0.210 U	0.220 U	0.200 U
PFHxS	0.200 U	0.210 U	0.210 U	0.220 U	0.200 U
PFNA	**0.0930 J**	0.210 U	0.210 U	0.220 U	0.200 U
PFOS	**0.490 J**	0.530 U	0.520 U	0.550 U	0.500 U
PFOA	**0.190 J**	**0.290 J**	0.210 U	0.220 U	0.200 U

GPSB-19-06

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 15.00 (FD)	7.00 - 15.00	31.00 - 33.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	0.200 U	0.220 U	0.210 U	0.210 U	0.210 U	0.200 U
PFHpA	0.200 U	0.220 U	0.210 U	0.210 U	0.210 U	0.200 U
PFHxS	0.200 U	**0.0810 J**	0.210 U	0.210 U	0.210 U	0.200 U
PFNA	0.200 U	0.220 U	0.210 U	0.210 U	0.210 U	0.200 U
PFOS	0.500 U	0.560 U	0.530 U	0.510 U	0.530 U	0.500 U
PFOA	0.200 U	0.220 U	0.210 U	0.210 U	0.210 U	0.200 U

GPSB-19-07

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00 (FD)	3.00 - 7.00	7.00 - 15.00	25.00 - 27.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.580**	**1.00**	**0.670**	**0.300**	0.240 U	**0.140 J**
PFHpA	**0.130 J**	0.220 U	**0.0900 J**	0.200 U	0.240 U	**0.180 J**
PFHxS	0.210 U	0.220 U	0.210 U	0.200 U	0.240 U	0.220 U
PFNA	**0.0910 J**	**0.280 J**	**0.0910 J**	0.200 U	0.240 U	0.220 U
PFOS	**0.620 J**	**1.60**	**0.450 J**	**0.270 J**	0.610 U	0.540 U
PFOA	**0.230 J**	0.220 U	**0.170 J**	**0.140 J**	0.240 U	**0.820**

GPSB-19-02

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 15.00	26.00 - 28.00 (FD)	26.00 - 28.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.310 J**	0.210 U	0.200 U	0.210 U	0.210 U	0.210 U
PFHpA	0.210 U	0.210 U	0.200 U	0.210 U	0.210 U	0.210 U
PFHxS	0.210 U	0.210 U	0.200 U	0.210 U	0.210 U	0.210 U
PFNA	**0.100 J**	0.210 U	0.200 U	0.210 U	0.210 U	0.210 U
PFOS	**0.430 J**	0.530 U	0.500 U	0.540 U	0.530 U	0.520 U
PFOA	**0.110 J**	0.210 U	0.200 U	0.210 U	0.210 U	0.210 U

GPSB-19-01

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 15.00	7.00 - 15.00 (FD)	22.00 - 24.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**9.90**	**4.50**	**0.750**	**0.150 J**	0.210 U	0.220 U
PFHpA	**1.60**	**0.250 J**	**0.380**	**0.300 J**	**0.530**	**1.30**
PFHxS	**0.390**	**0.100 J**	**0.220 J**	**0.0720 J**	**0.100 J**	0.220 U
PFNA	**1.60**	**1.30**	**0.380**	0.230 U	0.210 U	0.220 U
PFOS	**14.0**	**7.00**	**1.50**	0.580 U	0.520 U	0.540 U
PFOA	**2.40**	**0.900**	**1.80**	**0.250 J**	**0.350**	0.220 U

GPSB-19-08

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 15.00	26.00 - 28.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**32.0**	**8.90**	**3.30**	**0.540**	**1.30**
PFHpA	**1.80**	**0.110 J**	**0.210 J**	**0.410**	**0.540**
PFHxS	0.220 U	0.200 U	**0.0900 J**	**0.120 J**	**0.150 J**
PFNA	**2.80**	**3.60**	**1.50**	**0.190 J**	**0.600**
PFOS	**29.0**	**23.0**	**7.00**	**0.980 J**	**2.40**
PFOA	**3.20**	**0.490**	**2.60**	**4.90**	**1.80**

GPSB-19-04

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 15.00	22.00 - 24.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	0.200 U	0.220 U	0.250 U	0.200 U	0.200 U
PFHpA	0.200 U	0.220 U	0.250 U	0.200 U	0.200 U
PFHxS	0.200 U	0.220 U	0.250 U	0.200 U	0.200 U
PFNA	0.200 U	0.220 U	0.250 U	0.200 U	0.200 U
PFOS	**0.240 J**	0.550 U	0.630 U	0.500 U	0.490 U
PFOA	**0.160 J**	0.220 U	0.250 U	0.200 U	0.200 U

GPSB-19-03

Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 15.00 (FD)	7.00 - 15.00	21.00 - 23.00
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	0.200 U	0.200 U	0.230 U	0.210 U	0.220 U	0.260 U
PFHpA	0.200 U	0.200 U	0.230 U	0.210 U	0.220 U	0.260 U
PFHxS	**0.0890 J**	**0.120 J**	**0.0860 J**	0.210 U	0.220 U	0.260 U
PFNA	0.200 U	0.200 U	0.230 U	0.210 U	0.220 U	0.260 U
PFOS	0.500 U	0.500 U	0.570 U	0.510 U	0.540 U	0.660 U
PFOA	0.200 U	0.200 U	0.230 U	0.210 U	0.220 U	0.260 U

Legend

- Monitoring Well/Piezometer
- Soil Boring Location
- Vertical Profiling Location
- Former Fort Devens Boundary

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

PFAS	Limits (ug/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

1.30 = detection of PFAS
1.30 = detection of PFAS above criteria

Data reported to three significant figures

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

Aerial Source: USGS, MassGIS Orthoimagery 2019

Grove Pond Area Soil Results
Devens PFAS R I - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

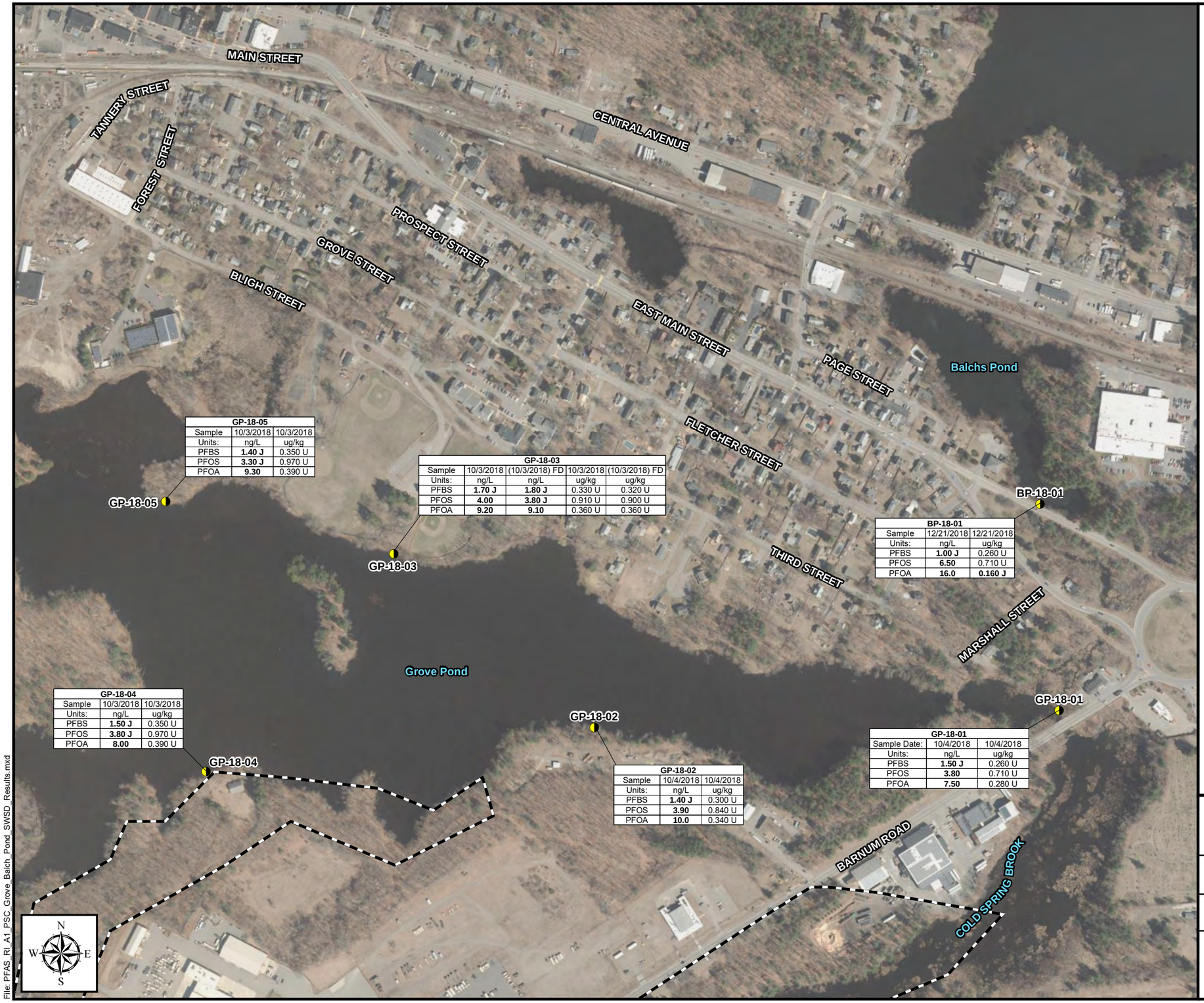
0 100 200
Feet

Date: 04/29/2020

Figure 6-8

KGS

File: PFAS_RI_A1_PSC_GrovePond_SoilResults.mxd



GP-18-05		
Sample	10/3/2018	10/3/2018
Units:	ng/L	ug/kg
PFBS	**1.40 J**	0.350 U
PFOS	**3.30 J**	0.970 U
PFOA	**9.30**	0.390 U

GP-18-03				
Sample	10/3/2018	(10/3/2018) FD	10/3/2018	(10/3/2018) FD
Units:	ng/L	ng/L	ug/kg	ug/kg
PFBS	**1.70 J**	**1.80 J**	0.330 U	0.320 U
PFOS	**4.00**	**3.80 J**	0.910 U	0.900 U
PFOA	**9.20**	**9.10**	0.360 U	0.360 U

BP-18-01		
Sample	12/21/2018	12/21/2018
Units:	ng/L	ug/kg
PFBS	**1.00 J**	0.260 U
PFOS	**6.50**	0.710 U
PFOA	**16.0**	**0.160 J**

GP-18-04		
Sample	10/3/2018	10/3/2018
Units:	ng/L	ug/kg
PFBS	**1.50 J**	0.350 U
PFOS	**3.80 J**	0.970 U
PFOA	**8.00**	0.390 U

GP-18-02		
Sample	10/4/2018	10/4/2018
Units:	ng/L	ug/kg
PFBS	**1.40 J**	0.300 U
PFOS	**3.90**	0.840 U
PFOA	**10.0**	0.340 U

GP-18-01		
Sample Date:	10/4/2018	10/4/2018
Units:	ng/L	ug/kg
PFBS	**1.50 J**	0.260 U
PFOS	**3.80**	0.710 U
PFOA	**7.50**	0.280 U

Legend

- Surface Water and Sediment Sample Location
- Former Fort Devens Boundary

EPA PFAS Site Specific Screening Levels for Former Fort Devens			
Surface Water		Sediment	
Units:	ng/L	Units:	µg/kg
PFOA	2,030	PFOA	609
PFOS	2,030	PFOS	609
PFBS	2,030,000	PFBS	609,000

Notes:

Perfluorooctane Sulfonic Acid (PFOS)
Perfluorooctanoic Acid (PFOA)
Perfluorobutanesulfonic acid (PFBS)
ng/L = nanograms per liter (Surface Water Result Value)
µg/kg = microgram per kilogram (Sediment Result value)

J = estimated result
U= not detected above the reported sample quantitation limit
Bold = detection

Grove Pond and Balch Pond
PFAS Results in Surface Water and Sediment Samples
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 200 400
Feet

Date: 05/05/2020

Figure 6-9

File: PFAS_RI_A1_PSC_Grove_Balch_Pond_SWSD_Results.mxd

Aerial Sources: 2019, USGS, MassGIS

Legend

- Public Water Supply Well
- Current Road
- AOC 40 Debris Disposal Area
- AOC 40 Sediment Removal Area
- Former Fort Devens Boundary

Note:

Aerial Source: MassGIS - 1:5,000 Black and White Digital Orthophoto Images - 1992

Patton Well Area/AOC 40 1992 Aerial Imagery
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC

0 250 500
Feet

Date: 05/13/2020

Figure 7-1

File: PFAS_IDE_2020_PattonWell_AOC40_1992Imagery.mxd

Legend

Historic Subsurface Features

- Communication
- Communication Line
- Electric
- Electric Line
- Steam Manhole
- Steam
- Storm
- Storm Line
- Storm Feature
- Sanitary
- Sanitary Line
- Sanitary Feature
- Water
- Water Line
- Water Feature
- Abandoned Feature
- Abandoned Line
- Gas
- Gas Line
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Patton Well Area/AOC 40 Area Historic Subsurface Features
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

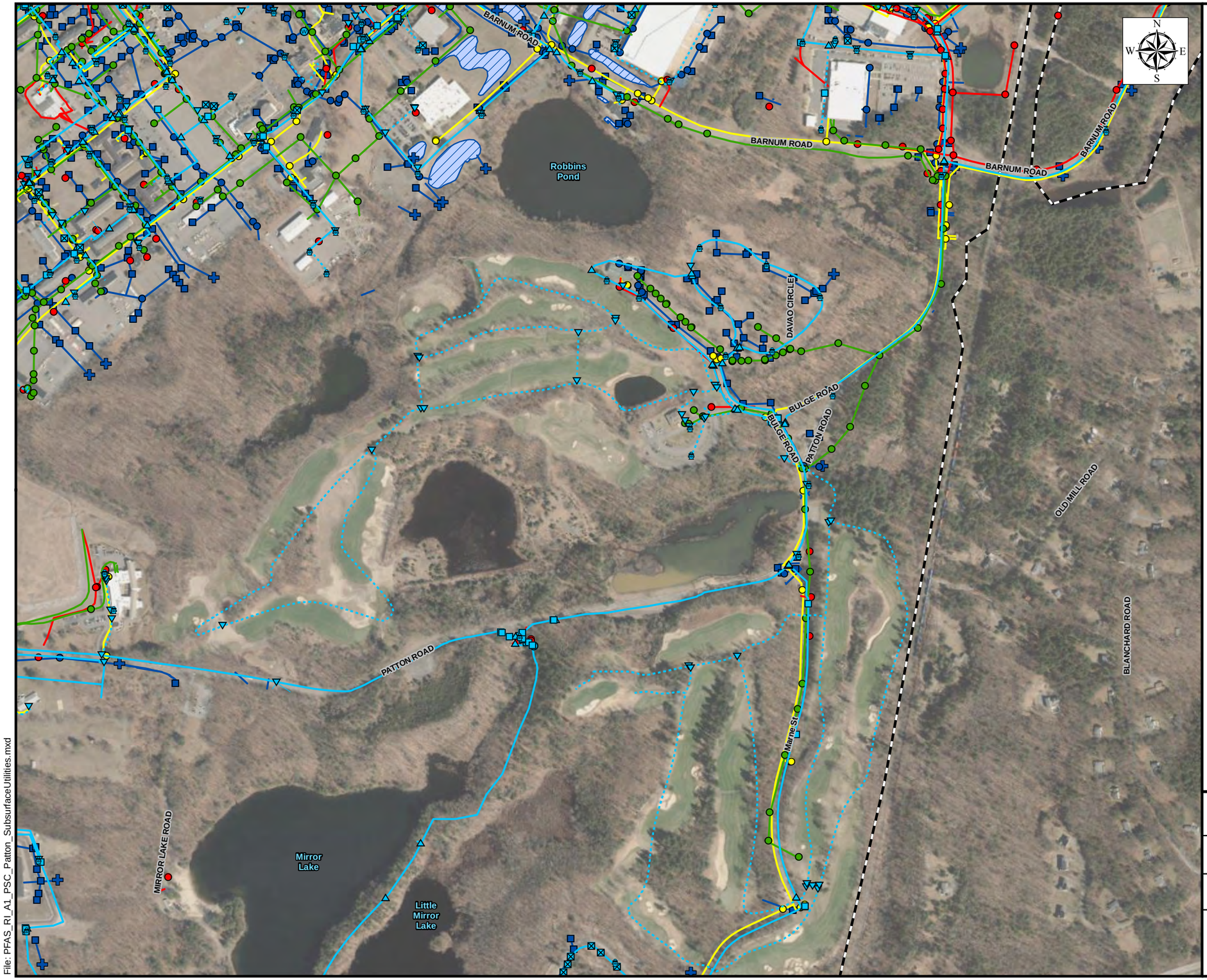
0 300 600
Feet

Date: 04/26/2020

Figure 7-2

KGS

File: PFAS_RI_A1_PSC_Patton_HistoricUtilities.mxd



Legend

Water 01/06/2020
- Hydrant
- Main Fitting
- Service Fitting
- Main Valve
- Service Valve
- Wellhead
- Main Line
- Service Line
- Tie

Sewer 01/06/2020
- Force Fitting, Main Fitting, Service Fitting, Manhole
- Force Main, Gravity Main, Service Line, Tie
- DBox, Grease Trap, Lift Station, Oil/Water

Electric 01/07/2020
- Connection Box, Handhole, Junction Box, Manhole, Meter, Switch, or Transformer
- Inservice/Abandoned
- Vault

Gas 01/06/2020
- Main Fitting, Main Valve, Meter, Rectifier, Service Fitting, Service Regulator, Service Valve, Test Station, Anode
- Main, Service, Tie, Cathodic Loop

Stormwater 12/11/2019
- Catch Basin
- Outfall
- Manhole
- Pipe, Culvert
- Detention Pond
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Patton Well Area/AOC 40 Area Current Subsurface Features
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 300 600
Feet

Date: 04/26/2020

Figure 7-3

KGS

File: PFAS_RI_A1_PSC_Patton_SubsurfaceUtilities.mxd

Legend

- Surface Water and Sediment Sampling Location
- Initial Monitoring Well/Piezometer
- New Monitoring Well/Piezometer
- Soil Boring Location
- Vertical Profiling Location Installation Phase 1
- Vertical Profiling Location Installation Phase 2
- Vertical Profiling Location Installation Phase 3
- AOC 43G Vertical Profiling Location
- Surface Water and Sediment Sampling Results
- Irrigation Well
- Public Water Supply Well
- Staff Gauge
- Former Fort Devens Boundary

Aerial Sources: USGS, MassGIS Orthoimagery 2019

Patton Well Area/AOC 40 Field Activities
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

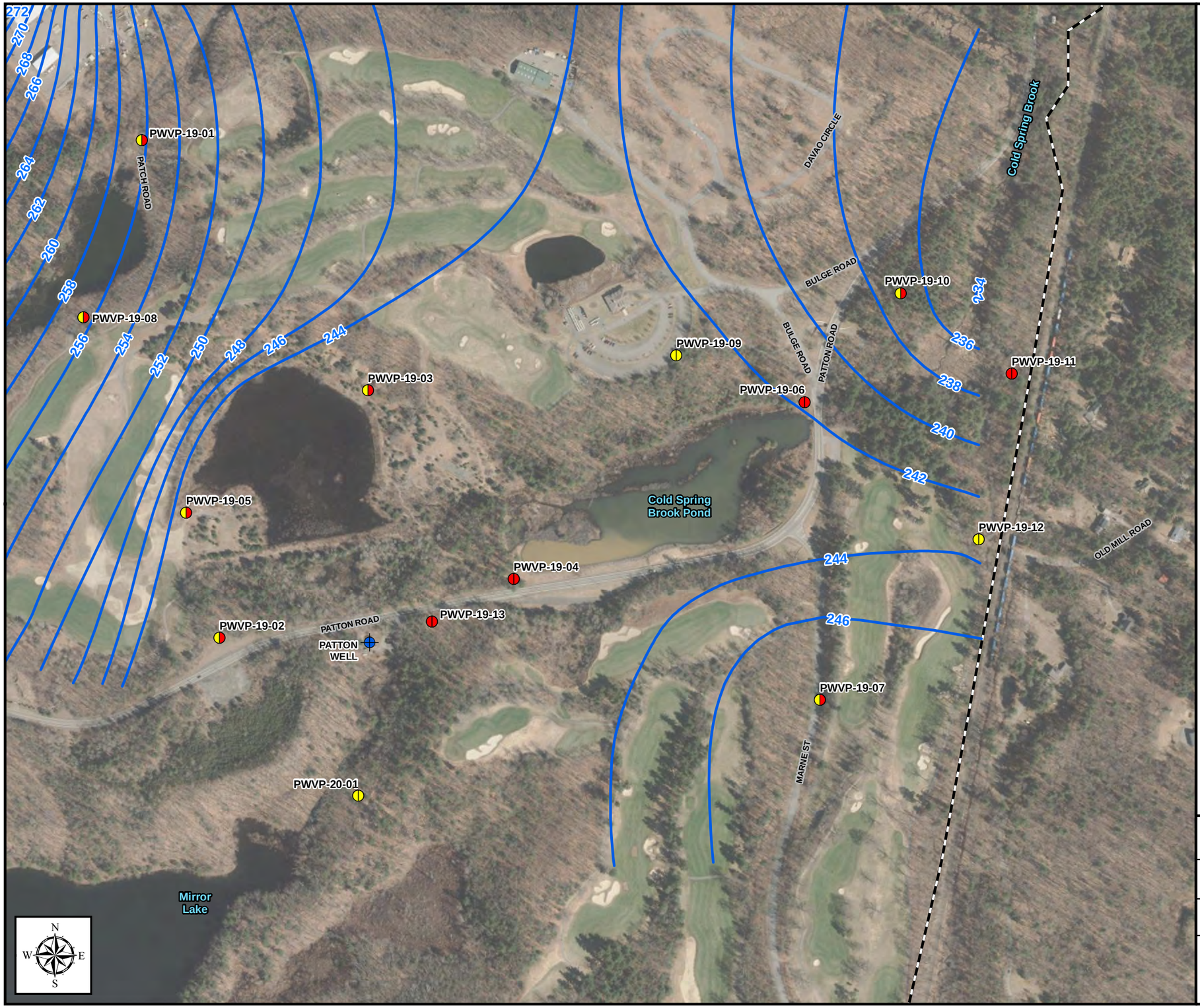
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 200 400
Feet

Date: 05/27/2020

Figure 7-4

File: PFAS_RI_A1_PSC_PattonWell_AOC40_FieldActivities.mxd



Legend

- Monitoring Well/Vertical Profiling Location

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

- EPA LHA ≥ 70 ng/L
- EPA LHA < 70 ng/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 Elevation Contour (ft NAVD 88)
  (Contour Interval = 2 ft) January 2-3, 2020
- 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

Aerial Source: USGS, MassGIS Orthoimagery 2019

Patton Well Area/AOC 40 Groundwater Results
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 200 400
Feet

Date: 05/28/2020

Figure 7-5

File: PFAS_RI_A1_PSC_Patton_GWResults.mxd

Legend

- Monitoring Well/Piezometer
- Abandoned Well
- Soil Boring Location
- Vertical Profiling Location
- Irrigation Well
- Public Water Supply Well
- Staff Gauge
- Cross Section Location
- Former Fort Devens Boundary

Aerial Sources: USGS, MassGIS Orthoimagery 2019

Patton Well Area/AOC 40 Cross Section Location Map
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

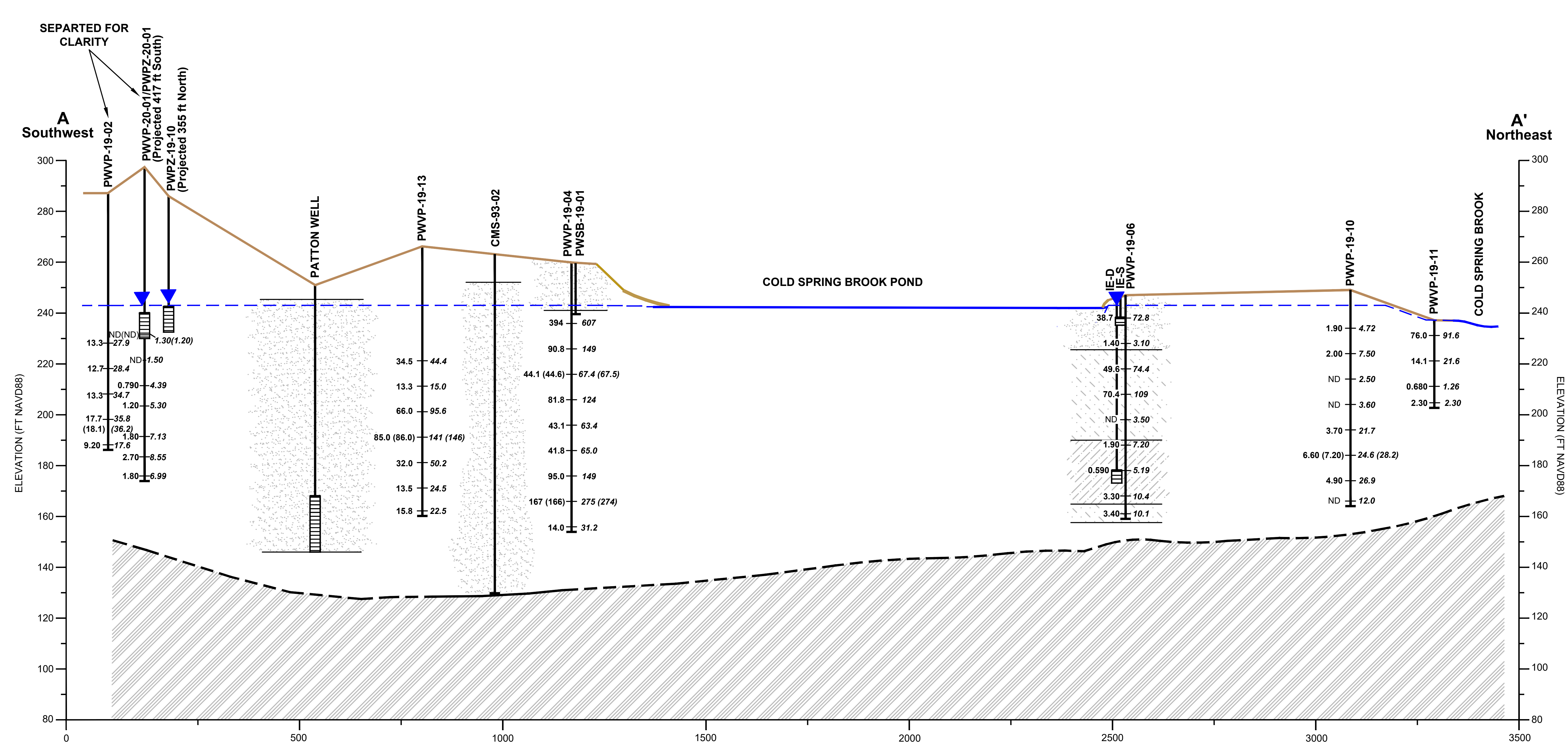
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 200 400
Feet

Date: 05/14/2020

Figure 7-6

File: PFAS_RI_A1_PSC_Patton_XSLoc.mxd



Legend

Vertical Profile

1.39 U EPA LHA Concentration (sum of PFOA and PFOS) | 2.59 U MassDEP Concentration (sum of PFOS + PFOA + PFDA + PFHpA + PFHxS + PFNA)

Monitoring Well

Screened Interval

- Sand with Gravel/Sand
- Sand with Silt/Silty Sand
- Silt
- Silt, Sand, Gravel, with Clay
- Till
- Weathered Bedrock
- Bedrock
- Unknown
- Water Table

Notes:

All results in ng/L
ng/L = nanograms per liter
ND = non-detect
( ) = field duplicate

Perfluorooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorodecanoic acid (PFDA)
Perfluoroheptanoic acid (PFHpA)
Perfluorohexanesulfonic acid (PFHxS)
Perfluorononanoic acid (PFNA)

VERTICAL SCALE IN FEET: 40
HORIZONTAL SCALE IN FEET: 250

Patton Well Area/AOC 40 - Cross Section, A-A'
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

Scale as Shown	Date: 05/28/2020	Figure 7-7

File: X:\HS_Environmental\FortDevens_Mass\Drawings\PSC_Report\Area1\PSC_A1_Patton_XS.dwg A-A

PWSB-19-04						
Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 15.00	19.50 - 21.50	19.50 - 21.50 (FD)
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.110 J**	0.210 U	0.200 U	0.200 U	0.200 U	0.220 U
PFHpA	**0.190 J**	0.210 U	0.200 U	0.200 U	0.200 U	0.220 U
PFHxS	**0.0900 J**	0.210 U	0.200 U	0.200 U	0.200 U	0.220 U
PFNA	**0.120 J**	0.210 U	0.200 U	0.200 U	0.200 U	0.220 U
PFOS	**1.40**	**0.470 J**	0.500 U	**0.340 J**	**0.330 J**	**0.330 J**
PFOA	**0.560**	0.210 U	0.200 U	0.200 U	0.200 U	0.220 U

PWSB-19-03	
Depth (ft bgs)	0.00 - 0.50
Units	µg/kg
PFDA	**0.630 J**
PFHpA	**0.390 J**
PFHxS	**1.70**
PFNA	**0.510 J**
PFOS	**4.00**
PFOA	**1.30**

PWSB-19-02	
Depth (ft bgs)	0.00 - 0.50
Units	µg/kg
PFDA	**0.300 J**
PFHpA	**0.240 J**
PFHxS	**0.870**
PFNA	**0.290 J**
PFOS	**4.30**
PFOA	**0.600**

PWSB-19-01					
Depth (ft bgs)	0.00 - 0.50	0.50 - 3.00	3.00 - 7.00	7.00 - 15.00	16.50 - 18.50
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFDA	**0.38**	0.210 U	0.190 U	0.200 U	0.200 U
PFHpA	**0.0840 J**	0.210 U	0.190 U	0.200 U	0.200 U
PFHxS	0.200 U	0.210 U	0.190 U	0.200 U	0.200 U
PFNA	0.200 U	0.210 U	0.190 U	0.200 U	0.200 U
PFOS	**1.80**	**0.530 J**	**0.400 J**	**0.270 J**	**0.270 J**
PFOA	**0.200 J**	0.210 U	0.190 U	0.200 U	**0.110 J**

Legend

- Monitoring Well/Piezometer
- Soil Boring Location
- Vertical Profiling Location
- Public Water Supply Well
- Staff Gauge
- Former Fort Devens Boundary

Notes:

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

PFAS	Limits (ug/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

1.70 = detection of PFAS

1.70 = detection of PFAS above criteria

Data reported to three significant figures

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

Aerial Source: USGS, MassGIS Orthoimagery 2019

Patton Well Area/AOC 40 Soil Results
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 100 200
Feet

Date: 04/27/2020

Figure 7-8

File: PFAS_RI_A1_PSC_PattonWell_AOC40_SoilResults.mxd

CSB-18-01		
Sample	9/27/2018	9/27/2018
Units:	ng/L	ug/kg
PFBS	**1.60 J**	2.50 U
PFOS	**4.10**	6.90 U
PFOA	**4.50**	**2.50 J**

CSB-20-01		
Sample	3/27/2020	3/27/2020
Units:	ng/L	ug/kg
PFBS	**3.20**	0.370 U
PFOS	**2.20 J**	1.00 U
PFOA	**8.60**	**0.270 J**

CP-20-02		
Sample	3/27/2020	3/27/2020
Units:	ng/L	ug/kg
PFBS	**2.20**	0.230 U
PFOS	**5.50**	**0.340 J**
PFOA	**67.0**	**0.250 J**

CP-20-03		
Sample	3/30/2020	3/30/2020
Units:	ng/L	ug/kg
PFBS	**1.80**	0.270 U
PFOS	**5.70**	0.740 U
PFOA	**57.0**	**0.230 J**

CP-20-01				
Sample	3/27/2020	(3/27/2020) FD	3/27/2020	(3/27/2020) FD
Units:	ng/L	ng/L	ug/kg	ug/kg
PFBS	**2.60**	**2.60**	0.450 U	0.470 U
PFOS	**7.40**	**7.70**	**1.00 J**	**0.910 J**
PFOA	**60.0**	**54.0**	**0.400 J**	**0.310 J**

ML-20-01		
Sample	3/30/2020	3/30/2020
Units:	ng/L	ug/kg
PFBS	**1.10 J**	0.230 U
PFOS	**11.0**	0.630 U
PFOA	**12.0**	0.250 U

Legend

- Surface Water and Sediment Sample Location
- Public Water Supply Well
- Former Fort Devens Boundary

EPA PFAS Site Specific Screening Levels for Former Fort Devens			
Surface Water		Sediment	
Units:	ng/L	Units:	µg/kg
PFOA	2,030	PFOA	609
PFOS	2,030	PFOS	609
PFBS	2,030,000	PFBS	609,000

Notes:

Perfluorooctane Sulfonic Acid (PFOS)
Perfluorooctanoic Acid (PFOA)
Perfluorobutanesulfonic acid (PFBS)
ng/L = nanograms per liter (Surface Water Result Value)
µg/kg = microgram per kilogram (Sediment Result value)

J = estimated result
U= not detected above the reported sample quantitation limit
Bold = detection

Southern Extent Cold Spring Brook,
Cold Spring Brook Pond, and Mirror Lake
PFAS Results in Surface Water and Sediment Samples
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 300 600
Feet

Date: 05/05/2020

Figure 7-9

File: PFAS_RI_A1_PSC_South_ColdSpringBrook_SWSD_Results.mxd

Aerial Sources: 2019, USGS, MassGIS

Legend

- Public Water Supply Well
- Current Road
- Former Fort Devens Boundary

Note:

Aerial Source: MassGIS - 1:5,000 Black and White Digital Orthophoto Images - 1992

Shabokin Well Area and AOC 43J 1992 Aerial Imagery
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, MA

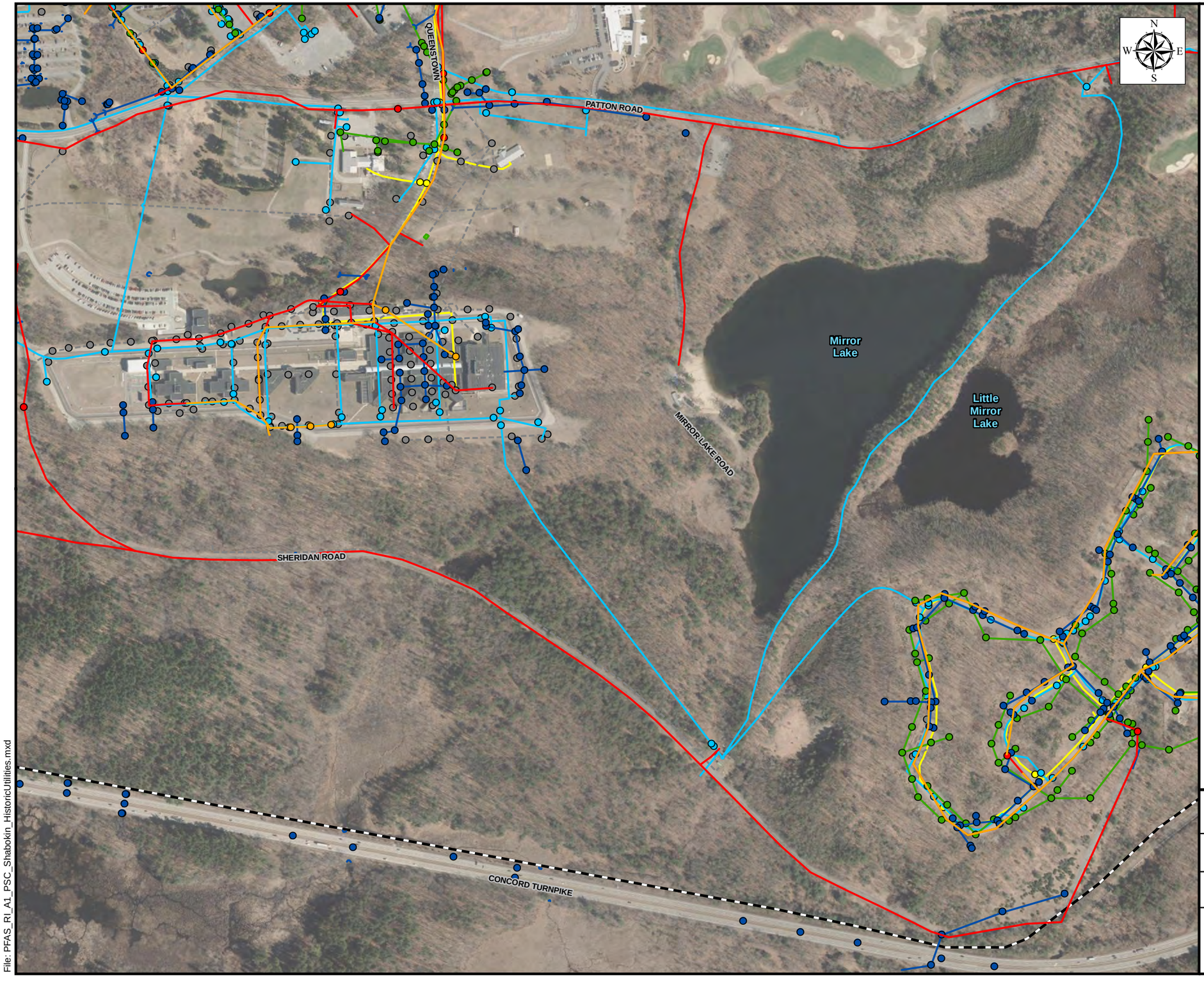
KOMAN Government Solutions, LLC

0 200 400
Feet

Date: 04/02/2020

Figure 8-1

File: PFAS_IDE_2020_ShabokinWell_1992Imagery.mxd



Legend

Historic Subsurface Features

- Communication
- Communication Line
- Electric
- Electric Line
- Storm
- Storm Line
- Storm Feature
- Sanitary
- Sanitary Line
- Sanitary Feature
- Water
- Water Line
- Water Feature
- Abandoned Feature
- Abandoned Line
- Gas
- Gas Line
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Shabokin Well Area and AOC 43J Historic Subsurface Features
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

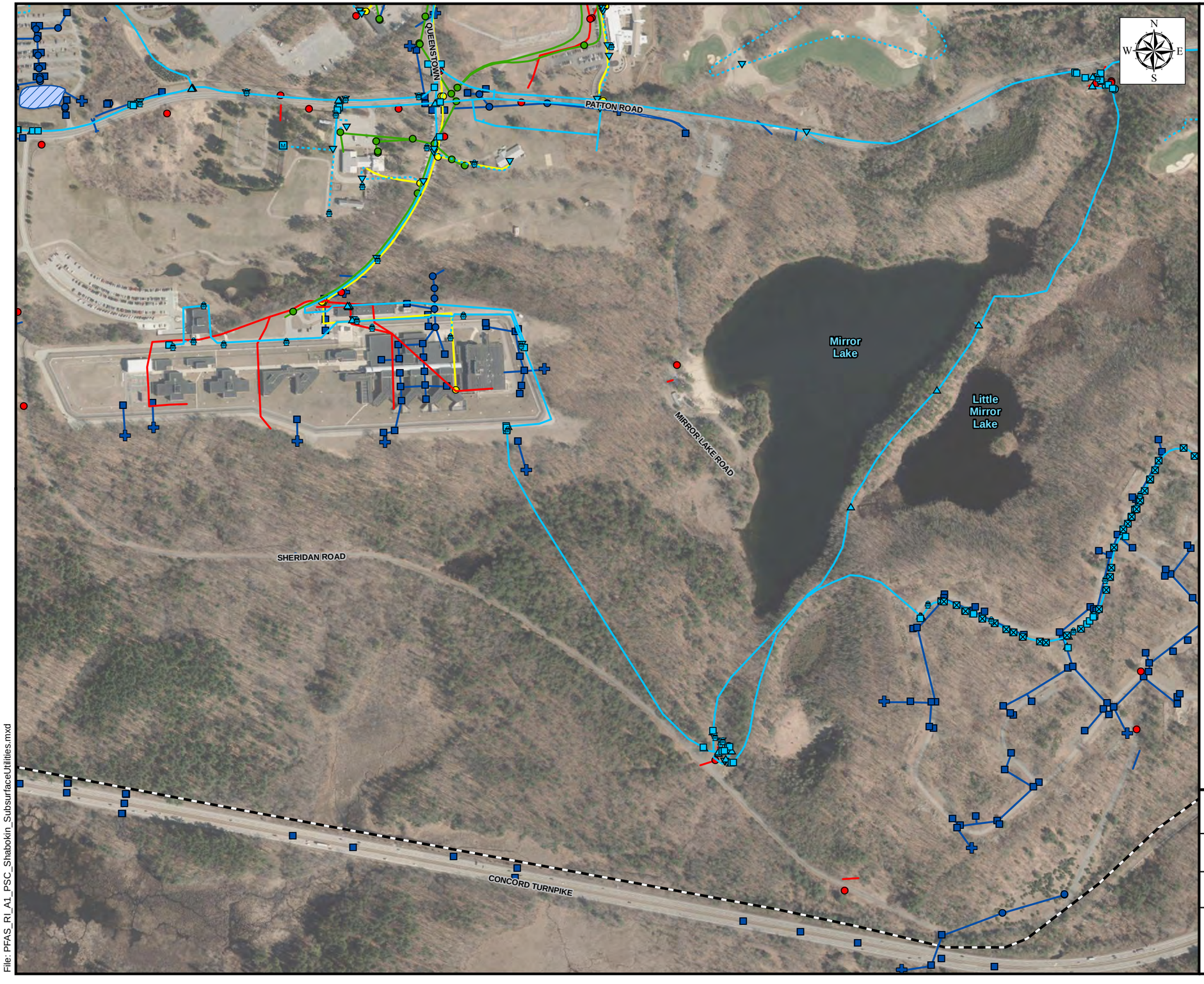
0 250 500
Feet

Date: 04/26/2020

Figure 8-2

KGS

File: PFAS_RI_A1_PSC_Shabokin_HistoricUtilities.mxd



Legend

Water 01/06/2020
- Hydrant
- Main Fitting
- Service Fitting
- Main Valve
- Service Valve
- Meter
- Wellhead
- Main Line
- Service Line
- Tie

Sewer 01/06/2020
- Force Fitting, Main Fitting, Service Fitting, Manhole
- Force Main, Gravity Main, Service Line, Tie
- DBox, Grease Trap, Lift Station, Oil/Water

Electric 01/07/2020
- Connection Box, Handhole, Junction Box, Manhole, Meter, Switch, or Transformer
- Inservice/Abandoned
- Vault

Gas 01/06/2020
- Main Fitting, Main Valve, Meter, Rectifier, Service Fitting, Service Regulator, Service Valve, Test Station, Anode
- Main, Service, Tie, Cathodic Loop

Stormwater 12/11/2019
- Catch Basin
- Outfall
- Manhole
- Pipe, Culvert
- Detention Pond
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Shabokin Well Area and AOC 43J Current Subsurface Features
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 250 500
Feet

Date: 04/26/2020

Figure 8-3

KGS

File: PFAS_RI_A1_PSC_Shabokin_SubsurfaceUtilities.mxd

Legend

- Existing Monitoring Well/Piezometer
- New Monitoring Well/Piezometer
- Vertical Profiling Location Installation Phase 1
- Vertical Profiling Location Installation Phase 2
- Surface Water and Sediment Sampling Location
- Public Water Supply Well
- Staff Gauge

Aerial Source: USGS, MassGIS Orthoimagery 2019

Shabokin Well Area Field Activities
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

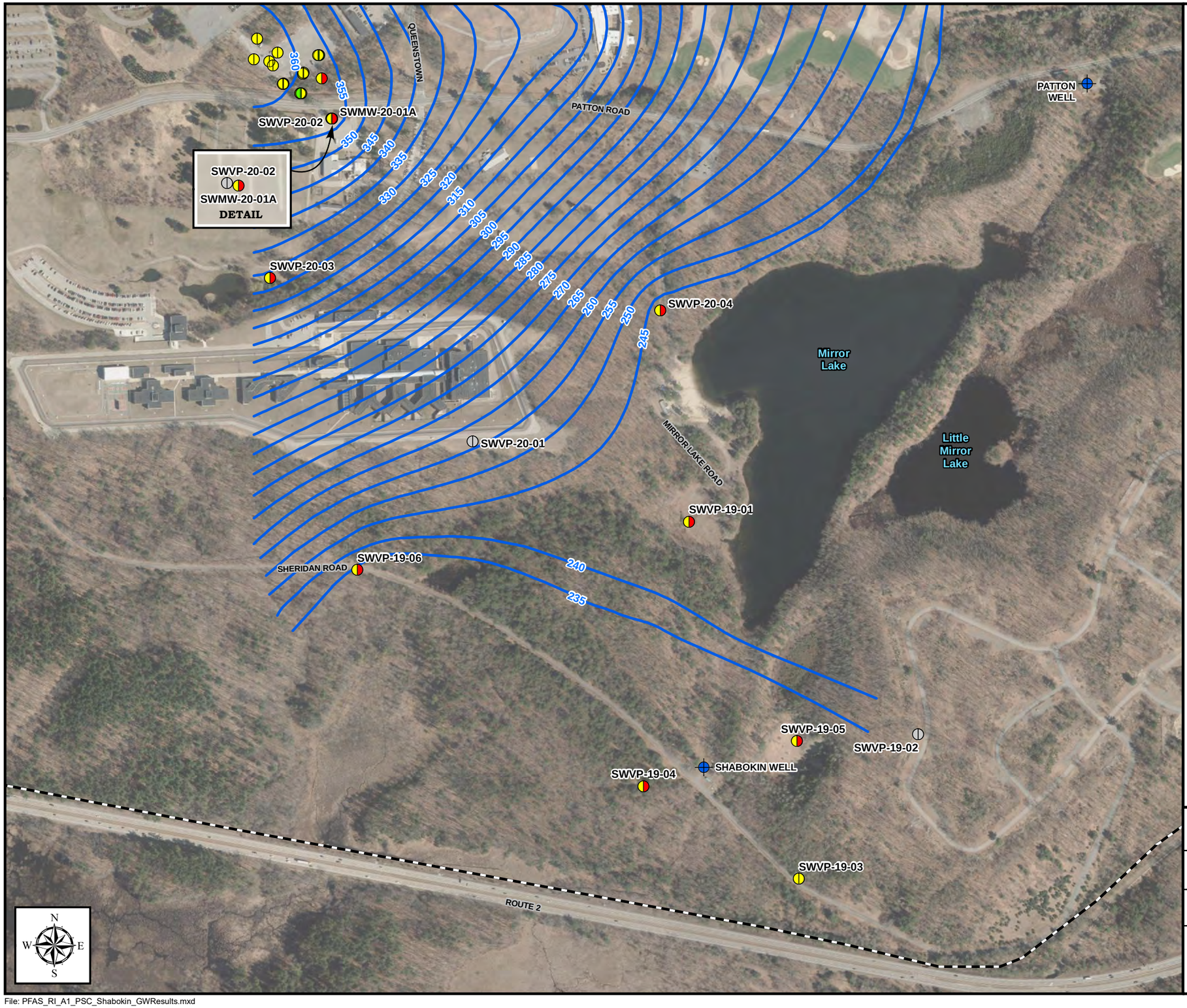
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 250 500
Feet

Date: 05/12/2020

Figure 8-4

File: PFAS_RI_A1_PSC_ShabokinWell_FieldActivities.mxd



Legend

- Monitoring Well/Vertical Profiling Location

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

- EPA LHA ≥ 70 ng/L
- EPA LHA < 70 ng/L
- EPA LHA No detection
- Dry

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

- MassDEP ≥ 20 ng/L
- MassDEP < 20ng/L
- MassDEP no detection
- Dry
- Groundwater Contour (ft NAVD 88)
  (Contour Interval = 5 Feet) - March 2020
- 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

Aerial Source: USGS, MassGIS Orthoimagery 2019

Shabokin Well Area Groundwater Results
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 250 500
Feet

Date: 05/28/2020

Figure 8-5

File: PFAS_RI_A1_PSC_Shabokin_GWResults.mxd

Legend

- Monitoring Well/Piezometer
- Piezometer not installed (no water encountered during drilling)
- Vertical Profiling Location
- Surface Water and Sediment Sampling Location
- Staff Gauge
- Public Water Supply Well
- Cross Section Location

Aerial Source: USGS, MassGIS Orthoimagery 2019

Shabokin Well Area Cross Section Locations
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

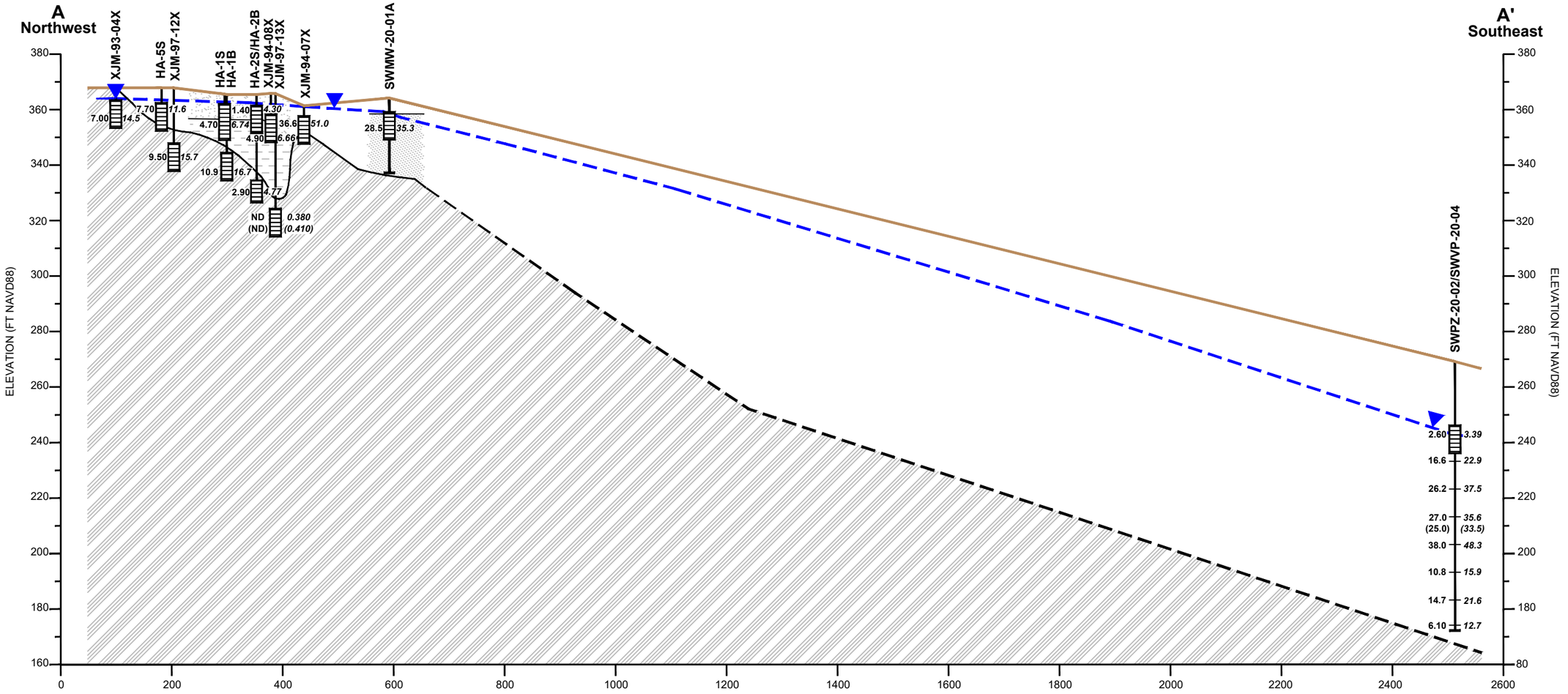
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 250 500
Feet

Date: 05/27/2020

Figure 8-6

File: PFAS_RI_A1_PSC_ShabokinWell_XSLoc.mxd



Legend

Vertical Profile

1.39 U
EPA LHA Concentration (sum of PFOA and PFOS)

2.59 U
MassDEP Concentration (sum of PFOS + PFOA + PFDA + PFHpA + PFHxS + PFNA)

Monitoring Well

Screened Interval

- Sand with Gravel/Sand
- Sand with Silt/Silty Sand
- Silt
- Silt, Sand, Gravel, with Clay
- Till
- Weathered Bedrock
- Bedrock
- Unknown
- Water Table

Notes:

All results in ng/L
ng/L = nanograms per liter
ND = non-detect
( ) = field duplicate

Perfluorooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorodecanoic acid (PFDA)
Perfluoroheptanoic acid (PFHpA)
Perfluorohexanesulfonic acid (PFHxS)
Perfluorononanoic acid (PFNA)

VERTICAL SCALE IN FEET: 40
HORIZONTAL SCALE IN FEET: 200

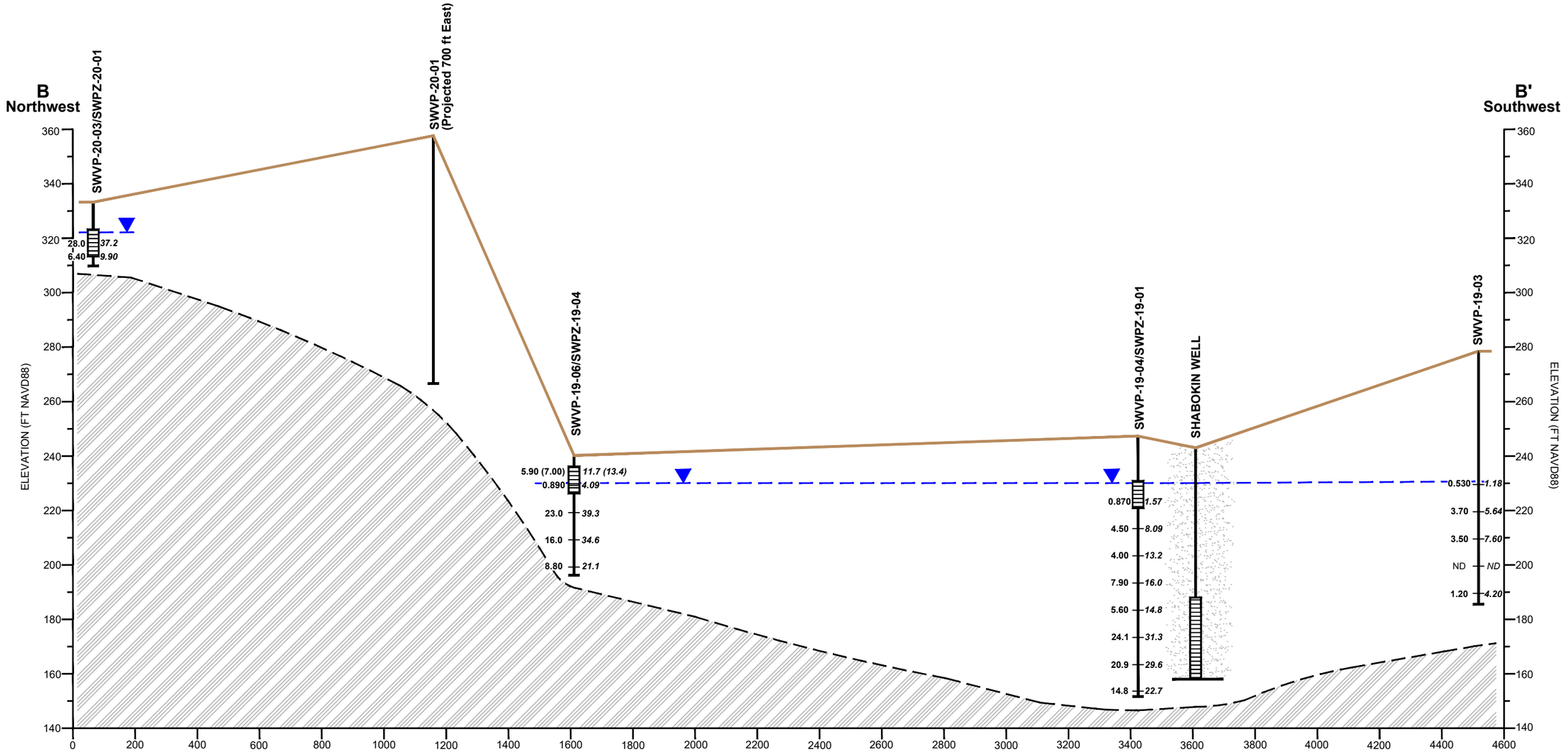
Shabokin Well Area - Cross Section, A-A'
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

Scale as Shown	Date: 05/14/2020	Figure 8-7	KGS

File: X:\HS_Environmental\FortDevens_Mass\Drawings\PSC_Report\Area1\PSC_A1_Shabokin_XS.dwg A-A



Legend

Vertical Profile

1.39 U
EPA LHA Concentration (sum of PFOA and PFOS)

2.59 U
MassDEP Concentration (sum of PFOS + PFOA + PFDA + PFHpA + PFHxS + PFNA)

Monitoring Well

Screened Interval

- Sand with Gravel/Sand
- Sand with Silt/Silty Sand
- Silt
- Silt, Sand, Gravel, with Clay
- Till
- Weathered Bedrock
- Bedrock
- Unknown
- Water Table

Notes:

All results in ng/L
ng/L = nanograms per liter
ND = non-detect
( ) = field duplicate

Perfluorooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorodecanoic acid (PFDA)
Perfluoroheptanoic acid (PFHpA)
Perfluorohexanesulfonic acid (PFHxS)
Perfluorononanoic acid (PFNA)

VERTICAL SCALE IN FEET: 40
HORIZONTAL SCALE IN FEET: 350

Shabokin Well Area - Cross Section, B-B'
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

Scale as Shown	Date: 05/14/2020	Figure 8-8	KGS

File: X:\HS_Environmental\FortDevens_Mass\Drawings\PSC_Report\Area1\PSC_A1_Shabokin_XS.dwg B-B

Legend

- Approximate Location of Potential Former Source Area
- Monitoring Well
- Injection Well
- Approximate Location of Former UST
- Approximate Location of 2009 and 2010 Pilot Test Area
- Former Building

References:
HGL. LTMMP 2010, Haley Aldrich Inc. 2015

Aerial Sources: 2019, USGS, MassGIS

AOC 43J Site Layout
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

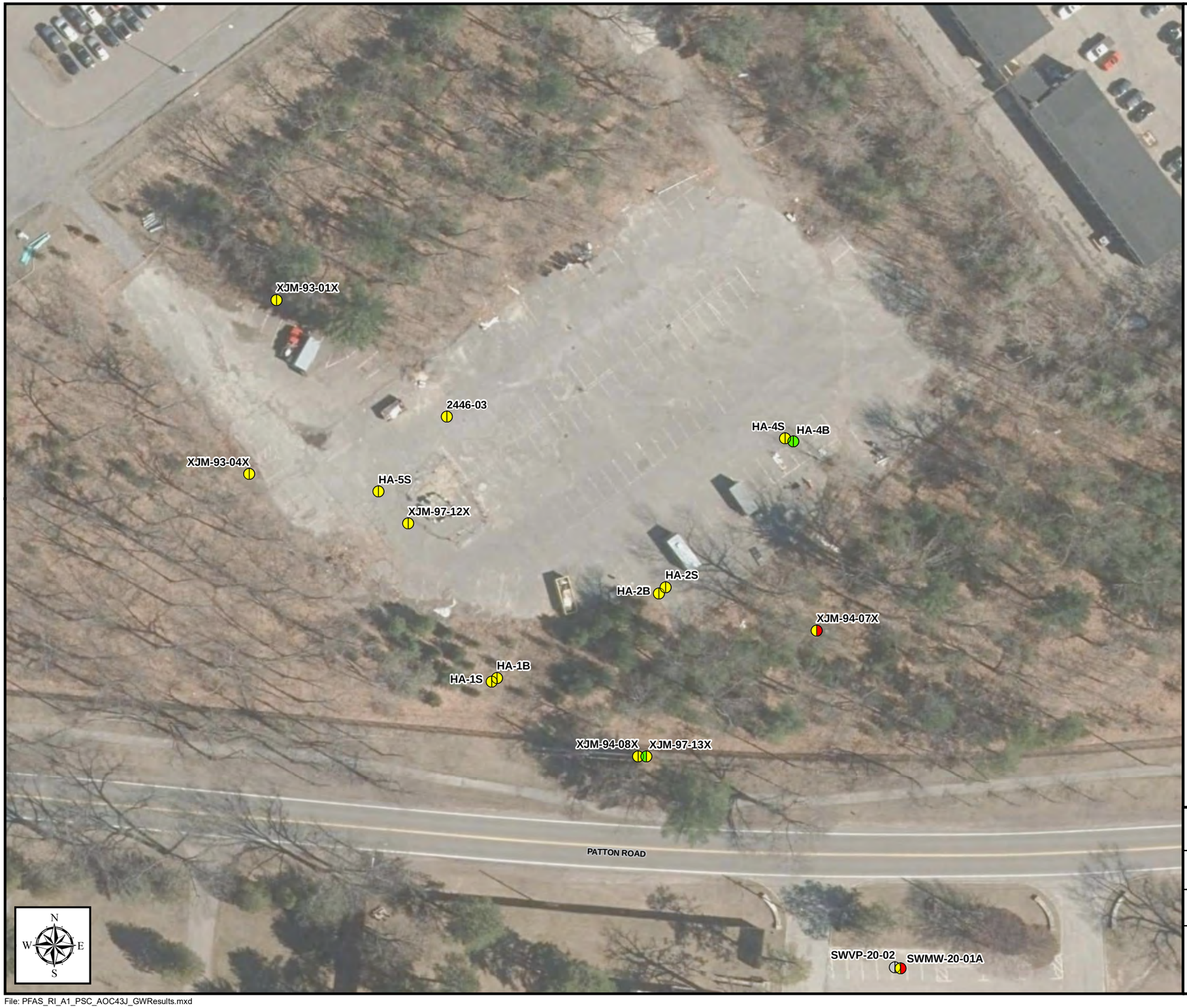
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 30 60
Feet

Date: 05/14/2020

Figure 9-1

File: PFAS_RI_A1_PSC_AOC43J_SL.mxd



Legend

- Monitoring Well/Vertical Profiling Location

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

- EPA LHA ≥ 70 ng/L
- EPA LHA < 70 ng/L
- EPA LHA No detection
- Dry

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

- MassDEP ≥ 20 ng/L
- MassDEP < 20ng/L
- MassDEP no detection
- Dry
- 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

Aerial Source: USGS, MassGIS Orthoimagery 2019

AOC 43J Groundwater Results
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 30 60
Feet

Date: 05/04/2020

Figure 9-2

KGS

File: PFAS_RI_A1_PSC_AOC43J_GWResults.mxd

Legend

- Vertical Profiling Location
- Monitoring Well/Piezometer
- Soil Boring
- Surface Water/Sediment Sample
- Staff Gauge
- Irrigation Well
- Public Water Supply Well
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Sample Locations
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 200 400 800 1,200
Feet

Date: 05/20/2020

Plate 1

File: PFAS_RI_A1_PSC_Plate_Samples.mxd

Legend

- Monitoring Well/ Vertical Profiling Location
- Former Fort Devens Boundary

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

- EPA LHA ≥ 70 ng/L
- EPA LHA < 70 ng/L
- EPA LHA No detection
- Dry

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

- MassDEP ≥ 20 ng/L
- MassDEP < 20ng/L
- MassDEP no detection
- Dry

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

Aerial Source: USGS, MassGIS Orthoimagery 2019

Groundwater Results
Devens PFAS RI - Area 1 PSCS

Former Fort Devens Army Installation
Devens, Massachusetts

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

0 200 400 800 1,200
Feet

Date: 05/19/2020

Plate 2

File: PFAS_RI_A1_PSC_Plate_GWResults.mxd

TABLES

Table 1-1
Select PFAS Criteria
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

	EPA											Massachusetts			
	Lifetime Health Advisory Drinking Water		Site-Specific PFAS Screening Levels For the Former Fort Devens									ORSG Guidelines for Drinking Water and GW-1 Standard		GW-3 Standard	S-1 SOIL & GW-1
	Summed Value	Individual Concentrations	Ingestion, Surface water	Ingestion, Groundwater		Dermal + Ingestion, Soil				Ingestion, Fish		Summed Value	Individual Concentrations	Individual Concentrations	Individual Concentrations
			Child Recreator	Child Resident	Adult Commercial Worker	Child Recreator	Child Resident	Adult Commercial Worker	Adult Construction Worker	Adult	Child				
	ng/L		ng/L	ng/L		µg/kg				mg/kg		ng/L		ng/L	µg/kg
PFBS			2,030,000	40,100	234,000	609,000	126,000	428,000	631,000	7.95	6.13				
PFOS	70	70	2,030	40.1	234	609	126	631	428	7.95X10-3	6.13X10-3	20	20	5.0E+05	2
PFOA		70	2,030	40.1	234	609	126	631	428	7.95X10-3	6.13X10-3		20	4.0E+07	0.72
PFDA													20	4.0E+07	0.3
PFHpA													20	4.0E+07	0.5
PFHxS													20	5.0E+05	0.3
PFNA													20	4.0E+07	0.32

ORSG = Office of Standards and Guidelines
PFBS = Perfluorobutanesulfonic Acid
PFDA = Perfluorodecanoic Acid
PFHpA = Perfluoroheptanoic Acid
PFHxS = Perfluorohexanesulfonic Acid
PFNA = Perfluorononanoic Acid
PFOS = Perfluorooctanesulfonic Acid
PFOA = Perfluorooctanoic Acid
ng/L = nanograms per liter
µg/L = micrograms per liter
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram

Table 2-1
Bedrock Elevations
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location Name	Northing	Easting	Bedrock Elevation (ft NAVD88)	Notes
6892	3019369.81	637629.81	232.91	Bedrock confirmed
6899	3015693.68	638403.63	317.50	Bedrock confirmed
6902	3012476.05	633915.96	264.81	Bedrock confirmed
19466	3013984.65	639129.95	367.30	Bedrock confirmed
19474	3013314.33	639509.69	344.50	Bedrock confirmed
19539	3013178.34	639451.17	225.47	Bedrock confirmed
19541	3018147.46	635070.53	215.14	Bedrock confirmed
19542	3018251.61	635163.35	208.33	Bedrock confirmed
19568	3013978.98	639185.57	358.34	Bedrock confirmed
19569	3013973.93	639180.18	341.34	Bedrock confirmed
19572	3014051.74	639116.87	340.52	Bedrock confirmed
19573	3014046.69	639111.48	330.52	Bedrock confirmed
19576	3019022.54	637590.83	286.51	Bedrock confirmed
19578	3014056.67	639122.13	362.88	Bedrock confirmed
19581	3016366.19	637642.97	253.95	Bedrock confirmed
19597	3013755.82	629547.79	333.04	Bedrock confirmed
19606	3018167.83	635115.57	180.18	Bedrock confirmed
19612	3014513.16	631363.78	408.40	Bedrock confirmed
19617	3018167.83	635115.57	170.18	Bedrock confirmed
19638	3016867.57	631398.99	365.78	Bedrock confirmed
19643	3018712.75	635422.80	138.48	Bedrock confirmed
19647	3017885.98	639368.35	351.59	Bedrock confirmed
19672	3019682.65	631942.43	109.53	Bedrock confirmed
19679	3016655.01	631825.75	358.79	Bedrock confirmed
19683	3016565.04	631781.72	338.20	Bedrock confirmed
19684	3016696.72	631664.33	375.76	Bedrock confirmed
19685	3016753.85	631746.61	365.45	Bedrock confirmed
19687	3016823.64	631575.78	377.77	Bedrock confirmed
19689	3017010.22	631593.50	368.84	Bedrock confirmed
20642	3026405.03	638157.73	145.46	Bedrock confirmed
20644	3026405.03	638157.73	218.46	Bedrock confirmed
20645	3026405.03	638157.73	170.46	Bedrock confirmed
20648	3026405.03	638157.73	148.46	Bedrock confirmed
20649	3026405.03	638157.73	148.46	Bedrock confirmed
20650	3026405.03	638157.73	147.46	Bedrock confirmed
3-2	3027010.14	629207.26	267.28	Bedrock confirmed
100172	3017116.80	634702.45	265.61	Bedrock confirmed
112915	3019842.31	637491.04	228.40	Bedrock confirmed
116354	3023227.20	635700.46	262.00	Bedrock confirmed
116380	3012811.73	630070.84	348.30	Bedrock confirmed
120605	3019016.07	636262.35	220.47	Bedrock confirmed
122636	3013326.81	634249.15	290.38	Bedrock confirmed

Table 2-1
Bedrock Elevations
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location Name	Northing	Easting	Bedrock Elevation (ft NAVD88)	Notes
124393	3022025.87	626272.36	247.65	Bedrock confirmed
124394	3022084.27	625375.53	294.83	Bedrock confirmed
125411	3024306.14	636865.17	240.00	Bedrock confirmed
125983	3021921.85	639335.32	172.58	Bedrock confirmed
135693	3016427.39	631000.37	313.00	Bedrock confirmed
137190	3017905.67	630347.19	236.69	Bedrock confirmed
139875	3012922.31	630685.34	370.31	Bedrock confirmed
141452	3017358.63	634999.39	200.28	Bedrock confirmed
154142	3019981.57	633661.25	201.42	Bedrock confirmed
155274	3016667.93	630989.31	287.68	Bedrock confirmed
158532	3019845.70	632862.23	229.94	Bedrock confirmed
163457	3015455.46	631414.93	406.66	Bedrock confirmed
259017	3025319.25	629598.32	253.10	Bedrock confirmed
263203	3021440.75	626136.84	282.44	Bedrock confirmed
272055	3015740.44	638542.01	289.56	Bedrock confirmed
600579	3021455.28	629423.52	229.57	Bedrock confirmed
604832	3016596.62	632954.37	332.40	Bedrock confirmed
608632	3018915.67	636043.13	170.21	Bedrock confirmed
636470	3018173.46	630637.85	206.42	Bedrock confirmed
654229	3024855.22	636465.80	200.99	Bedrock confirmed
655357	3020348.84	632723.00	179.58	Bedrock confirmed
658624	3013361.80	628807.50	338.03	Bedrock confirmed
659493	3012530.73	632203.64	350.51	Bedrock confirmed
659713	3014094.68	639975.00	180.19	Bedrock confirmed
661314	3023606.29	636323.12	249.29	Bedrock confirmed
661407	3017990.62	631198.31	272.71	Bedrock confirmed
662300	3018649.56	636126.46	221.07	Bedrock confirmed
1E-D	3018993.00	629332.90	159.10	Refusal
20-1	3027170.82	629112.41	277.78	Bedrock confirmed
20-2	3027166.71	629111.41	277.30	Bedrock confirmed
2125021-01G	3016629.42	632957.09	298.00	Bedrock confirmed
2125021-02G	3016589.32	632973.23	307.00	Bedrock confirmed
2125021-03G	3016538.30	632965.09	306.00	Bedrock confirmed
2125021-04G	3016509.11	633002.80	309.00	Bedrock confirmed
2446-02 MW-2	3018147.75	623480.94	353.20	Refusal
27-1	3027214.79	629165.47	268.09	Bedrock confirmed
27-2	3027240.60	629172.50	273.07	Bedrock confirmed
27-30B-1	3027281.23	629203.61	271.56	Bedrock confirmed
27-30B-2	3027284.76	629206.48	271.75	Bedrock confirmed
32M-01-13XBR	3025296.45	629547.21	251.30	Bedrock confirmed
32M-01-14XBR	3025386.10	629684.78	224.90	Bedrock confirmed
32M-01-15XBR	3025254.04	629568.09	253.20	Bedrock confirmed

Table 2-1
Bedrock Elevations
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location Name	Northing	Easting	Bedrock Elevation (ft NAVD88)	Notes
32M-01-16XBR	3025101.97	629604.12	240.72	Bedrock confirmed
32M-01-17XBR	3025238.37	629698.54	218.30	Bedrock confirmed
32M-01-18XBR	3025246.91	629515.04	248.60	Bedrock confirmed
32VP-19-01	3025306.37	630204.66	176.96	Refusal
32VP-19-02	3025523.59	630202.20	170.46	Refusal
32VP-19-03	3024888.63	630129.63	202.86	Refusal
32VP-19-06	3025854.25	631324.64	133.01	Refusal
32VP-19-07	3026159.02	631312.89	143.77	Refusal
32VP-19-08	3024454.76	629466.05	245.91	Refusal
32VP-19-09	3025549.90	630381.43	150.65	Refusal
32VP-19-10	3025650.83	630756.50	130.86	Refusal
32VP-19-11	3025173.29	630471.70	145.79	Refusal
32VP-19-12	3024968.92	630585.90	118.31	Refusal
32Z-01-04XBR	3024501.97	629578.95	252.70	Bedrock confirmed
32Z-01-06XBR	3025592.12	629526.37	248.80	Bedrock confirmed
32Z-01-10XBR	3024914.37	629597.33	250.32	Bedrock confirmed
32Z-01-11XBR	3025496.11	629315.82	254.04	Bedrock confirmed
32Z-01-12XBR	3025272.70	629002.21	231.30	Bedrock confirmed
3A-2	3027046.42	629233.07	263.27	Bedrock confirmed
43AVP-19-01	3024626.48	628433.51	179.97	Refusal
43AVP-19-02	3024764.19	628440.23	177.49	Refusal
43AVP-19-03	3024888.29	628514.41	193.30	Refusal
43AVP-19-04	3024520.26	628624.35	190.09	Refusal
43GVP-19-04	3020797.50	627076.93	226.74	Refusal
43GVP-19-05	3020945.00	627082.00	218.09	Refusal
43GVP-19-06	3021117.00	627228.00	204.02	Refusal
43GVP-19-07	3020685.00	627042.00	229.20	Refusal
43GVP-19-08	43GVP-19-08	43GVP-19-08	140.73	Refusal
43GVP-19-09	43GVP-19-09	43GVP-19-09	195.51	Refusal
43GVP-19-10	43GVP-19-10	43GVP-19-10	232.85	Refusal
43J-92-01X	3018162.47	623451.62	361.80	Bedrock confirmed
43M-01-16XBR	3025055.12	628980.91	211.50	Bedrock confirmed
43M-01-17XBR	3024934.85	629073.30	214.00	Bedrock confirmed
43M-01-20XBR	3024830.04	628852.12	193.36	Bedrock confirmed
48-OMR	3020148.74	633218.82	235.91	Bedrock confirmed
5702MW-19-01	3023020.86	632237.00	97.60	Bedrock confirmed
5702MW-20-01	3022574.41	632761.63	107.27	Bedrock confirmed
5702MW-20-03	3022636.00	632530.26	89.70	Bedrock confirmed
5702MW-20-05	3022545.98	632578.79	92.09	Bedrock confirmed
5703MW-20-02A	3022994.58	633213.60	149.46	Bedrock confirmed
5703VP-19-01	3023322.79	633621.49	168.14	Refusal
74PZ-19-10	3023949.00	634140.80	188.03	Refusal

Table 2-1
Bedrock Elevations
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location Name	Northing	Easting	Bedrock Elevation (ft NAVD88)	Notes
74VP-18-01	3024093.50	633760.55	131.85	Refusal
74VP-18-02	3023875.13	634038.49	168.12	Refusal
74VP-18-03	3023897.80	633502.96	123.19	Refusal
74VP-18-04	3024257.72	633990.70	153.48	Refusal
74VP-18-05	3024359.94	633819.70	128.87	Refusal
74VP-18-06	3023940.54	633800.45	142.32	Refusal
74VP-18-08	3024483.67	633723.43	101.44	Refusal
74VP-18-09	3023987.55	634147.17	182.85	Refusal
74VP-18-10	3023801.51	633867.83	176.22	Refusal
74VP-18-11	3024179.62	633266.66	145.19	Refusal
74VP-18-12	3024634.59	633907.92	145.94	Refusal
74VP-18-13	3024450.12	634201.21	159.03	Refusal
74VP-19-03	3024285.56	634403.90	188.96	Refusal
74VP-19-04	3024119.61	634318.93	182.49	Refusal
75MW-19-01BR	3021955.16	628945.47	232.79	Bedrock confirmed
75MW-19-02	3022530.02	630771.18	-49.13	Bedrock confirmed
75MW-19-04	3022030.68	631713.03	135.57	Bedrock confirmed
75VP-19-03	3022507.51	629633.92	203.90	Refusal
75VP-19-04	3022260.89	629582.86	205.23	Refusal
75VP-19-06	3022003.80	629499.80	221.76	Refusal
75VP-19-07	3022255.47	629335.90	231.42	Refusal
75VP-19-08	3022520.54	629274.19	220.89	Refusal
76VP-19-01	3022565.00	626638.00	219.79	Refusal
76VP-19-02	3022441.24	626688.54	221.99	Refusal
76VP-19-03	3022341.00	627036.00	191.17	Refusal
76VP-19-04	3022704.43	626829.69	204.34	Refusal
76VP-19-05	3022590.00	626959.00	184.68	Refusal
76VP-19-06	3022466.41	627204.18	171.91	Refusal
76VP-19-07	3023123.00	626796.00	179.80	Refusal
76VP-19-08	3022734.83	627023.84	189.71	Refusal
76VP-19-09	3022978.06	627177.65	183.56	Refusal
76VP-19-10	3022933.00	627231.00	165.31	Refusal
76VP-19-11	3022635.00	627283.00	149.02	Refusal
76VP-19-12	3022376.81	627495.79	164.05	Refusal
76VP-19-13	3022828.00	627783.00	172.04	Refusal
76VP-19-14	3022424.82	627295.82	174.70	Refusal
76VP-19-15	3022322.00	627305.00	186.85	Refusal
76VP-19-16	3024060.00	627490.00	170.93	Refusal
76VP-19-17	3022897.48	627335.14	158.17	Refusal
76VP-19-18	3023076.01	627324.01	156.99	Refusal
76VP-19-19	3024048.00	627189.00	145.02	Refusal
76VP-19-20	3022218.00	627711.00	168.56	Refusal

Table 2-1
Bedrock Elevations
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location Name	Northing	Easting	Bedrock Elevation (ft NAVD88)	Notes
76VP-19-21	3024032.00	626786.00	181.85	Refusal
76VP-19-22	3025578.00	626606.00	148.80	Refusal
76VP-19-23	3025570.85	627108.29	182.05	Refusal
76VP-19-24	3025486.34	627766.68	130.05	Refusal
76VP-19-25	3026471.00	626845.00	143.31	Refusal
76VP-19-26	3026673.00	627309.00	172.68	Refusal
76VP-19-27	3026356.00	626355.00	179.07	Refusal
76VP-19-28	3026155.00	625292.00	168.20	Refusal
76VP-19-29	3022191.20	628031.25	184.15	Refusal
76VP-19-31	3022548.97	628006.90	212.41	Refusal
76VP-19-32	3023682.00	626097.00	226.50	Refusal
76VP-19-33	3025081.01	625671.43	185.25	Refusal
92-5	3026858.08	633898.88	181.87	Refusal
AAFES-2	3020965.13	626168.53	274.47	Bedrock confirmed
AAFES-3	3021032.38	626005.31	281.95	Bedrock confirmed
AAFES-5	3020999.40	626200.16	269.51	Bedrock confirmed
AAFES-6R	3020910.95	626119.77	271.77	Bedrock confirmed
AAFES-ID	3020929.41	626148.56	274.20	Bedrock confirmed
Ayer Pathfinder	3023629.40	632370.90	93.00	Bedrock confirmed
Br. # H-9-10, C-W Hwy. over Bower's Brook	3015582.91	636278.85	224.34	Bedrock confirmed
Br. # H-9-11, C-W Hwy. under Rte. 110	3015825.60	633936.72	302.30	Bedrock confirmed
Br. # H-9-12, C-W Hwy. under Boxboro Rd.	3015406.21	637995.12	280.96	Bedrock confirmed
Br. # H-9-17, C-W Hwy. over B&M R.R.	3013356.47	627399.96	194.04	Bedrock confirmed
Br. # H-9-18, C-W Hwy. over Depot Street	3014254.21	629402.55	315.89	Bedrock confirmed
CAP-1B	3027165.45	629318.93	236.13	Bedrock confirmed
CAP-2B	3027118.86	629296.39	240.66	Bedrock confirmed
CAP-3	3027047.54	629269.85	245.45	Bedrock confirmed
CAP-4	3027088.57	629284.53	237.73	Bedrock confirmed
CH-1D	3027062.71	629287.99	230.46	Bedrock confirmed
CSM-93-02A	3018164.08	628075.66	132.30	Bedrock confirmed
Deven Pathfinder	3021479.60	629419.20	215.31	Bedrock confirmed
GF-1	3025991.64	634345.89	111.04	Bedrock confirmed
GF-2	3026015.85	634184.51	111.58	Bedrock confirmed
GPMW-19-01	3025551.65	633756.22	99.33	Bedrock confirmed
GPVP-18-01	3026944.26	633523.97	203.44	Refusal
GPVP-18-02	3026775.09	634465.62	189.84	Refusal

Table 2-1
Bedrock Elevations
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location Name	Northing	Easting	Bedrock Elevation (ft NAVD88)	Notes
GPVP-18-03	3026862.72	635021.12	195.67	Refusal
GPVP-18-04	3026424.94	635682.46	204.81	Refusal
GPVP-18-05	3025683.86	634879.86	143.17	Refusal
GPVP-18-06	3025456.71	634491.63	112.71	Refusal
GPVP-18-07	3025504.43	634247.71	134.14	Refusal
GPVP-18-08	3025523.94	634013.75	110.70	Refusal
GPVP-18-10	3025555.89	633458.74	93.66	Refusal
GPVP-18-11	3025633.51	633154.97	109.82	Refusal
GPVP-18-12	3025799.18	632892.79	118.83	Refusal
GPVP-19-02	3025149.35	632760.07	156.09	Refusal
GPVP-19-03	3025088.32	633181.86	111.12	Refusal
GPVP-19-06	3024725.06	632092.00	155.60	Refusal
GPVP-19-10	3025325.41	632104.79	144.91	Refusal
GPVP-19-13	3025637.86	632668.47	130.36	Refusal
GPVP-19-14	3025561.54	632898.81	141.84	Refusal
GPVP-19-15	3025731.59	633095.54	132.58	Refusal
HA-1B	3018026.98	623550.04	346.50	Bedrock confirmed
HA-2B	3018078.41	623648.13	338.60	Bedrock confirmed
HA-3B	3018253.33	623729.29	330.70	Bedrock confirmed
HA-4B	3018170.43	623729.51	332.80	Bedrock confirmed
HA-5S	3018140.12	623478.15	352.10	Bedrock confirmed
LFM-99-01B	3018613.31	624305.81	293.60	Bedrock confirmed
LFM-99-02B	3018229.31	624305.59	329.23	Bedrock confirmed
LFM-99-03B	3019102.62	624498.69	293.78	Bedrock confirmed
LFM-99-04B	3019101.41	624498.82	297.65	Bedrock confirmed
LFM-99-05A	3018947.95	624886.54	287.48	Bedrock confirmed
LFM-99-05B	3018950.88	624874.17	259.98	Bedrock confirmed
LFM-99-06A	3018340.60	624993.40	318.01	Bedrock confirmed
LIDAR1	3025637.95	628118.41	237.48	Bedrock confirmed
LIDAR10	3025734.83	628548.77	313.49	Bedrock confirmed
LIDAR11	3025930.46	628467.01	338.44	Bedrock confirmed
LIDAR12	3026669.19	628423.21	341.14	Bedrock confirmed
LIDAR14	3026287.17	629073.02	279.61	Bedrock confirmed
LIDAR15	3026997.72	628952.41	316.61	Bedrock confirmed
LIDAR16	3027063.38	628837.83	312.56	Bedrock confirmed
LIDAR18	3025939.42	628656.35	330.17	Bedrock confirmed
LIDAR19	3022628.36	628369.57	295.05	Bedrock confirmed
LIDAR2	3026140.69	628069.90	266.46	Bedrock confirmed
LIDAR21	3026912.16	628922.09	328.42	Bedrock confirmed
LIDAR23	3026829.79	628767.76	347.80	Bedrock confirmed
LIDAR24	3026298.85	629280.33	284.22	Bedrock confirmed
LIDAR25	3026293.01	629338.73	281.31	Bedrock confirmed

Table 2-1
Bedrock Elevations
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location Name	Northing	Easting	Bedrock Elevation (ft NAVD88)	Notes
LIDAR26	3024003.36	628102.21	263.54	Bedrock confirmed
LIDAR27	3023940.86	628119.57	260.77	Bedrock confirmed
LIDAR28	3021864.47	629064.01	262.95	Bedrock confirmed
LIDAR29	3024055.45	628036.24	265.52	Bedrock confirmed
LIDAR3	3026278.09	627940.79	245.09	Bedrock confirmed
LIDAR30	3022176.97	628268.87	269.10	Bedrock confirmed
LIDAR31	3022486.00	628459.85	286.74	Bedrock confirmed
LIDAR32	3023956.84	628349.08	260.32	Bedrock confirmed
LIDAR33	3026411.30	628858.46	342.61	Bedrock confirmed
LIDAR34	3026300.30	628847.36	328.42	Bedrock confirmed
LIDAR35	3023568.81	628414.19	261.78	Bedrock confirmed
LIDAR36	3022756.84	628699.43	281.76	Bedrock confirmed
LIDAR4	3026856.07	628426.13	308.11	Bedrock confirmed
LIDAR5	3026666.62	628262.72	312.85	Bedrock confirmed
LIDAR6	3025777.65	628856.88	279.28	Bedrock confirmed
LIDAR9	3026123.17	628218.82	306.62	Bedrock confirmed
MA-HIW_116	3017499.88	636306.43	236.63	Bedrock confirmed
MA-HIW_117	3019017.42	637430.83	216.71	Bedrock confirmed
MA-HIW_122	3021749.68	638705.74	180.59	Bedrock confirmed
N2-P2	3027311.05	630658.72	178.03	Bedrock confirmed
N3-P2	3027130.23	630777.95	192.23	Bedrock confirmed
N4-P1	3026763.55	631241.15	133.10	Bedrock confirmed
N5-P2	3027173.21	629805.75	151.89	Bedrock confirmed
N6-P1	3026338.61	630017.06	176.78	Bedrock confirmed
N7-P2	3025618.25	629990.92	193.51	Bedrock confirmed
PWPZ-19-04-F1	3016816.68	629767.37	251.17	Refusal
PWPZ-19-04-F2	3016928.42	629238.35	219.67	Refusal
PWVP-19-01	3020032.16	626701.74	236.29	Refusal
PWVP-19-03	3019038.18	627604.00	182.96	Refusal
PWVP-19-05	3018548.45	626877.05	192.95	Refusal
PWVP-19-06	3018991.14	629350.01	159.03	Refusal
PWVP-19-07	3017800.39	629411.02	191.19	Refusal
PWVP-19-08	3019328.79	626466.48	237.88	Refusal
PWVP-19-09	3019177.00	628836.70	169.76	Refusal
PWVP-19-10	3019425.00	629733.70	164.06	Refusal
PWVP-19-11	3019103.36	630177.38	202.70	Refusal
PWVP-19-12	3018441.00	630045.00	229.11	Refusal
PWVP-20-01	3017383.20	627584.88	173.94	Refusal
PZ-12-09	3026801.42	630740.93	208.26	Bedrock confirmed
Q4-1	3027091.94	629194.72	266.20	Bedrock confirmed
Q4-2	3027060.36	629172.56	262.55	Bedrock confirmed
Q5-1	3027166.14	629228.23	259.32	Bedrock confirmed

Table 2-1
Bedrock Elevations
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location Name	Northing	Easting	Bedrock Elevation (ft NAVD88)	Notes
SAJ08	3017990.09	623616.53	338.49	Refusal
SAJ09	3018096.19	623685.27	355.02	Refusal
SEA-1/SHL-1	3026531.80	629259.23	245.28	Bedrock confirmed
SHB-99-30X	3026397.00	629701.20	228.30	Bedrock confirmed
SHL-10	3026867.70	630877.27	207.58	Bedrock confirmed
SHL-11	3027316.40	630495.92	193.97	Bedrock confirmed
SHL-14A	3026748.58	629288.95	256.20	Bedrock confirmed
SHL-20	3027329.59	630463.33	186.69	Bedrock confirmed
SHL-24	3025638.53	631302.97	122.20	Bedrock confirmed
SHM-10-07	3026889.79	630301.42	196.76	Bedrock confirmed
SHM-10-11	3025971.51	629990.62	199.86	Bedrock confirmed
SHM-10-12	3026718.54	629717.49	182.52	Bedrock confirmed
SHM-10-13	3027156.89	629906.12	157.41	Bedrock confirmed
SHM-10-15	3027101.42	629680.93	181.91	Bedrock confirmed
SHM-11-02	3027075.65	630457.81	194.63	Bedrock confirmed
SHM-11-03	3026892.95	630622.47	211.38	Bedrock confirmed
SHM-11-04	3027252.60	630473.96	197.13	Bedrock confirmed
SHM-11-05	3026979.39	630573.68	204.65	Bedrock confirmed
SHM-11-07	3027132.51	630414.59	192.19	Bedrock confirmed
SHM-11-08	3026970.62	630486.79	199.48	Bedrock confirmed
SHM-12-01	3026755.83	630771.77	213.28	Bedrock confirmed
SHM-12-02	3027066.64	630443.83	174.82	Bedrock confirmed
SHM-12-04	3027168.22	630452.46	191.11	Bedrock confirmed
SHM-12-06	3027082.93	630468.55	194.66	Bedrock confirmed
SHM-93-01A	3026711.96	630676.98	214.10	Bedrock confirmed
SHM-93-10C	3026846.23	630886.09	209.30	Bedrock confirmed
SHM-93-18B	3026453.24	631180.16	141.79	Bedrock confirmed
SHP-2016-07	3026881.95	629219.76	254.98	Bedrock confirmed
SHP-99-01C	3026540.97	629215.98	262.36	Bedrock confirmed
SHP-99-29X	3027143.35	629539.09	203.88	Bedrock confirmed
SHP-99-35X	3026547.20	629722.70	220.69	Bedrock confirmed
SWMW-20-01A	3017855.05	623813.13	338.96	Bedrock confirmed
SWPZ-19-02	3017684.34	625630.18	255.58	Refusal
SWPZ-19-02-F1	3017684.34	625630.18	255.58	Refusal
SWVP-19-01	3015815.08	625598.71	155.64	Refusal
SWVP-19-03	3014012.64	626152.94	185.50	Refusal
SWVP-19-04	3014479.30	625367.56	151.56	Refusal
SWVP-19-06	3015553.23	623974.74	194.20	Refusal
SWVP-20-01	3016220.83	624504.24	266.65	Refusal
SWVP-20-03	3017049.30	623460.84	309.80	Refusal
SWVP-20-04	3016909.50	625457.38	172.20	Refusal
XGB-93-04X	3020838.60	625538.97	283.54	Bedrock confirmed

Table 2-1
Bedrock Elevations
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location Name	Northing	Easting	Bedrock Elevation (ft NAVD88)	Notes
XGB-93-05X	3020787.70	625494.76	281.00	Bedrock confirmed
XGB-93-06X	3020742.78	625510.90	282.45	Bedrock confirmed
XGB-93-07X	3020785.78	625541.21	288.53	Bedrock confirmed
XGB-93-08X	3021041.37	625745.09	280.34	Bedrock confirmed
XGB-93-09X	3020945.01	625,648.166	277.50	Bedrock confirmed
XGB-94-10X	3020982.03	626105.93	281.20	Bedrock confirmed
XGB-94-11X	3020998.24	626103.88	280.91	Bedrock confirmed
XGB-94-12X	3020989.51	626109.49	278.60	Bedrock confirmed
XGB-94-13X	3020973.25	626113.27	279.25	Bedrock confirmed
XGB-94-14X	3020965.34	626009.38	281.10	Bedrock confirmed
XGB-94-15X	3021012.01	626000.61	280.00	Bedrock confirmed
XGM-20-01A	3021077.41	626682.57	242.91	Bedrock confirmed
XGM-20-02A	3021013.90	626578.52	254.36	Bedrock confirmed
XGM-20-03A	3020862.35	626603.92	243.88	Bedrock confirmed
XGM-93-01X	3020993.26	625846.17	280.75	Bedrock confirmed
XGM-93-02X	3020956.87	626109.44	274.90	Bedrock confirmed
XGM-94-03X	3020946.00	626168.33	272.40	Bedrock confirmed
XGM-94-04X	3020880.04	626072.55	280.30	Bedrock confirmed
XGM-94-05X	3021000.89	626277.72	271.50	Bedrock confirmed
XGM-94-06X	3020773.57	626429.96	254.40	Bedrock confirmed
XGM-94-07X	3020925.63	626257.94	271.70	Bedrock confirmed
XGM-94-08X	3020799.50	626239.62	269.40	Bedrock confirmed
XGM-94-09X	3020819.91	626001.97	277.10	Bedrock confirmed
XGM-94-10X	3020730.49	626132.59	269.00	Bedrock confirmed
XGM-97-12X	3020989.42	626086.01	279.26	Bedrock confirmed
XGP-94-01X	3020846.68	626040.75	274.90	Bedrock confirmed
XGP-94-02X	3020768.42	626434.35	253.90	Bedrock confirmed
XGP-94-05X	3020869.14	626065.06	282.00	Bedrock confirmed
XGP-94-06X	3020852.70	626079.34	276.50	Bedrock confirmed
XGP-94-07X	3020867.18	626100.74	277.80	Bedrock confirmed
XJB-94-03X / SAJ02	3018130.28	623514.40	351.12	Bedrock confirmed
XJB-94-04X	3018202.56	623516.36	346.97	Bedrock confirmed
XJB-94-05X	3018188.62	623499.66	351.31	Bedrock confirmed
XJB-94-06X	3018176.42	623486.34	351.39	Bedrock confirmed
XJB-94-07X	3018221.36	623542.94	348.19	Bedrock confirmed
XJB-94-08X	3018153.80	623479.82	355.85	Bedrock confirmed
XJB-94-09X	3018180.58	623552.12	348.07	Bedrock confirmed
XJB-94-10X	3018130.37	623548.48	346.47	Bedrock confirmed
XJB-94-11X	3018103.90	623511.42	349.13	Bedrock confirmed
XJB-94-12X	3018061.35	623457.25	352.20	Bedrock confirmed
XJB-94-13X	3018027.38	623482.80	347.78	Bedrock confirmed
XJB-94-15X	3017980.93	623544.51	343.77	Bedrock confirmed

Table 2-1
Bedrock Elevations
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location Name	Northing	Easting	Bedrock Elevation (ft NAVD88)	Notes
XJM-93-01X	3018256.15	623416.31	355.30	Bedrock confirmed
XJM-93-04X	3018150.54	623399.70	367.20	Bedrock confirmed
XJM-94-05X	3018126.42	623509.51	352.00	Bedrock confirmed
XJM-94-06X	3018168.62	623646.69	351.10	Bedrock confirmed
XJM-94-07X	3018055.81	623743.83	352.40	Bedrock confirmed
XJM-94-09X	3018066.02	623414.43	346.20	Bedrock confirmed
XJM-94-10X	3017979.67	623640.39	345.70	Bedrock confirmed
XJM-97-11X	3017992.65	623378.02	347.00	Bedrock confirmed
XJM-97-12X	3018120.60	623496.13	352.00	Bedrock confirmed
XJM-97-13X	3017979.53	623640.48	328.30	Bedrock confirmed

ft NAVD88 = feet North America Vertical Datum 1988

Table 2-2
Synoptic Water Level Event Grove Pond Area, October 2, 2018
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location ID	Measuring Point Elevation (ft NAVD88)	Measurement Date	Depth to Water from MPE (ft)	Groundwater Elevation (ft NAVD88)	Notes
92-1	223.35	10/2/2018	8.95	214.4	
92-2	NA	NA	NA	NA	Well is bent, unable to get accurate reading
92-3	219.39	10/2/2018	8.4	210.99	
92-4	254.56	10/2/2018	40.11	214.45	
92-5	NA	NA	NA	NA	Well is blocked with equipment, unable to get a reading
CSMS-11-01	253.6	10/2/2018	37.53	216.07	
CSMS-11-02	252.04	10/2/2018	36.99	215.05	
GF-1	223.65	10/2/2018	9.57	214.08	
GF-2	223.27	10/2/2018	9.1	214.17	
GF-3A	220.67	10/2/2018	6.1	214.57	
GF-3B	220.63	10/2/2018	4.56	216.07	
GF-4	225.93	10/2/2018	13.43	212.5	
MNG-2R	236.08	10/2/2018	19.18	216.9	
MNG-3R	254.36	10/2/2018	39.32	215.04	
MNG-5R	235.91	10/2/2018	16.7	219.21	
MNG-6R	252.39	10/2/2018	35.7	216.69	

MPE = Measuring Point Elevation
NAVD88 = North America Vertical Datum 1988

Table 2-3
Synoptic Water Level Event AOC 74/Grove Pond Area March 19, 2019
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location ID	Measuring Point Elevation (ft NAVD88)	Measurement Date	Depth to Water from MPE (ft)	Groundwater Elevation (ft NAVD88)
CSMS-11-01	253.60	03/19/2019	37.55	216.05
CSMS-11-02	252.04	03/19/2019	37.13	214.91
MNG-2R	236.08	03/19/2019	18.92	217.16
MNG-3R	254.36	03/19/2019	39.42	214.94
MNG-5R	235.91	03/19/2019	16.46	219.45
MNG-6R	252.39	03/19/2019	35.62	216.77
74PZ-19-01	244.37	03/19/2019	20.72	223.65
74PZ-19-02	244.41	03/19/2019	17.90	226.51
74PZ-19-03	246.48	03/19/2019	20.30	226.18
74PZ-19-04	225.13	03/19/2019	4.32	220.81
74PZ-19-05	242.69	03/19/2019	17.90	224.79
74PZ-19-06	249.10	03/19/2019	25.90	223.20
74PZ-19-07	248.40	03/19/2019	27.30	221.10
74PZ-19-08	248.89	03/19/2019	28.55	220.34
74PZ-19-09	237.42	03/19/2019	17.10	220.32

MPE = Measuring Point Elevation
NAVD88 = North America Vertical Datum 1988

Table 2-4
Synoptic Water Level Event Patton Well Area/AOC 40, January 2-3, 2020
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location ID	Measuring Point Elevation (ft NAVD88)	Measurement Date	Depth to Water from MPE (ft)	Groundwater Elevation (ft NAVD88)
43GPZ-19-03	307.99	01/2/2020	21.98	286.01
43GPZ-19-02	290.09	01/2/2020	26.99	263.10
43GPZ-19-01	280.67	01/2/2020	17.55	263.12
43GPZ-19-04	256.75	01/2/2020	6.98	249.77
43GPZ-19-05	254.82	01/2/2020	7.25	247.57
43GPZ-19-06	254.86	01/2/2020	9.07	245.79
43GPZ-19-07	246.59	01/2/2020	1.40	245.19
43GPZ-19-08	257.69	01/2/2020	10.99	246.70
AAFES-2	301.72	01/2/2020	21.65	280.07
AAFES-5	299.80	01/2/2020	21.51	278.29
AAFES-6R	298.74	01/2/2020	17.58	281.16
XGM-93-02X	309.01	01/2/2020	27.30	281.71
XGM-94-04X	300.69	01/2/2020	18.36	282.33
XGM-94-06X	284.07	01/2/2020	18.35	265.72
XGM-94-07X	294.82	01/2/2020	19.17	275.65
XGM-94-08X	298.98	01/2/2020	24.20	274.78
XGM-94-10X	301.96	01/2/2020	23.09	278.87
XGM-97-12X	308.7	01/2/2020	24.17	284.53
AAFES-7	257.77	01/2/2020	7.20	250.57
76PZ-19-18	248.01	01/2/2020	4.19	243.82
76PZ-19-04	249.14	01/2/2020	5.80	243.34
76PZ-19-15	245.83	01/2/2020	2.39	243.44
76PZ-19-03	256.74	01/2/2020	11.98	244.76
76PZ-19-05	262.10	01/2/2020	19.48	242.62
76PZ-19-01	264.51	01/2/2020	20.76	243.75
PWPZ-19-01	304.94	01/3/2020	61.96	242.98
PWPZ-19-02	251.52	01/3/2020	14.31	237.21
PWPZ-19-03	256.02	01/3/2020	12.40	243.62
PWPZ-19-04	288.00	01/3/2020	40.64	247.36
PWPZ-19-05	312.43	01/3/2020	68.81	243.62
PWPZ-19-06	266.22	01/3/2020	22.87	243.35
PWPZ-19-07	260.29	01/3/2020	12.69	247.60
PWPZ-19-08	256.53	01/3/2020	13.10	243.43
PWPZ-19-09	253.09	01/3/2020	9.80	243.29
PWPZ-19-10	288.42	01/3/2020	44.87	243.55
CPSG-01	247.28	01/3/2020	3.675	243.61
CPSG-02	244.09	01/3/2020	1.92	242.17
CSBSG-01	236.80	01/3/2020	2.97	233.83
RPSG-01	247.10	01/2/2020	2.20	244.90

MPE = Measuring Point Elevation
NAVD88 = North America Vertical Datum 1988
The Patton water supply well was not operating in January

Table 2-5
Synoptic Water Level Event Area 1, March 12-13, 2020
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location ID	Measuring Point Elevation (ft NAVD88)	Measurement Date	Depth to Water from MPE (ft)	Groundwater Elevation (ft NAVD88)	Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)
1C	251.22	03/13/2020	6.92	244.3	49	54
1D-D	247.72	03/13/2020	2.52	245.2	49	54
1D-S	247.63	03/13/2020	2.44	245.19	10	13
1E-D	248.05	03/13/2020	5.89	242.16	63	68
1E-S	248.01	03/13/2020	5.32	242.69	5	8
1F-D	262.77	03/13/2020	9.57	253.2	27	32
1F-S	263.39	03/13/2020	6.78	256.61	7	12
43GPZ-19-01	280.67	03/13/2020	18.64	262.03	9.83	19.83
43GPZ-19-02	290.09	03/13/2020	27.86	262.23	19.33	29.33
43GPZ-19-03	307.99	03/13/2020	22.67	285.32	15	25
43GPZ-19-04	256.75	03/13/2020	7.28	249.47	2	12
43GPZ-19-05	254.82	03/13/2020	7.64	247.18	6	16
43GPZ-19-06	254.86	03/13/2020	9.1	245.76	10	20
43GPZ-19-07	246.59	03/12/2020	1.4	245.19	3	13
43GPZ-19-07	246.59	03/13/2020	1.19	245.4	3	13
43GPZ-19-08	257.69	03/13/2020	11.41	246.28	13	23
5702MW-19-01A	247.37	03/12/2020	23.55	223.82	20	30
5702MW-19-01B	247.6	03/12/2020	23.76	223.84	40	50
5702MW-20-01A	222.23	03/12/2020	2.82	219.41	30	40
5702MW-20-01B	222.27	03/12/2020	1.82	220.45	70	80
5702MW-20-02A	244.32	03/12/2020	21.7	222.62	30	40
5702MW-20-03A	237.7	03/12/2020	16.96	220.74	26	36
5702MW-20-04A	235.62	03/12/2020	14.41	221.21	70	80
5702MW-20-05A	226.09	03/12/2020	6.22	219.87	30	40
5702MW-20-05B	226.07	03/12/2020	4.87	221.2	70	80
5702MW-20-06A	236.52	03/12/2020	15.21	221.31	70	80
5702MW-20-07A	221.71	03/12/2020	2.48	219.23	30	40
5703MW-20-01A	228.18	03/12/2020	7.33	220.85	2	12
5703MW-20-01B	228.1	03/12/2020	7.62	220.48	50	60
5703MW-20-02A	235.75	03/12/2020	13.44	222.31	10	20
5703MW-20-03A	225.8	03/12/2020	5.08	220.72	50	60
5703MW-20-04A	231.74	03/12/2020	10.65	221.09	60	70
5703PZ-19-01	222.93	03/12/2020	3.08	219.85	62.5	67.5
57M-03-01X	235.73	03/12/2020	14.37	221.36	10	20
57M-03-02X	224.84	03/12/2020	5.05	219.79	2	12
57M-03-03X	220	03/12/2020	0.88	219.12	2	12
57M-03-04X	221.39	03/12/2020	2.29	219.1	2	12
57M-03-05X	221.88	03/12/2020	2.62	219.26	2	12
57M-03-06X	221.87	03/12/2020	2.76	219.11	2	12
57M-95-03X	232.79	03/12/2020	10.74	222.05	7	17
57M-95-05X	235.15	03/12/2020	14.77	220.38	10	20
57M-95-06X	234.39	03/12/2020	12.77	221.62	11.87	21.87
57M-95-07X	222.36	03/12/2020	2.62	219.74	3	13
57M-96-11X	222.2	03/12/2020	2.68	219.52	2	12
57M-96-12X	225.8	03/12/2020	4.8	221	2	12
57M-96-13X	225.58	03/12/2020	4.55	221.03	2	12
57P-98-03X	220.39	03/12/2020	2.28	218.11	2.5	5.5
57P-98-04X	221.75	03/12/2020	3.58	218.17	2	5
57WP-06-02	220.29	03/12/2020	1.13	219.16	18.92	23.92
57WP-06-03	220.51	03/12/2020	0.76	219.75	13.85	18.85
74MW-19-04A	225.48	03/12/2020	4.81	220.67	18	28
74PZ-19-01	244.37	03/12/2020	21.52	222.85	16	26
74PZ-19-02	244.41	03/12/2020	19.23	225.18	18	28
74PZ-19-03	246.48	03/12/2020	21.62	224.86	26	36

Table 2-5
Synoptic Water Level Event Area 1, March 12-13, 2020
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location ID	Measuring Point Elevation (ft NAVD88)	Measurement Date	Depth to Water from MPE (ft)	Groundwater Elevation (ft NAVD88)	Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)
74PZ-19-04	225.13	03/12/2020	4.81	220.32	6	16
74PZ-19-05	242.69	03/12/2020	19.21	223.48	20	30
74PZ-19-06	249.1	03/12/2020	26.77	222.33	32	42
74PZ-19-07	248.4	03/12/2020	27.67	220.73	30	40
74PZ-19-08	248.89	03/12/2020	28.81	220.08	25	35
74PZ-19-09	237.42	03/12/2020	18.02	219.4	18	28
74PZ-19-10	226.03	03/12/2020	7.04	218.99	36	38
74PZ-20-01	238.62	03/12/2020	18.41	220.21	17.5	27.5
74PZ-20-02	240.92	03/12/2020	16.71	224.21	20.5	30.5
74PZ-20-03	243.04	03/12/2020	21.57	221.47	16.2	26.2
74PZ-20-04	243.73	03/12/2020	19.57	224.16	18.5	28.5
74PZ-20-05	237.64	03/12/2020	14.62	223.02	13.5	23.5
75MW-19-01BR	258.79	03/12/2020	23.85	234.94	35	45
75MW-19-02A	250.08	03/12/2020	19.7	230.38	37.5	47.5
75MW-19-02B	250.47	03/12/2020	20.2	230.27	70	80
75MW-19-02BR	250.78	03/12/2020	21.35	229.43	308	318
75MW-19-02C	250.64	03/12/2020	21.22	229.42	210	220
75MW-19-04A	230.51	03/12/2020	5.4	225.11	20	30
75MW-19-04B	230.57	03/12/2020	5.56	225.01	50	60
75PZ-19-01	230.47	03/12/2020	5.55	224.92	0.8	10.8
75PZ-19-02	247.94	03/12/2020	16.05	231.89	15.2	25.2
75PZ-19-03	240.39	03/12/2020	8.8	231.59	8.2	18.2
75PZ-19-04	249.7	03/12/2020	15.55	234.15	24.6	34.6
75PZ-20-01	236.21	03/12/2020	10.94	225.27	11.5	21.5
75PZ-20-02	245.44	03/12/2020	16.05	229.39	14.25	24.25
75PZ-20-03	245.82	03/12/2020	15.93	229.89	13	23
75PZ-20-04	246.17	03/12/2020	15.22	230.95	14	24
75PZ-20-05	243.2	03/12/2020	10.5	232.7	10	20
75PZ-20-06	249.11	03/12/2020	17.9	231.21	16	26
75PZ-20-07	228.63	03/12/2020	4.1	224.53	1	11
76PZ-19-01	264.51	03/13/2020	21.1	243.41	21.5	31.5
76PZ-19-03	256.74	03/13/2020	12.3	244.44	15	25
76PZ-19-04	249.14	03/13/2020	6.02	243.12	5	15
76PZ-19-05	262.1	03/13/2020	19.78	242.32	13	23
76PZ-19-15	245.83	03/13/2020	2.54	243.29	4	14
76PZ-19-18	248.01	03/12/2020	4.53	243.48	6	16
76PZ-19-18	248.01	03/13/2020	4.44	243.57	6	16
92-1	223.35	03/12/2020	8.57	214.78	49	55
92-3	219.39	03/12/2020	4.87	214.52	49	55
92-4	254.56	03/12/2020	39.74	214.82	67	71
AAFES-5	299.8	03/13/2020	21.07	278.73	15.5	30.5
AAFES-7	258.8	03/13/2020	8.03	250.77	4.5	14.5
CSMS-11-01	253.6	03/12/2020	37.34	216.26	30	40
CSMS-11-02	252.04	03/12/2020	36.65	215.39	30	40
GF-1	223.65	03/12/2020	9.13	214.52	116	121
GF-2	223.27	03/12/2020	8.54	214.73	114	121
GF-3A	220.67	03/12/2020	5.07	215.6	97	102
GF-3B	220.63	03/12/2020	4.51	216.12	8	13
GF-4	225.93	03/12/2020	12.44	213.49	79	84
GPMW-19-01A	253.93	03/12/2020	37.58	216.35	45	55
GPMW-19-01BR	253.75	03/12/2020	37.65	216.1	175	185
GPPZ-19-01	253.63	03/12/2020	37.64	215.99	105	110
HA-3B	362.9	03/13/2020	6.05	356.85	36	44
HA-3S	362.8	03/13/2020	8.35	354.45	4	17

Table 2-5
Synoptic Water Level Event Area 1, March 12-13, 2020
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location ID	Measuring Point Elevation (ft NAVD88)	Measurement Date	Depth to Water from MPE (ft)	Groundwater Elevation (ft NAVD88)	Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)
HA-4B	365.3	03/13/2020	6	359.3	35.8	43.8
HA-4S	365.5	03/13/2020	7.8	357.7	4	17
LFM-99-02B	353.83	03/13/2020	17.28	336.55	14.5	23.8
LFM-99-05A	316.58	03/13/2020	21.95	294.63	19	28.3
LFM-99-05B	316.58	03/13/2020	19.12	297.46	51.5	55.8
LFM-99-06ARP	337.84	03/13/2020	14.87	322.97	10.09	19.39
MNG-2R	236.08	03/12/2020	19.1	216.98	14	24
MNG-3R	254.36	03/12/2020	38.94	215.42	55	65
MNG-5R	235.91	03/12/2020	16.79	219.12	10	20
MNG-6R	252.39	03/12/2020	35.67	216.72	30	40
MW75-UNKNOWN	233.47	03/12/2020	6.45	227.02	5	15
PWPZ-19-01	304.94	03/13/2020	61.73	243.21	60	70
PWPZ-19-02	251.52	03/13/2020	14.34	237.18	12	22
PWPZ-19-03	256.02	03/13/2020	13.27	242.75	13	23
PWPZ-19-04	288	03/13/2020	39.24	248.76	36.2	46.2
PWPZ-19-05	312.43	03/13/2020	68.23	244.2	70	80
PWPZ-19-07	260.29	03/13/2020	13.29	247	16	25.9
PWPZ-19-08	256.53	03/13/2020	13.78	242.75	9.3	19.3
PWPZ-19-09	253.09	03/13/2020	9.37	243.72	5.6	15.6
PWPZ-19-10	288.42	03/13/2020	44.57	243.85	43.5	53.5
PWPZ-20-01	299.82	03/13/2020	56.79	243.03	58	68
PTW-A	253.54	03/13/2020	10.12	243.42	57	62
PTW-B	253.36	03/13/2020	10.88	242.48	64	69
XGM-20-01A	257.5	03/13/2020	7.49	250.01	10.5	20.5
XGM-20-02A	265.1	03/13/2020	12.41	252.69	13	23
XGM-20-03A	268.69	03/13/2020	14.8	253.89	20	30
XGM-94-04X	300.69	03/13/2020	19.63	281.06	18.2	28.2
XGM-94-06X	284.07	03/13/2020	20.29	263.78	17	27
XGM-94-10X	301.96	03/13/2020	24.56	277.4	21.5	31.5
XJM-93-01X	370.6	03/13/2020	6.18	364.42	6.5	16.5
XJM-93-04X	370.37	03/13/2020	6.3	364.07	4.5	14.5
XJM-94-07X	364.24	03/13/2020	7.1	357.14	3.7	13.7
XJM-94-08X	368.5	03/13/2020	9.78	358.72	7.6	17.6
XJM-94-10X	370.6	03/13/2020	8.98	361.62	7.8	17.8
XJM-97-11X	370.7	03/13/2020	8.85	361.85	25.5	35.5
XJM-97-13X	368.5	03/13/2020	8.82	359.68	41.5	51.5
CPSG-01	247.28	03/13/2020	3.02	244.26	NA	NA
CPSG-02	244.09	03/13/2020	0.4	243.69	NA	NA
CSBSG-01	236.8	03/13/2020	1.42	235.38	NA	NA
RPSG-01	247.1	03/13/2020	2	245.1	NA	NA
SG-01	220.72	03/12/2020	2.63	218.09	NA	NA
SG-02	220.65	03/12/2020	2.58	218.07	NA	NA
MW-9D	246.35	03/13/2020	12.68	233.67	71	81
MW-A	249.1	03/13/2020	18.35	230.75	30	40
MW-B	262.98	03/13/2020	31.50	231.48	72	82
MW-C	262.91	03/13/2020	31.45	231.46	87	97
MW-D	244.01	03/13/2020	13.22	230.79	60	70
MW-E	243.76	03/13/2020	12.98	230.78	62	72
MW-F	245.46	03/13/2020	14.78	230.68	22	32
MW-G	250.64	03/13/2020	16.86	233.78	79	84
MW-H	243.91	03/13/2020	11.92	231.99	24	34
MW-I	245.91	03/13/2020	15.43	230.48	9	19
MW-J	245.34	03/13/2020	11.53	233.81	40	50
MW-K	245.41	03/13/2020	11.60	233.81	40	50

Table 2-5
Synoptic Water Level Event Area 1, March 12-13, 2020
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location ID	Measuring Point Elevation (ft NAVD88)	Measurement Date	Depth to Water from MPE (ft)	Groundwater Elevation (ft NAVD88)	Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)
SWMW-20-01A	362.55	03/13/2020	5.13	357.42	5	15
SWPZ-19-01	250.62	03/13/2020	20.63	229.99	16.5	26.5
SWPZ-19-03	245.26	03/13/2020	4.04	241.22	3	13
SWPZ-19-04	240.63	03/13/2020	8.39	232.24	4	14
SWPZ-20-01	333.38	03/13/2020	4.19	329.19	10	20
SWPZ-20-02	267.19	03/13/2020	24.79	242.4	23	33

bgs = below ground surface

MPE = Measuring Point Elevation

NAVD88 = North America Vertical Datum 1988

The Patton water supply well was operating at the time of synoptic water level survey.

Table 2-6
Vertical Groundwater Gradients
Water Level Gauging Event - 3/12/2020 and 3/13/2020*
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location ID	Location	Screen Interval	Bottom of Screen Interval	Top of Screen Interval	Mid-Point of Screen	Difference Between Mid-Screen	Groudwater Elevation	Difference GW Elevation	Downward Gradient	Upward Gradient
		(ft bgs)	(ft NAVD88)	(ft NAVD88)	(ft NAVD88)	(ft)	(ft NAVD88)	(ft)	(unitless)	(unitless)
AOC 57 - Area 2										
AOC 57 - Area 2 - Well Pair 1										
5702MW-19-01A	Shallow Well	20-30	217.72	227.72	222.72	19.89	223.82	0.02	--	-0.0010
5702MW-19-01B	Deep Well	40-50	197.86	207.86	202.83		223.84			
AOC 57 - Area 2 - Well Pair 2										
57M-03-01X	Shallow Well	10-20	214.44	224.44	219.44	60.34	221.36	0.05	+0.0008	--
5702MW-20-06A	Deep Well	70-80	154.10	164.10	159.10		221.31			
AOC 57 - Area 2 - Well Pair 3										
57M-95-06X	Shallow Well	11.87-21.87	210.76	220.76	215.76	58.07	221.62	0.41	+0.0071	--
5702MW-20-04A	Deep Well	70-80	152.69	162.69	157.69		221.21			
AOC 57 - Area 2 - Well Pair 4										
5702MW-20-05A	Mid-Depth Well	30-40	183.25	193.25	188.25	39.96	219.87	1.33	--	-0.0333
5702MW-20-05B	Deep Well	70-80	143.29	153.29	148.29		221.20			
AOC 57 - Area 2 - Well Triplet 1										
57M-03-05X	Shallow Well	2-12	207.58	217.58	212.58		219.26			
5702MW-20-01A	Mid-Depth Well	30-40	179.59	189.59	184.59		219.41			
5702MW-20-01B	Deep Well	70-80	139.69	149.69	144.69		220.45			
	57M-03-05X Shallow					67.89		1.19	--	-0.0175
	5702MW-20-01B Deep									
	57M-03-05X Shallow					27.99		0.15	--	-0.0054
	5702MW-20-01A Mid-Depth									
	5702MW-20-01A Mid-Depth					39.90		1.04	--	-0.0261
	5702MW-20-01B Deep									
AOC 57 - Area 2 - Well Triplet 2										
57M-03-03X	Shallow Well	2-12	206.98	216.98	211.98		219.12			
57WP-06-02	Mid-Depth Well	18.92-23.92	195.25	200.25	197.75		219.16			
5702MW-20-07A	Deep Well	30-40	179.42	189.42	184.42		219.23			
	57M-03-03X Shallow					27.56		0.11	--	-0.0040
	5702MW-20-07A Deep									
	57M-03-03X Shallow					14.23		0.04	--	-0.0028
	57WP-06-02 Mid-Depth									
	57WP-06-02 Mid-Depth					13.33		0.07	--	-0.0053
	5702MW-20-07A Deep									

Table 2-6
Vertical Groundwater Gradients
Water Level Gauging Event - 3/12/2020 and 3/13/2020*
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location ID	Location	Screen Interval	Bottom of Screen Interval	Top of Screen Interval	Mid-Point of Screen	Difference Between Mid-Screen	Groudwater Elevation	Difference GW Elevation	Downward Gradient	Upward Gradient
		(ft bgs)	(ft NAVD88)	(ft NAVD88)	(ft NAVD88)	(ft)	(ft NAVD88)	(ft)	(unitless)	(unitless)
AOC 57 - Area 3										
AOC 57 - Area 3 - Well Pair 1										
57M-95-03X	Shallow Well	7-17	213.80	223.80	218.80	53.59	222.05	0.96	+0.0179	--
5703MW-20-04A	Deep Well	60-70	159.21	169.21	165.21		221.09			
AOC 57 - Area 3 - Well Pair 2										
57M-96-12X	Shallow Well	2-12	210.78	220.78	215.78	47.83	221.00	0.28	+0.0059	--
5703MW-20-03A	Deep Well	50-60	162.95	172.95	167.95		220.72			
AOC 57 - Area 3 - Well Pair 3										
5703MW-20-01A	Shallow Well	2-12	213.24	223.24	218.24	48.12	220.85	0.37	+0.0077	--
5703MW-20-01B	Deep Well	50-60	165.12	175.12	170.12		220.48			
AOC 57 - Area 3 - Well Triplet 1										
57M-96-11X	Shallow Well	2-12	208.04	218.04	213.04		219.52			
57WP-06-03	Mid-Depth Well	13.85-18.85	200.46	205.46	202.96		219.75			
5703PZ-19-01	Deep Well	62.5-67.5	152.66	157.66	155.16		219.85			
	57M-96-11X Shallow					57.88		0.33	--	-0.0057
	5703PZ-19-01 Deep									
	57M-96-11X Shallow					10.08		0.23	--	-0.0228
	57WP-06-03 Mid-Depth									
	57WP-06-03 Mid-Depth					47.80		0.10	--	-0.0021
	5703PZ-19-01 Deep									
Grove Pond Area										
Grove Pond Area Well Triplet 1										
GPMW-19-01A	Shallow Well	45-55	196.09	206.09	201.09		216.35			
GPPZ-19-01	Deep Piezometer	105-110	140.72	145.72	143.22		215.99			
GPMW-19-01BR	Bedrock Well	175-185	65.83	75.83	70.83		216.10			
	GPMW-19-01A Shallow					57.87		0.36	+0.0062	--
	GPPZ-19-01 Deep Piezometer									
	GPMW-19-01A Shallow					130.26		0.25	+0.0019	--
	GPMW-19-01BR Bedrock									
	GPPZ-19-01 Deep Piezometer					72.39		0.11	--	-0.0015
	GPMW-19-01BR Bedrock									

Table 2-6
Vertical Groundwater Gradients
Water Level Gauging Event - 3/12/2020 and 3/13/2020*
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location ID	Location	Screen Interval	Bottom of Screen Interval	Top of Screen Interval	Mid-Point of Screen	Difference Between Mid-Screen	Groudwater Elevation	Difference GW Elevation	Downward Gradient	Upward Gradient
		(ft bgs)	(ft NAVD88)	(ft NAVD88)	(ft NAVD88)	(ft)	(ft NAVD88)	(ft)	(unitless)	(unitless)
AOC 75										
AOC 75 Well Quadruplet 1										
75MW-19-02A	Shallow Well	37.5-47.5	200.26	210.26	205.26		230.38			
75MW-19-02B	Mid-Depth Well	70-80	167.86	177.86	172.86		230.27			
75MW-19-02C	Deep Well	210-220	28.01	38.01	35.01		229.42			
75MW-19-02BR	Bedrock Well	308-318	-70.13	-60.13	-65.13		229.43			
	75MW-19-01A Shallow					270.39		0.95	+0.0035	--
	75MW-19-02BR Bedrock									
	75MW-19-01A Shallow					170.25		0.96	+0.0056	--
	75MW-19-02C Deep									
	75MW-19-01A Shallow					32.40		0.11	+0.0034	--
	75MW-19-02B Mid-Depth									
	75MW-19-02B Mid-Depth					137.85		0.85	+0.0062	--
	75MW-19-02C Deep									
	75MW-19-02B Mid-Depth					237.99		0.84	+0.0035	--
	75MW-19-02BR Bedrock									
	75MW-19-02C Deep					100.14		0.01	--	-0.0001
	75MW-19-02BR Bedrock									
AOC 75 Well Triplet 1										
75PZ-19-01	Shallow Piezometer	0.8-10.8	216.83	226.83	221.83		224.92			
75MW-19-04A	Mid-Depth Well	20-30	198.06	208.06	203.06		225.11			
75MW-19-04B	Deep Well	50-60	167.99	177.99	172.99		225.01			
	75PZ-19-01 Shallow Piezometer					48.84		0.09	--	-0.0018
	75MW-19-04B Deep									
	75PZ-19-01 Shallow Piezometer					18.77		0.19	--	-0.0101
	75MW-19-02A Mid-Depth									
	75MW-19-04A Mid-Depth					30.07		0.10	+0.0033	--
	75MW-19-04B Deep									

Table 2-6
Vertical Groundwater Gradients
Water Level Gauging Event - 3/12/2020 and 3/13/2020*
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Location ID	Location	Screen Interval	Bottom of Screen Interval	Top of Screen Interval	Mid-Point of Screen	Difference Between Mid-Screen	Groudwater Elevation	Difference GW Elevation	Downward Gradient	Upward Gradient
		(ft bgs)	(ft NAVD88)	(ft NAVD88)	(ft NAVD88)	(ft)	(ft NAVD88)	(ft)	(unitless)	(unitless)
Patton/AOC 40										
Patton - Well Pair 1										
1D-S	Shallow Well	10-13	232.70	235.70	234.20	39.90	245.19	0.01	--	-0.0003
1D-D	Deep Well	49-54	191.80	196.80	194.30		245.20			
Patton - Well Pair 2										
1E-S	Shallow Well	5-8	238.20	241.20	239.70	59.10	242.69	0.53	+0.0090	--
1E-D	Deep Well	63-68	178.10	183.10	180.60		242.16			
Patton - Well Pair 3										
1F-S	Shallow Well	7-12	248.90	253.90	251.40	20.10	256.61	3.41	+0.1697	--
1F-D	Deep Well	27-32	228.80	233.80	231.30		253.20			

*Vertical gradients calculated using water level measurements collected on 3/12/2020 and 3/13/2020 (Patton only)
bgs = below ground surface
MPE = Measuring Point Elevation
NAVD88 = North America Vertical Datum 1988

Table 3-1
AOC 57 Field Activities
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

	Location	North Coordinate (ft NAD83)	East Coordinate (ft NAD83)	Construction Method	Establishing Date	Surface Elevation (ft NAVD88)	Total Depth (ft BGS)	Description of Total Depth	Top of Casing Elevation (ft NAVD88)	Depth to Top of Screen (ft BGS)	Depth to Bottom of Screen (ft BGS)	Elevation of Top of Screen (ft NAVD88)	Elevation of Bottom of Screen (ft NAVD88)
Existing Monitoring Well Sampling													
Initial Existing MW Sampling	57M-03-01X	3022695.05	632664.39	UKN	01/1/2003	234.45	UKN	UKN	235.73	10	20	224.45	214.45
	57M-03-02X	3022574.56	632652.66	UKN	01/1/2003	224.5	UKN	UKN	224.84	2	12	222.5	212.5
	57M-03-03X	3022501.24	632697.32	UKN	01/1/2003	218.99	UKN	UKN	220	2	12	216.99	206.99
	57M-03-04X	3022512.76	632732.81	UKN	01/1/2003	219.46	UKN	UKN	221.39	2	12	217.46	207.46
	57M-03-05X	3022567.79	632765.26	UKN	01/1/2003	219.58	UKN	UKN	221.88	2	12	217.58	207.58
	57M-03-06X	3022592.27	632784.14	UKN	01/1/2003	220.26	UKN	UKN	221.87	2	12	218.26	208.26
	57M-95-03X	3022997.24	633253.39	UKN	01/1/1995	230.8	UKN	UKN	232.79	7	17	223.8	213.8
	57M-95-05X	3022618.45	632528.15	UKN	01/1/1995	232.99	UKN	UKN	235.15	10	20	222.99	212.99
	57M-95-06X	3022717.48	632762.54	UKN	01/1/1995	232.64	UKN	UKN	234.39	11.87	21.87	220.77	210.77
	57M-95-07X	3022491.56	632547.82	UKN	01/1/1995	221.5	UKN	UKN	222.36	3	13	218.5	208.5
	57M-96-09X	3023093.82	633132.27	UKN	01/1/1900	239.44	UKN	UKN	241.82	12.8	22.8	226.64	216.64
	57M-96-10X	3022925.35	633338.47	UKN	01/1/1996	226.29	UKN	UKN	228.75	3	13	223.29	213.29
	57M-96-11X	3022891.53	633267.79	UKN	01/1/1996	220.05	UKN	UKN	222.2	2	12	218.05	208.05
	57M-96-12X	3022906.05	633169.85	UKN	01/1/1996	222.78	UKN	UKN	225.8	2	12	220.78	210.78
	57M-96-13X	3022859.27	633110.57	UKN	01/1/1996	223.23	UKN	UKN	225.58	2	12	221.23	211.23
	57P-98-03X	3022869.57	633313.90	UKN	01/1/1998	218.62	UKN	UKN	220.39	2.5	5.5	216.12	213.12
	57P-98-04X	3022867.92	633254.15	UKN	01/1/1998	218.24	UKN	UKN	221.75	2	5	216.24	213.24
	57WP-05-01	3022462.51	632632.11	UKN	01/1/2005	UKN	UKN	UKN	UKN	UKN	UKN	UKN	UKN
	57WP-06-02	3022505.52	632703.32	UKN	01/1/2006	219.17	UKN	UKN	220.29	18.92	23.92	200.25	195.25
	57WP-06-03	3022888.60	633262.66	UKN	01/1/2006	219.31	UKN	UKN	220.51	13.85	18.85	205.46	200.46
Second Set of Existing MW Sampling	57M-03-01X	3022695.05	632664.39	UKN	01/1/2003	234.45	UKN	UKN	235.73	10	20	224.45	214.45
	57M-03-04X	3022512.76	632732.81	UKN	01/1/2003	219.46	UKN	UKN	221.39	2	12	217.46	207.46
	57M-95-03X	3022997.24	633253.39	UKN	01/1/1995	230.8	UKN	UKN	232.79	7	17	223.8	213.8
	57WP-06-02	3022505.52	632703.32	UKN	01/1/2006	219.17	UKN	UKN	220.29	18.92	23.92	200.25	195.25
Suface Water and Sediment Sampling													
Initial Surface Water and Sediment Sampling	CSB-18-02	3022280.93	632467.46	NA	09/27/2018	NA	NA	NA	NA	NA	NA	NA	NA
	CSB-18-03	3022514.63	632735.04	NA	09/27/2018	NA	NA	NA	NA	NA	NA	NA	NA
	CSB-18-04	3022756.78	633294.49	NA	09/27/2018	NA	NA	NA	NA	NA	NA	NA	NA
	CSB-18-05	3022816.30	633543.83	NA	09/27/2018	NA	NA	NA	NA	NA	NA	NA	NA
Second Set of Surface Water and Sediment Sampling	CSB-20-04	3022495.83	632682.01	NA	03/26/2020	NA	NA	NA	NA	NA	NA	NA	NA
	CSB-20-05	3022812.20	633391.11	NA	03/26/2020	NA	NA	NA	NA	NA	NA	NA	NA

Table 3-1
AOC 57 Field Activities
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

	Location	North Coordinate (ft NAD83)	East Coordinate (ft NAD83)	Construction Method	Establishing Date	Surface Elevation (ft NAVD88)	Total Depth (ft BGS)	Description of Total Depth	Top of Casing Elevation (ft NAVD88)	Depth to Top of Screen (ft BGS)	Depth to Bottom of Screen (ft BGS)	Elevation of Top of Screen (ft NAVD88)	Elevation of Bottom of Screen (ft NAVD88)
Vertical Profiles													
Initial Vertical Profiles	5701VP-18-01	3022382.86	632076.87	GP	12/5/2018	227.14	78	Refusal	NA	NA	NA	NA	NA
	5701VP-18-02	3022337.07	632105.82	GP	12/6/2018	224.79	77	Refusal	NA	NA	NA	NA	NA
	5702VP-18-01	3022841.00	632506.00	GP	11/9/2018	241.65	109	Refusal	NA	NA	NA	NA	NA
	5702VP-18-02	3022709.84	632672.62	GP	11/19/2018	235.21	89	Refusal	NA	NA	NA	NA	NA
Initial Vertical Profiles	5702VP-18-03	3022636.00	632530.26	GP	11/12/2018	234.8	102	Refusal	NA	NA	NA	NA	NA
	5702VP-18-04	3022784.08	632786.35	GP	11/12/2018	233.46	109	Refusal	NA	NA	NA	NA	NA
	5702VP-18-05	3022653.38	632720.38	GP	11/14/2018	232	84	Refusal	NA	NA	NA	NA	NA
	5702VP-18-06	3022595.40	632728.94	GP	11/15/2018	222.96	85.5	Refusal	NA	NA	NA	NA	NA
	5702VP-18-07	3022676.66	632839.27	GP	11/29/2018	226.06	79.5	Refusal	NA	NA	NA	NA	NA
	5702VP-18-08	3022549.53	632592.00	GP	11/14/2018	224.12	94	Refusal	NA	NA	NA	NA	NA
	5703VP-18-01	3023024.23	633105.77	GP	11/9/2018	239.44	90	Refusal	NA	NA	NA	NA	NA
	5703VP-18-02	3023109.39	633236.20	GP	10/22/2018	237.94	81	Refusal	NA	NA	NA	NA	NA
	5703VP-18-03	3023187.59	633374.13	GP	10/19/2018	237.56	84	Refusal	NA	NA	NA	NA	NA
	5703VP-18-04	3022994.58	633213.70	GP	11/7/2018	233.5	82	Refusal	NA	NA	NA	NA	NA
	5703VP-18-05	3022906.67	633128.82	GP	11/27/2018	225.29	77.5	Refusal	NA	NA	NA	NA	NA
	5703VP-18-06	3022927.89	633221.90	GP	11/26/2018	225.45	72.5	Refusal	NA	NA	NA	NA	NA
	5703VP-18-07	3022902.14	633407.52	GP	11/28/2018	220.16	64	Refusal	NA	NA	NA	NA	NA
	5703VP-18-08	3022964.14	633241.22	GP	11/8/2018	228.33	73	Refusal	NA	NA	NA	NA	NA
Second Set of Vertical Profiles	5702VP-19-01	3023029.13	632232.46	GP	01/25/2019	248.62	106	EOB	NA	NA	NA	NA	NA
	5702VP-19-02	3022862.83	632116.43	GP	01/29/2019	248.32	106	EOB	NA	NA	NA	NA	NA
	5703VP-18-09	3023154.56	633153.93	GP	12/19/2018	243.56	86.5	Refusal	NA	NA	NA	NA	NA
	5703VP-19-01	3023322.79	633621.49	GP	01/24/2019	240.14	72	Refusal	NA	NA	NA	NA	NA
Third Set of Vertical Profiles	5702VP-19-03	3023366.33	631959.75	GP	03/20/2019	247.47	101	EOB	NA	NA	NA	NA	NA
	5702VP-19-04	3023166.21	631886.95	GP	03/18/2019	249.55	106	EOB	NA	NA	NA	NA	NA
	5702VP-19-05	3023052.98	631778.62	GP	03/18/2019	250.02	106	EOB	NA	NA	NA	NA	NA
	5702VP-19-06	3023245.20	632414.51	GP	03/22/2019	246.88	106	EOB	NA	NA	NA	NA	NA
Fourth Set of Vertical Profiles	5702VP-19-07	3023592.23	632716.56	GP	05/2/2019	246.47	78.5	Refusal	NA	NA	NA	NA	NA
Fifth Set of Vertical Profiles	5702VP-19-08	3022573.81	632265.00	GP	06/1/2019	233.53	106	Refusal	NA	NA	NA	NA	NA
	5702VP-19-09	3023639.65	632359.01	GP	06/21/2019	247.29	101	EOB	NA	NA	NA	NA	NA

Table 3-1
AOC 57 Field Activities
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

	Location	North Coordinate (ft NAD83)	East Coordinate (ft NAD83)	Construction Method	Establishing Date	Surface Elevation (ft NAVD88)	Total Depth (ft BGS)	Description of Total Depth	Top of Casing Elevation (ft NAVD88)	Depth to Top of Screen (ft BGS)	Depth to Bottom of Screen (ft BGS)	Elevation of Top of Screen (ft NAVD88)	Elevation of Bottom of Screen (ft NAVD88)
Soil Borings													
Initial Soil Borings	5702SB-19-01	3022745.36	632610.70	GP	01/28/2019	239.31	13	EOB	NA	NA	NA	NA	NA
	5702SB-19-02	3022699.67	632587.84	GP	01/29/2019	237.11	13	EOB	NA	NA	NA	NA	NA
	5702SB-19-03	3022734.15	632717.76	GP	01/28/2019	234.88	11	EOB	NA	NA	NA	NA	NA
	5702SB-19-04	3022653.72	632616.31	GP	01/28/2019	234.36	12	EOB	NA	NA	NA	NA	NA
	5702SB-19-05	3022654.00	632708.00	GP	01/29/2019	232.82	10	EOB	NA	NA	NA	NA	NA
	5702SB-19-06	3022705.47	632781.33	GP	01/29/2019	232.77	8	EOB	NA	NA	NA	NA	NA
	5702SB-19-07	3022842.00	632505.00	GP	01/28/2019	241.65	16	EOB	NA	NA	NA	NA	NA
	5703SB-19-01	3023010.28	633157.03	GP	01/28/2019	234.81	8	EOB	NA	NA	NA	NA	NA
	5703SB-19-02	3023109.00	633236.00	GP	01/28/2019	237.94	12	EOB	NA	NA	NA	NA	NA
	5703SB-19-03	3023140.96	633314.20	GP	01/28/2019	236.39	12	EOB	NA	NA	NA	NA	NA
	5703SB-19-04	3022986.00	633205.00	GP	01/28/2019	233.46	10	EOB	NA	NA	NA	NA	NA
Piezometer and Monitoring Well Installation													
Well and Piezometer Installation	5702MW-19-01	3023020.90	632237.00	RD	12/10/2019	247.9	160	EOB	NA	NA	NA	NA	NA
	5702MW-19-01A	3023025.66	632239.57	RD	12/16/2019	247.72	30	Well depth	247.37	20	30	227.72	217.72
	5702MW-19-01B	3023020.86	632237.00	RD	12/16/2019	247.86	50	Well depth	247.6	40	50	207.86	197.86
	5702MW-20-01	3022574.44	632761.63	W	01/3/2020	219.69	115	EOB	NA	NA	NA	NA	NA
	5702MW-20-01A	3022575.57	632765.18	W	01/2/2020	219.59	40.5	Well depth	222.23	30	40	189.59	179.59
	5702MW-20-01B	3022574.41	632761.63	W	01/10/2020	219.7	80	Well depth	222.27	70	80	149.7	139.7
	5702MW-20-02	3022839.99	632508.28	W	01/17/2020	241.65	40.5	EOB	NA	NA	NA	NA	NA
	5702MW-20-02A	3022839.99	632508.28	W	01/17/2020	241.65	40	Well depth	244.32	30	40	211.65	201.65
	5702MW-20-03	3022636.00	632530.26	RD	02/6/2020	234.78	150	EOB	NA	NA	NA	NA	NA
	5702MW-20-03A	3022636.00	632530.26	RD	02/10/2020	234.78	36	Well depth	237.7	26	36	208.78	198.78
	5702MW-20-04	3022723.53	632758.35	W	01/15/2020	232.69	80.5	EOB	NA	NA	NA	NA	NA
	5702MW-20-04A	3022723.53	632758.35	W	01/15/2020	232.69	80	Well depth	235.62	70	80	162.69	152.69
	5702MW-20-05	3022550.82	632575.52	RD	01/27/2020	223.29	140	EOB	NA	NA	NA	NA	NA
	5702MW-20-05A	3022545.98	632578.79	RD	02/5/2020	223.25	40	Well depth	226.09	30	40	193.25	183.25
	5702MW-20-05B	3022550.82	632575.52	RD	02/5/2020	223.29	80	Well depth	226.07	70	80	153.29	143.29
	5702MW-20-06	3022688.54	632671.44	W	01/14/2020	234.1	82.5	EOB	NA	NA	NA	NA	NA
	5702MW-20-06A	3022688.54	632671.44	W	01/14/2020	234.1	80	Well depth	236.52	70	80	164.1	154.1
	5702MW-20-07	3022514.57	632695.25	W	01/13/2020	219.42	40.5	EOB	NA	NA	NA	NA	NA
	5702MW-20-07A	3022514.57	632695.25	W	01/13/2020	219.42	40	Well depth	221.71	30	40	189.42	179.42
	5703MW-20-01	3022962.90	633315.55	W	01/22/2020	225.12	60.5	EOB	NA	NA	NA	NA	NA
	5703MW-20-01A	3022963.71	633310.05	W	01/23/2020	225.25	12	Well depth	228.18	2	12	223.25	213.25
	5703MW-20-01B	3022962.90	633315.55	W	01/22/2020	225.1	60	Well depth	228.1	50	60	175.1	165.1
	5703MW-20-02	3022994.58	633213.60	W	01/28/2020	233.46	84	Refusal	NA	NA	NA	NA	NA
	5703MW-20-02A	3022994.58	633213.60	W	01/31/2020	233.46	20	Well depth	235.75	10	20	223.46	213.46

Table 3-1
AOC 57 Field Activities
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

	Location	North Coordinate (ft NAD83)	East Coordinate (ft NAD83)	Construction Method	Establishing Date	Surface Elevation (ft NAVD88)	Total Depth (ft BGS)	Description of Total Depth	Top of Casing Elevation (ft NAVD88)	Depth to Top of Screen (ft BGS)	Depth to Bottom of Screen (ft BGS)	Elevation of Top of Screen (ft NAVD88)	Elevation of Bottom of Screen (ft NAVD88)
Well and Piezometer Installation	5703MW-20-03	3022909.33	633168.54	W	01/20/2020	222.95	61	EOB	NA	NA	NA	NA	NA
	5703MW-20-03A	3022909.33	633168.54	W	01/20/2020	222.95	60	Well depth	225.8	50	60	172.95	162.95
	5703MW-20-04	3022990.40	633265.61	W	01/24/2020	229.21	70.5	EOB	NA	NA	NA	NA	NA
	5703MW-20-04A	3022990.40	633265.61	W	01/24/2020	229.21	70	Well depth	231.74	60	70	169.21	159.21
	5703PZ-19-01	3022896.59	633266.60	GP	02/19/2020	220.16	67.5	Well depth	222.93	62.5	67.5	157.66	152.66

BGS = below ground surface
EOB = end of boring
ft = feet
GP = Geoprobe
NA = not applicable
RD = rotosonic
SB = soil boring
UKN = unknown
VP = vertical profile
W = drive and wash
NAD83 = North American Datum 1983.
NAVD88 = North American Vertical Datum 1988

Table 3-2
AOC 57 Summary of Groundwater Results from Vertical Profile Samples
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Parameter	Sample Count with Detected Concentrations	Number of Samples Exceeding EPA LHA	Number of Samples Exceeding MassDEP GW-1	Maximum Detected Concentration (ng/L)	Minimum Detected Concentration (ng/L)	Location of Maximum Detected Concentration
6:2 Fluorotelomer sulfonate (6:2 FTS)	5/245	---	---	17.0 J	8.40 J	5702VP-18-08
8:2 Fluorotelomer sulfonate (8:2 FTS)	3/245	---	---	43.0	7.00 J	5702VP-19-01
N-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0/245	---	---	---	---	---
N-Methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0/245	---	---	---	---	---
Perfluorobutanesulfonic acid (PFBS)	174/245	---	---	88.0	0.470 J	5703VP-18-04
Perfluorodecanoic acid (PFDA)	45/245	---	2	82.0	0.450 J	5702VP-19-01
Perfluorododecanoic acid (PFDoA)	6/245	---	---	19.0	0.640 J	5702VP-19-01
Perfluoroheptanoic acid (PFHpA)	150/245	---	60	1600	0.590 J	5702VP-18-01
Perfluorohexanesulfonic acid (PFHxS)	209/245	---	58	4100	0.370 J	5702VP-18-08
Perfluorohexanoic acid (PFHxA)	184/245	---	---	1500	0.510 J	5702VP-18-08
Perfluorononanoic acid (PFNA)	75/245	---	2	65.0	0.510 J	5702VP-19-03
Perfluorooctanesulfonic acid (PFOS)	124/245	7	21	1100	1.00 J	5702VP-19-01
Perfluorooctanoic acid (PFOA)	178/245	36	64	3900	0.470 J	5702VP-18-08
Perfluorotetradecanoic acid (PFTA)	2/245	---	---	3.10 J	2.80 J	5702VP-19-01
Perfluorotridecanoic acid (PFTrDA)	2/245	---	---	4.80	2.70 J	5702VP-19-07
Perfluoroundecanoic acid (PFUnA)	6/245	---	---	32.0	1.10 J	5702VP-19-01
EPA LHA	---	41	---	4390	1.54	5702VP-18-08
MassDEP GW-1	---	---	124	8760	2.10	5702VP-18-08

ng/L = nanograms per liter
EPA Life-time Health Advisory (LHA) is the individual or sum of PFOS and PFOA = 70 ng/L.
MassDEP GW-1 is the individual concentration or sum of PFOA, PFOS, PFHpA, PFHxS, PFNA, PFDA = 20 ng/L.

Table 3-3
AOC 57 Summary of Groundwater Results from Monitoring Wells
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Parameter	Sample Count with Detected Concentrations	Number of Samples Exceeding EPA LHA	Number of Samples Exceeding MassDEP GW-1	Maximum Detected Concentration (ng/L)	Minimum Detected Concentration (ng/L)	Location of Maximum Detected Concentration
6:2 Fluorotelomer sulfonate (6:2 FTS)	3/37	---	---	39.0 J	7.50 J	57WP-06-02
8:2 Fluorotelomer sulfonate (8:2 FTS)	1/37	---	---	14.0 J	14.0 J	5702MW-19-01A
N-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0/37	---	---	---	---	---
N-Methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0/37	---	---	---	---	---
Perfluorobutanesulfonic acid (PFBS)	35/37	---	---	82.0	0.610 J	57M-96-13X
Perfluorodecanoic acid (PFDA)	9/37	---	---	6.80	0.460 J	57WP-06-02
Perfluorododecanoic acid (PFDoA)	0/37	---	---	---	---	---
Perfluoroheptanoic acid (PFHpA)	35/37	---	24	760	1.20 J	5702MW-20-02A
Perfluorohexanesulfonic acid (PFHxS)	37/37	---	19	1500	0.510 J	5702MW-20-05A
Perfluorohexanoic acid (PFHxA)	35/37	---	---	600	1.70	57M-96-12X
Perfluorononanoic acid (PFNA)	23/37	---	---	10.0	0.490 J	57WP-06-02
Perfluorooctanesulfonic acid (PFOS)	27/37	3	9	190	1.30 J	5702MW-20-02A
Perfluorooctanoic acid (PFOA)	35/37	19	26	2400	1.70 J	5702MW-20-05A
Perfluorotetradecanoic acid (PFTA)	0/37	---	---	---	---	---
Perfluorotridecanoic acid (PFTrDA)	1/37	---	---	1.20 J	1.20 J	5702MW-19-01A
Perfluoroundecanoic acid (PFUnA)	0/37	---	---	---	---	---
EPA LHA	---	20	---	2480	2.90	5702MW-20-05A
MassDEP GW-1	---	---	31	4150	6.60	5702MW-20-05A

ng/L = nanograms per liter
EPA Life-time Health Advisory (LHA) is the individual or sum of PFOS and PFOA = 70 ng/L.
MassDEP GW-1 is the individual concentration or sum of PFOA, PFOS, PFHpA, PFHxS, PFNA, PFDA = 20 ng/L.

Table 4-1
AOC 74 Field Activities
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

	Location	North Coordinate (ft NAD83)	East Coordinate (ft NAD83)	Construction Method	Establishing Date	Surface Elevation (ft NAVD88)	Total Depth (ft BGS)	Description of Total Depth	Top of Casing Elevation (ft NAVD88)	Depth to Top of Screen (ft BGS)	Depth to Bottom of Screen (ft BGS)	Elevation of Top of Screen (ft NAVD88)	Elevation of Bottom of Screen (ft NAVD88)
Existing Irrigation Well Sampling													
	74IG-01	3024085.92	633412.84	NA	UKN	UKN	505	UKN	UKN	UKN	UKN	UKN	UKN
Suface Water and Sediment Sampling													
First Set of Samples	CSB-18-06	3023671.96	633972.07	NA	09/27/2018	NA	NA	NA	NA	NA	NA	NA	NA
	CSB-18-07	3024023.65	634345.64	NA	09/26/2018	NA	NA	NA	NA	NA	NA	NA	NA
	CSB-18-08	3024816.25	634801.52	NA	09/26/2018	NA	NA	NA	NA	NA	NA	NA	NA
Second Set of Samples	CSB-20-06	3023863.16	634270.73	NA	03/26/2020	NA	NA	NA	NA	NA	NA	NA	NA
Vertical Profiles													
Initial Vertical Profiles	74VP-18-01	3024093.5	633760.56	GP	10/10/2018	237.85	106	Refusal	NA	NA	NA	NA	NA
	74VP-18-02	3023875.13	634038.49	GP	12/5/2018	241.12	73	Refusal	NA	NA	NA	NA	NA
	74VP-18-03	3023897.8	633502.96	GP	10/12/2018	242.69	119.5	Refusal	NA	NA	NA	NA	NA
	74VP-18-04	3024257.72	633990.7	GP	12/10/2018	238.48	71	Refusal	NA	NA	NA	NA	NA
	74VP-18-04A	3024245.06	633996.44	GP	12/11/2018	238.36	85	Refusal	NA	NA	NA	NA	NA
	74VP-18-05	3024359.94	633819.7	GP	10/8/2018	242.87	114	Refusal	NA	NA	NA	NA	NA
	74VP-18-06	3023940.54	633800.45	GP	12/3/2018	227.82	85.5	Refusal	NA	NA	NA	NA	NA
	74VP-18-07	3024328.32	633464.18	GP	10/3/2018	244.72	121	EOB	NA	NA	NA	NA	NA
	74VP-18-08	3024483.67	633723.43	GP	10/5/2018	247.44	146	Refusal	NA	NA	NA	NA	NA
	74VP-18-09	3023959.35	634135.92	GP	12/4/2018	222.35	39.5	Refusal	NA	NA	NA	NA	NA
	74VP-18-10	3023801.51	633867.83	GP	12/4/2018	226.22	50	Refusal	NA	NA	NA	NA	NA
	74VP-18-11	3024179.62	633266.66	GP	10/1/2018	245.19	100	Refusal	NA	NA	NA	NA	NA
Second Set of Vertical Profiles	74VP-18-12	3024634.59	633907.92	GP	12/16/2018	247.94	102	Refusal	NA	NA	NA	NA	NA
	74VP-18-13	3024450.12	634201.21	GP	12/11/2018	241.53	82.5	Refusal	NA	NA	NA	NA	NA
Third Set of Vertical Profiles	74VP-19-01	3023830.68	633238.51	GP	02/20/2019	243.73	106	EOB	NA	NA	NA	NA	NA
	74VP-19-02	3024992.85	634477.49	GP	02/20/2019	246.05	101	EOB	NA	NA	NA	NA	NA
Fourth Set of Vertical Profiles	74VP-19-03	3024285.56	634403.9	GP	06/5/2019	230.46	41.5	Refusal	NA	NA	NA	NA	NA
	74VP-19-04	3024119.61	634318.93	GP	06/6/2019	236.49	54	Refusal	NA	NA	NA	NA	NA
Fifth Set of Vertical Profiles	74VP-20-01	3024085.21	633829.77	GP	02/4/2020	237.09	92	Refusal	NA	NA	NA	NA	NA

Table 4-1
AOC 74 Field Activities
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

	Location	North Coordinate (ft NAD83)	East Coordinate (ft NAD83)	Construction Method	Establishing Date	Surface Elevation (ft NAVD88)	Total Depth (ft BGS)	Description of Total Depth	Top of Casing Elevation (ft NAVD88)	Depth to Top of Screen (ft BGS)	Depth to Bottom of Screen (ft BGS)	Elevation of Top of Screen (ft NAVD88)	Elevation of Bottom of Screen (ft NAVD88)
Soil Borings													
Soil Borings	74SB-19-01	3024093	633760	GP	01/3/2019	239.35	14	EOB	NA	NA	NA	NA	NA
	74SB-19-02	3024024.64	633674.78	GP	01/3/2019	238.15	14	EOB	NA	NA	NA	NA	NA
	74SB-19-03	3024146.58	633834.37	GP	01/3/2019	238.38	13	EOB	NA	NA	NA	NA	NA
	74SB-19-04	3024257	633990	GP	01/4/2019	238.27	13	EOB	NA	NA	NA	NA	NA
	74SB-19-05	3024359	633819	GP	01/3/2019	242.87	18	EOB	NA	NA	NA	NA	NA
	74SB-19-06	3023940	633800	GP	01/4/2019	238.04	16	EOB	NA	NA	NA	NA	NA
	74SB-19-07	3024065.04	633950.39	GP	01/4/2019	236.47	13	EOB	NA	NA	NA	NA	NA
Piezometer and Monitoring Well Installation													
First Set of Piezometers	74PZ-19-01	3023395.6	633692.45	GP	02/25/2019	241.51	26	EOB	244.37	16	26	225.51	215.51
	74PZ-19-02	3023830.28	633310.6	GP	02/22/2019	244.67	28	EOB	244.41	18	28	226.67	216.67
	74PZ-19-03	3024181.02	633069.43	GP	03/6/2019	246.64	36	EOB	246.48	26	36	220.64	210.64
	74PZ-19-04	3023948.72	634144.94	GP	02/22/2019	222.70	16	EOB	246.48	6	16	216.7	206.7
	74PZ-19-05	3024351.21	633822.46	GP	02/25/2019	243.15	30	EOB	242.69	20	30	223.15	213.15
	74PZ-19-06	3024738.94	633401.05	GP	03/7/2019	249.51	42	EOB	249.1	32	42	217.51	207.51
	74PZ-19-07	3024827.51	633824.08	GP	03/8/2019	248.63	40	EOB	248.4	30	40	218.63	208.63
	74PZ-19-08	3024747.66	634083.73	GP	02/25/2019	249.04	35	EOB	248.89	25	35	224.04	214.04
	74PZ-19-09	3024557.03	634521.85	GP	02/25/2019	237.52	35	EOB	237.42	18	28	219.52	209.52
Second Set of Piezometers and Monitoring Wells	74PZ-19-10	3023949	634140.8	GP	11/6/2019	222.37	38	EOB	226.03	36	38	186.37	184.37
	74PZ-20-01	3024411.3	634446.6	GP	02/7/2020	235.93	27.5	EOB	238.62	17.5	27.5	218.43	208.43
	74PZ-20-02	3023988	633699	GP	02/3/2020	238.08	30.5	EOB	240.92	20.5	30.5	217.58	207.58
	74PZ-20-03	3024551.1	634138.7	GP	02/6/2020	243.24	26.2	EOB	243.04	16.2	26.2	227.04	217.04
	74PZ-20-04	3024308.95	633457.2	GP	02/3/2020	243.97	28.5	EOB	243.73	18.5	28.5	225.47	215.47
	74PZ-20-05	3024184.3	634092.9	GP	02/6/2020	237.89	23.5	EOB	237.64	13.5	23.5	224.39	214.39
	74MW-19-04	3023949.2	634137.2	GP	11/7/2019	222.06	30	EOB	NA	NA	NA	NA	NA
	74MW-19-04A	3023949.2	634137.2	GP	11/7/2019	222.07	28	EOB	225.48	18	28	204.07	194.07

BGS = below ground surface
EOB = end of boring
ft = feet
GP = Geoprobe
NA = not applicable
SB = soil boring
VP = vertical profile
NAD83 = North American Datum 1983.
NAVD88 = North American Vertical Datum 1988

Table 4-2
AOC 74 Summary of Groundwater Results from Vertical Profile Samples
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Parameter	Sample Count with Detected Concentrations	Number of Samples Exceeding EPA LHA	Number of Samples Exceeding MassDEP GW-1	Maximum Detected Concentration (ng/L)	Minimum Detected Concentration (ng/L)	Location of Maximum Detected Concentration
6:2 Fluorotelomer sulfonate (6:2 FTS)	4/133	---	---	32.0 J	10.6 J	74VP-20-01
8:2 Fluorotelomer sulfonate (8:2 FTS)	0/133	---	---	---	---	---
N-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0/133	---	---	---	---	---
N-Methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0/133	---	---	---	---	---
Perfluorobutanesulfonic acid (PFBS)	70/133	---	---	21.0	0.460 J	74VP-19-01
Perfluorodecanoic acid (PFDA)	29/133	---	5	113 J	0.580 J	74VP-18-05
Perfluorododecanoic acid (PFDoA)	0/133	---	---	---	---	---
Perfluoroheptanoic acid (PFHpA)	90/133	---	19	1360 J	0.590 J	74VP-18-05
Perfluorohexanesulfonic acid (PFHxS)	70/133	---	2	22.7 J	0.360 J	74VP-18-05
Perfluorohexanoic acid (PFHxA)	99/133	---	---	2020 J	0.640 J	74VP-18-05
Perfluorononanoic acid (PFNA)	51/133	---	7	128 J	0.560 J	74VP-18-05
Perfluorooctanesulfonic acid (PFOS)	60/133	2	15	505 J	1.08 J	74VP-18-05
Perfluorooctanoic acid (PFOA)	103/133	11	27	2270 J	0.540 J	74VP-18-05
Perfluorotetradecanoic acid (PFTA)	0/133	---	---	---	---	---
Perfluorotridecanoic acid (PFTrDA)	1/133	---	---	0.790 J	0.790 J	74VP-20-01
Perfluoroundecanoic acid (PFUnA)	10/133	---	---	6.39	0.930 J	74VP-18-03
EPA LHA	---	17	---	2270	2.00	74VP-18-05
MassDEP GW-1	---	---	48	3660	3.64	74VP-18-05

ng/L = nanograms per liter
EPA Life-time Health Advisory (LHA) is the individual or sum of PFOS and PFOA = 70 ng/L.
MassDEP GW-1 is the individual concentration or sum of PFOA, PFOS, PFHpA, PFHxS, PFNA, PFDA = 20 ng/L.

Table 4-3
AOC 74 Summary of Groundwater Results from Monitoring Wells
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Parameter	Sample Count with Detected Concentrations	Number of Samples Exceeding EPA LHA	Number of Samples Exceeding MassDEP GW-1	Maximum Detected Concentration (ng/L)	Minimum Detected Concentration (ng/L)	Location of Maximum Detected Concentration
6:2 Fluorotelomer sulfonate (6:2 FTS)	0/1	---	---	---	---	---
8:2 Fluorotelomer sulfonate (8:2 FTS)	0/1	---	---	---	---	---
N-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0/1	---	---	---	---	---
N-Methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0/1	---	---	---	---	---
Perfluorobutanesulfonic acid (PFBS)	0/1	---	---	---	---	---
Perfluorodecanoic acid (PFDA)	1/1	---	---	8.1 J	8.1 J	74MW-19-04A
Perfluorododecanoic acid (PFDoA)	0/1	---	---	---	---	---
Perfluoroheptanoic acid (PFHpA)	1/1	---	---	12 J	12 J	74MW-19-04A
Perfluorohexanesulfonic acid (PFHxS)	0/1	---	---	---	---	---
Perfluorohexanoic acid (PFHxA)	1/1	---	---	10 J	10 J	74MW-19-04A
Perfluorononanoic acid (PFNA)	1/1	---	---	7.9 J	7.9 J	74MW-19-04A
Perfluorooctanesulfonic acid (PFOS)	1/1	---	1	44	44	74MW-19-04A
Perfluorooctanoic acid (PFOA)	1/1	---	1	27	27	74MW-19-04A
Perfluorotetradecanoic acid (PFTA)	0/1	---	---	---	---	---
Perfluorotridecanoic acid (PFTrDA)	0/1	---	---	---	---	---
Perfluoroundecanoic acid (PFUnA)	0/1	---	---	---	---	---
EPA LHA	---	1	---	71.0	71.0	74MW-19-04A
MassDEP GW-1	---	---	1	99.0	99.0	74MW-19-04A

ng/L = nanograms per liter
EPA Life-time Health Advisory (LHA) is the individual or sum of PFOS and PFOA = 70 ng/L.
MassDEP GW-1 is the individual concentration or sum of PFOA, PFOS, PFHpA, PFHxS, PFNA, PFDA = 20 ng/L.

Table 5-1
AOC 75 Field Activities
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

	Location	North Coordinate (ft NAD83)	East Coordinate (ft NAD83)	Construction Method	Establishing Date	Surface Elevation (ft NAVD88)	Total Depth (ft BGS)	Description of Total Depth	Top of Casing Elevation (ft NAVD88)	Depth to Top of Screen (ft BGS)	Depth to Bottom of Screen (ft BGS)	Elevation of Top of Screen (ft NAVD88)	Elevation of Bottom of Screen (ft NAVD88)
Vertical Profiles													
Initial Vertical Profiles	75VP-18-01	3022466.17	630346.17	GP	10/24/2018	251.84	106	EOB	NA	NA	NA	NA	NA
	75VP-18-02	3022800.50	630545.97	GP	10/29/2018	250.63	106	EOB	NA	NA	NA	NA	NA
	75VP-18-03	3022470.42	631194.33	GP	10/17/2018	244.78	106	EOB	NA	NA	NA	NA	NA
	75VP-18-04	3022226.45	631088.24	GP	10/18/2018	241.52	106	EOB	NA	NA	NA	NA	NA
	75VP-18-05	3022771.83	630810.20	GP	10/26/2018	249.58	106	EOB	NA	NA	NA	NA	NA
	75VP-18-06	3022543.94	630803.42	GP	10/25/2018	243.25	76	EOB	NA	NA	NA	NA	NA
	75VP-18-06A	3022512.92	630796.57	GP	10/29/2018	243.17	86	EOB	NA	NA	NA	NA	NA
	75VP-18-07	3022266.62	630755.51	GP	10/23/2018	244.39	86	Refusal	NA	NA	NA	NA	NA
	75VP-18-08	3022677.30	631295.62	GP	10/10/2018	247.86	151	Refusal	NA	NA	NA	NA	NA
	75VP-18-09	3022736.34	631341.94	GP	10/16/2018	248.57	115	Refusal	NA	NA	NA	NA	NA
Second set of Vertical Profiles	75VP-18-10	3021835.14	630997.50	GP	12/17/2018	245.36	102	Refusal	NA	NA	NA	NA	NA
	75VP-18-11	3022032.26	631721.26	GP	12/17/2018	227.43	96	Refusal	NA	NA	NA	NA	NA
	75VP-18-12	3022571.40	631969.34	GP	12/12/2018	243.61	122.5	Refusal	NA	NA	NA	NA	NA
	75VP-18-13	3021710.55	631556.29	GP	12/18/2018	225.37	102	Refusal	NA	NA	NA	NA	NA
	75VP-19-01	3022307.80	630336.86	GP	01/8/2019	248.95	109	Refusal	NA	NA	NA	NA	NA
Third set of Vertical Profiles	75VP-19-02	3021943.47	630296.37	GP	02/11/2019	247.65	106	EOB	NA	NA	NA	NA	NA
	75VP-19-03	3022507.51	629633.92	GP	02/11/2019	252.4	48.5	Refusal	NA	NA	NA	NA	NA
	75VP-19-04	3022260.89	629582.86	GP	02/12/2019	250.23	45	Refusal	NA	NA	NA	NA	NA
Fourth set of Vertical Profiles	75VP-19-05	3021749.65	630301.10	GP	05/7/2019	248.39	106	EOB	NA	NA	NA	NA	NA
	75VP-19-06	3022003.80	629499.80	GP	05/6/2019	253.56	31.8	Refusal	NA	NA	NA	NA	NA
	75VP-19-07	3022255.47	629335.90	GP	05/6/2019	253.92	22.5	Refusal	NA	NA	NA	NA	NA
	75VP-19-08	3022520.54	629274.19	GP	05/9/2019	252.89	32	Refusal	NA	NA	NA	NA	NA
Fifth set of Vertical Profiles	75VP-19-09	3021588.41	629841.11	GP	06/20/2019	245.29	61	Refusal	NA	NA	NA	NA	NA
Sixth set of Vertical Profiles	75VP-20-01	3022310.31	631904.78	GP	02/11/2020	233.2	110	Refusal	NA	NA	NA	NA	NA

Table 5-1
AOC 75 Field Activities
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

	Location	North Coordinate (ft NAD83)	East Coordinate (ft NAD83)	Construction Method	Establishing Date	Surface Elevation (ft NAVD88)	Total Depth (ft BGS)	Description of Total Depth	Top of Casing Elevation (ft NAVD88)	Depth to Top of Screen (ft BGS)	Depth to Bottom of Screen (ft BGS)	Elevation of Top of Screen (ft NAVD88)	Elevation of Bottom of Screen (ft NAVD88)
Soil Borings													
Initial Soil Borings	75SB-19-01	3022466.00	630346.00	GP	01/8/2019	251.84	20	EOB	NA	NA	NA	NA	NA
	75SB-19-02	3022800.00	630545.00	GP	01/7/2019	250.63	20	EOB	NA	NA	NA	NA	NA
	75SB-19-03	3022571.27	630610.22	GP	01/4/2019	249.36	20	EOB	NA	NA	NA	NA	NA
	75SB-19-04	3022444.18	630708.23	GP	01/7/2019	247.31	15	EOB	NA	NA	NA	NA	NA
	75SB-19-05	3022771.00	630810.00	GP	01/7/2019	249.58	20	EOB	NA	NA	NA	NA	NA
	75SB-19-06	3022562.96	630772.91	GP	01/7/2019	243.25	15	EOB	NA	NA	NA	NA	NA
	75SB-19-07	3022266.00	630755.00	GP	01/7/2019	244.39	10	EOB	NA	NA	NA	NA	NA
Second set of Soil Borings	75SB-19-08	3022306.99	630340.02	GP	05/9/2019	248.79	16	EOB	NA	NA	NA	NA	NA
	75SB-19-09	3022152.79	630400.32	GP	05/9/2019	240.86	8	EOB	NA	NA	NA	NA	NA
	75SB-19-10	3022097.78	630367.68	GP	05/10/2019	239.99	7	EOB	NA	NA	NA	NA	NA
Piezometer and Monitoring Well Installation													
Well Installation, Piezometer Installation, and Last VP	75MW-19-01	3021955.16	628945.47	RD	02/13/2020	259.37	45	EOB	258.79	35	45	224.37	214.37
	75MW-19-01BR	3021955.16	628945.47	RD	02/13/2020	259.37	45	EOB	258.79	35	45	224.37	214.37
	75MW-19-02	3022542.59	630774.48	RD	12/18/2019	247.87	318	EOB	NA	NA	NA	NA	NA
	75MW-19-02A	3022532.69	630775.34	RD	01/22/2020	247.76	47.5	EOB	250.08	37.5	47.5	210.26	200.26
	75MW-19-02B	3022534.02	630766.92	RD	01/21/2020	247.86	80	EOB	250.47	70	80	177.86	167.86
	75MW-19-02C	3022561.92	630773.85	RD	02/12/2020	248.01	220	EOB	250.64	210	220	38.01	28.01
	75MW-19-02BR	3022530.02	630771.18	RD	02/13/2020	247.87	318	EOB	250.78	308	318	-60.13	-70.13
	75MW-19-04	3022035.06	631715.44	RD	12/16/2019	227.99	99.5	Bedrock	NA	NA	NA	NA	NA
	75MW-19-04A	3022035.06	631715.44	RD	12/17/2019	228.06	30	EOB	230.51	20	30	208.06	198.06
	75MW-19-04B	3022030.68	631713.03	RD	12/17/2019	227.99	60	EOB	230.57	50	60	177.99	167.99
	75PZ-19-01	3022028.20	631721.60	GP	12/9/2019	227.63	10.8	NA	230.47	0.8	10.8	226.83	216.83
	75PZ-19-02	3021645.30	630327.03	GP	12/6/2019	248.23	25.2	NA	247.94	15.2	25.2	233.03	223.03
	75PZ-19-03	3022129.20	630373.50	GP	12/6/2019	240.62	18.2	NA	240.39	8.2	18.2	232.42	222.42
	75PZ-19-04	3022269.70	629580.60	GP	12/5/2019	249.98	35	NA	249.70	24.6	34.6	225.38	215.38
	75PZ-20-01	3022301.20	631915.70	GP	02/14/2020	236.43	21.5	NA	236.21	11.5	21.5	224.93	214.93
	75PZ-20-02	3022659.40	631327.90	GP	02/19/2020	245.64	24.25	NA	245.44	14.25	24.25	231.39	221.39
	75PZ-20-03	3022208.90	631092.20	GP	02/14/2020	242.50	23	NA	245.82	13	23	229.50	219.50
	75PZ-20-04	3021622.30	630904.40	GP	02/13/2020	246.31	24	NA	246.17	14	24	232.31	222.31
	75PZ-20-05	3021245.40	629855.60	GP	03/3/2020	243.46	20	NA	243.20	10	20	233.46	223.46
	75PZ-20-06	3022430.80	630363.80	GP	02/18/2020	249.41	26	NA	249.11	16	26	233.41	223.41
	75PZ-20-07	3021697.10	631557.90	GP	02/13/2020	225.30	11	NA	228.63	1	11	224.30	214.30

Table 5-1
AOC 75 Field Activities
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

	Location	North Coordinate (ft NAD83)	East Coordinate (ft NAD83)	Construction Method	Establishing Date	Surface Elevation (ft NAVD88)	Total Depth (ft BGS)	Description of Total Depth	Top of Casing Elevation (ft NAVD88)	Depth to Top of Screen (ft BGS)	Depth to Bottom of Screen (ft BGS)	Elevation of Top of Screen (ft NAVD88)	Elevation of Bottom of Screen (ft NAVD88)
Surface Water and Sediment													
	CSB-20-02	3021877.48	631980.01	NA	03/27/2020	NA	NA	NA	NA	NA	NA	NA	NA
	CSB-20-03	3021961.28	632089.43	NA	03/26/2020	NA	NA	NA	NA	NA	NA	NA	NA

BGS = below ground surface
EOB = end of boring
ft = feet
GP = Geoprobe
NA = not applicable
RD = rotosonic
SB = soil boring
VP = vertical profile
NAD83 = North American Datum 1983.
NAVD88 = North American Vertical Datum 1988

Table 5-2
AOC 75 Summary of Groundwater Results from Vertical Profile Samples
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Parameter	Sample Count with Detected Concentrations	Number of Samples Exceeding EPA LHA	Number of Samples Exceeding MassDEP GW-1	Maximum Detected Concentration (ng/L)	Minimum Detected Concentration (ng/L)	Location of Maximum Detected Concentration
6:2 Fluorotelomer sulfonate (6:2 FTS)	0/194	---	---	---	---	---
8:2 Fluorotelomer sulfonate (8:2 FTS)	2/194	---	---	8.40 J	3.10 J	75VP-19-03
N-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0/194	---	---	---	---	---
N-Methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0/194	---	---	---	---	---
Perfluorobutanesulfonic acid (PFBS)	155/194	---	---	16.0	0.450 J	75VP-19-01
Perfluorodecanoic acid (PFDA)	2/194	---	---	0.73 J	0.630 J	75VP-19-09
Perfluorododecanoic acid (PFDoA)	0/194	---	---	---	---	---
Perfluoroheptanoic acid (PFHpA)	157/194	---	15	44.0	0.594 J	75VP-19-02
Perfluorohexanesulfonic acid (PFHxS)	174/194	---	72	1100	0.380 J	75VP-19-01
Perfluorohexanoic acid (PFHxA)	168/194	---	---	130	0.444 J	75VP-19-01
Perfluorononanoic acid (PFNA)	50/194	---	---	3.90	0.520 J	75VP-19-04
Perfluorooctanesulfonic acid (PFOS)	142/194	24	47	1160	0.981 J	75VP-18-07
Perfluorooctanoic acid (PFOA)	160/194	14	35	290	0.487 J	75VP-19-01
Perfluorotetradecanoic acid (PFTA)	0/194	---	---	---	---	---
Perfluorotridecanoic acid (PFTrDA)	0/194	---	---	---	---	---
Perfluoroundecanoic acid (PFUnA)	2/194	---	---	1.70 J	0.680 J	75VP-19-01
EPA LHA	---	33	---	1400	1.75	75VP-18-07
MassDEP GW-1	---	---	119	2050	2.10	75VP-19-01

ng/L = nanograms per liter
EPA Life-time Health Advisory (LHA) is the individual or sum of PFOS and PFOA = 70 ng/L.
MassDEP GW-1 is the individual concentration or sum of PFOA, PFOS, PFHpA, PFHxS, PFNA, PFDA = 20 ng/L.

Table 5-3
AOC 75 Summary of Groundwater Results from Monitoring Wells in Overburden
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Parameter	Sample Count with Detected Concentrations	Number of Samples Exceeding EPA LHA	Number of Samples Exceeding MassDEP GW-1	Maximum Detected Concentration (ng/L)	Minimum Detected Concentration (ng/L)	Location of Maximum Detected Concentration
6:2 Fluorotelomer sulfonate (6:2 FTS)	0/5	---	---	---	---	---
8:2 Fluorotelomer sulfonate (8:2 FTS)	0/5	---	---	---	---	---
N-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0/5	---	---	---	---	---
N-Methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0/5	---	---	---	---	---
Perfluorobutanesulfonic acid (PFBS)	5/5	---	---	9.10	0.630 J	75MW-19-04A
Perfluorodecanoic acid (PFDA)	0/5	---	---	---	---	---
Perfluorododecanoic acid (PFDoA)	0/5	---	---	---	---	---
Perfluoroheptanoic acid (PFHpA)	5/5	---	1	23.0	1.70 J	75MW-19-04A
Perfluorohexanesulfonic acid (PFHxS)	5/5	---	3	680	9.30	75MW-19-04A
Perfluorohexanoic acid (PFHxA)	5/5	---	---	71.0	2.30	75MW-19-04A
Perfluorononanoic acid (PFNA)	0/5	---	---	---	---	---
Perfluorooctanesulfonic acid (PFOS)	5/5	3	3	530	2.2 J	75MW-19-04A
Perfluorooctanoic acid (PFOA)	5/5	1	3	170	1.90	75MW-19-04A
Perfluorotetradecanoic acid (PFTA)	0/5	---	---	---	---	---
Perfluorotridecanoic acid (PFTrDA)	0/5	---	---	---	---	---
Perfluoroundecanoic acid (PFUnA)	0/5	---	---	---	---	---
EPA LHA	---	3	---	700	4.10	75MW-19-04A
MassDEP GW-1	---	---	4	1403	19.8	75MW-19-04A

ng/L = nanograms per liter
EPA Life-time Health Advisory (LHA) is the individual or sum of PFOS and PFOA = 70 ng/L.
MassDEP GW-1 is the individual concentration or sum of PFOA, PFOS, PFHpA, PFHxS, PFNA, PFDA = 20 ng/L.

Table 6-1
Grove Pond Area Field Activities
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

	Location	North Coordinate (ft NAD83)	East Coordinate (ft NAD83)	Construction Method	Establishing Date	Surface Elevation (ft NAVD88)	Total Depth (ft BGS)	Description of Total Depth	Top of Casing Elevation (ft NAVD88)	Depth to Top of Screen (ft BGS)	Depth to Bottom of Screen (ft BGS)	Elevation of Top of Screen (ft NAVD88)	Elevation of Bottom of Screen (ft NAVD88)
Existing Monitoring Well Sampling													
	92-1	3025938.38	634242.21	UKN	UKN	221.45	55	UKN	223.35	49	55	172.45	166.45
	92-2	3025954.21	634521.93	UKN	UKN	UKN	UKN	UKN	UKN	UKN	UKN	UKN	UKN
	92-3	3025909.38	634255.61	UKN	UKN	217.38	55	UKN	219.39	49	55	168.38	162.38
	92-4	3025767.67	634052.02	UKN	UKN	251.55	86	UKN	254.56	67	71	184.55	180.55
	92-5	3026858.17	633899.9	UKN	UKN	222.87	41	UKN	223.87	35	41	187.87	181.87
	CSMS-11-01	3025631.5	633877.76	UKN	UKN	250.7	UKN	UKN	253.6	30	40	220.7	210.7
	CSMS-11-02	3025614.14	634304.19	UKN	UKN	248.9	UKN	UKN	252.04	30	40	218.9	208.9
	GF-1	3026000.98	634311.61	UKN	UKN	221.04	UKN	UKN	223.65	116	121	105.04	100.04
	GF-2	3026015.88	634185.31	UKN	UKN	221.58	UKN	UKN	223.27	114	121	107.58	100.58
	GF-3A	3026080.08	634258.31	UKN	UKN	218.52	UKN	UKN	220.67	97	102	121.52	116.52
	GF-3B	3026074.23	634258.46	UKN	UKN	218.61	UKN	UKN	220.63	8	13	210.61	205.61
	GF-4	3026033.17	634009.51	UKN	UKN	224.29	UKN	UKN	225.93	79	84	145.29	140.29
	MNG-2R	3025606.64	633011.03	UKN	05/9/2014	233.5	26	UKN	236.08	14	24	219.5	209.5
	MNG-3R	3025615.73	634063.76	UKN	05/6/2014	251.5	66	UKN	254.36	55	65	196.5	186.5
	MNG-5R	3025390.28	633156.49	UKN	05/8/2014	233.5	21	UKN	235.91	10	20	223.5	213.5
	MNG-6R	3025321.19	633467.4	UKN	05/5/2014	249.7	41	UKN	252.39	30	40	219.7	209.7
Surface Water and Sediment Samples													
	BP-18-01	3027010.47	636075.03	NA	12/21/2018	NA	NA	NA	NA	NA	NA	NA	NA
	GP-18-01	3026180.5	636151.98	NA	10/4/2018	NA	NA	NA	NA	NA	NA	NA	NA
	GP-18-02	3026112.32	634283.84	NA	10/4/2018	NA	NA	NA	NA	NA	NA	NA	NA
	GP-18-03	3026815.57	633482.21	NA	10/3/2018	NA	NA	NA	NA	NA	NA	NA	NA
	GP-18-04	3025933.9	632723.62	NA	10/3/2018	NA	NA	NA	NA	NA	NA	NA	NA
	GP-18-05	3027020.14	632561.73	NA	10/3/2018	NA	NA	NA	NA	NA	NA	NA	NA
Vertical Profiles													
Initial Set of Vertical Profiles	GPVP-18-01	3026944.26	633523.97	GP	03/6/2019	229.44	26	Refusal	NA	NA	NA	NA	NA
	GPVP-18-02	3026775.09	634465.62	GP	02/28/2019	231.84	42	Refusal	NA	NA	NA	NA	NA
	GPVP-18-03	3026862.72	635021.12	GP	03/5/2019	241.67	46	Refusal	NA	NA	NA	NA	NA
	GPVP-18-04	3026424.94	635682.46	GP	02/28/2019	226.81	21	Refusal	NA	NA	NA	NA	NA
	GPVP-18-05	3025683.86	634879.86	GP	02/11/2019	244.17	101	Refusal	NA	NA	NA	NA	NA
	GPVP-18-06	3025456.71	634491.63	GP	12/10/2018	244.71	132	Refusal	NA	NA	NA	NA	NA
	GPVP-18-07	3025504.43	634247.71	GP	10/30/2018	249.14	115	Refusal	NA	NA	NA	NA	NA
	GPVP-18-08	3025523.94	634013.75	GP	11/1/2018	250.7	140	Refusal	NA	NA	NA	NA	NA
	GPVP-18-09	3025563.54	633757.01	GP	10/31/2018	250.2	146	Refusal	NA	NA	NA	NA	NA
	GPVP-18-10	3025555.89	633458.74	GP	11/6/2018	228.16	134.5	Refusal	NA	NA	NA	NA	NA
	GPVP-18-11	3025633.51	633154.97	GP	11/5/2018	233.82	124	Refusal	NA	NA	NA	NA	NA
	GPVP-18-12	3025799.18	632892.79	GP	12/3/2018	222.83	104	Refusal	NA	NA	NA	NA	NA

Table 6-1
Grove Pond Area Field Activities
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

	Location	North Coordinate (ft NAD83)	East Coordinate (ft NAD83)	Construction Method	Establishing Date	Surface Elevation (ft NAVD88)	Total Depth (ft BGS)	Description of Total Depth	Top of Casing Elevation (ft NAVD88)	Depth to Top of Screen (ft BGS)	Depth to Bottom of Screen (ft BGS)	Elevation of Top of Screen (ft NAVD88)	Elevation of Bottom of Screen (ft NAVD88)
Second Set of Vertical Profiles	GPVP-19-01	3025337.49	632503.04	GP	01/23/2019	251.65	106	EOB	NA	NA	NA	NA	NA
	GPVP-19-02	3025149.35	632760.07	GP	01/22/2019	252.09	96	Refusal	NA	NA	NA	NA	NA
	GPVP-19-03	3025088.32	633181.86	GP	01/7/2019	249.12	138	Refusal	NA	NA	NA	NA	NA
	GPVP-19-04	3025047.16	633617.52	GP	01/17/2019	249.42	106	EOB	NA	NA	NA	NA	NA
	GPVP-19-05	3024941.07	633914.55	GP	01/11/2019	248.65	106	EOB	NA	NA	NA	NA	NA
	GPVP-19-06	3024725.06	632092	GP	01/15/2019	249.6	94	Refusal	NA	NA	NA	NA	NA
	GPVP-19-07	3024570.39	632282.44	GP	01/10/2019	251.01	101	EOB	NA	NA	NA	NA	NA
	GPVP-19-08	3024457.86	632522.78	GP	01/10/2019	251.1	106	EOB	NA	NA	NA	NA	NA
	GPVP-19-09	3024271.98	632853.02	GP	01/17/2019	248.23	101	EOB	NA	NA	NA	NA	NA
	GPVP-19-10	3025325.41	632104.79	GP	01/16/2019	243.71	98.8	Refusal	NA	NA	NA	NA	NA
Third Set of Vertical Profiles	GPVP-19-11	3024044	631993.37	GP	02/14/2019	249.48	106	EOB	NA	NA	NA	NA	NA
	GPVP-19-12	3023950.1	632105.7	GP	02/14/2019	250.16	101	EOB	NA	NA	NA	NA	NA
Fourth Set of Vertical Profiles	GPVP-19-13	3025637.86	632668.47	GP	04/29/2019	226.36	96	Refusal	NA	NA	NA	NA	NA
	GPVP-19-14	3025561.54	632898.81	GP	04/29/2019	234.34	92.5	Refusal	NA	NA	NA	NA	NA
	GPVP-19-15	3025731.59	633095.54	GP	05/1/2019	235.38	102.8	Refusal	NA	NA	NA	NA	NA
Soil Borings													
Soil Borings	GPSB-19-01	3024723.75	633221.53	GP	07/16/2019	248.03	24	EOB	NA	NA	NA	NA	NA
	GPSB-19-02	3025192.21	633346.68	GP	07/15/2019	249.37	28	EOB	NA	NA	NA	NA	NA
	GPSB-19-03	3024092.93	632212.33	GP	07/15/2019	249.29	15	EOB	NA	NA	NA	NA	NA
	GPSB-19-04	3024327.75	632404.13	GP	07/15/2019	267.51	24	EOB	NA	NA	NA	NA	NA
	GPSB-19-05	3025207.39	632401.47	GP	07/16/2019	250.89	17	EOB	NA	NA	NA	NA	NA
	GPSB-19-06	3025125.72	632780.29	GP	07/16/2019	252.39	33	EOB	NA	NA	NA	NA	NA
	GPSB-19-07	3024973.74	633228.87	GP	07/16/2019	247.79	27	EOB	NA	NA	NA	NA	NA
	GPSB-19-08	3024696.53	632805.41	GP	07/16/2019	250.5	28	EOB	NA	NA	NA	NA	NA
	GPSB-19-09	3025279.52	633614.47	GP	07/15/2019	251.49	38	EOB	NA	NA	NA	NA	NA
Piezometer and Monitoring Well Installation													
Piezometer and Monitoring Wells	GPMW-19-01	3025551.7	633756.2	RD	11/25/2019	250.83	185	EOB	NA	NA	NA	NA	NA
	GPMW-19-01A	3025549.93	633761.04	RD	12/10/2019	251.09	55	EOB	253.93	45	55	206.09	196.09
	GPMW-19-01BR	3025551.65	633756.22	RD	02/13/2020	250.83	185	EOB	253.75	175	185	75.83	65.83
	GPPZ-19-01	3025556.98	633757.59	RD	12/9/2019	250.72	110	EOB	253.63	105	110	145.72	140.72

BGS = below ground surface
EOB = end of boring
ft = feet
NA = not applicable
RD = rotosonic
SB = soil boring
GP = Geoprobe
UKN = unknown
VP = vertical profile
NAD83 = North American Datum 1983.
NAVD88 = North American Vertical Datum 1988

Table 6-2
Grove Pond Summary of Groundwater Results from Vertical Profile Samples
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Parameter	Sample Count with Detected Concentrations	Number of Samples Exceeding EPA LHA	Number of Samples Exceeding MassDEP GW-1	Maximum Detected Concentration (ng/L)	Minimum Detected Concentration (ng/L)	Location of Maximum Detected Concentration
6:2 Fluorotelomer sulfonate (6:2 FTS)	11/208	---	---	34.0 J	6.40 J	GPVP-19-11
8:2 Fluorotelomer sulfonate (8:2 FTS)	6/208	---	---	15.0 J	3.40 J	GPVP-19-12
N-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	1/208	---	---	4.80 J	4.80 J	GPVP-18-09
N-Methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0/208	---	---	---	---	---
Perfluorobutanesulfonic acid (PFBS)	159/208	---	---	15.0	0.450 J	GPVP-18-02
Perfluorodecanoic acid (PFDA)	41/208	---	1	31.0	0.480 J	GPVP-19-01
Perfluorododecanoic acid (PFDoA)	2/208	---	---	1.60 J	0.780 J	GPVP-19-09
Perfluoroheptanoic acid (PFHpA)	154/208	---	61	420	0.670 J	GPVP-19-01
Perfluorohexanesulfonic acid (PFHxS)	167/208	---	28	190	0.440 J	GPVP-18-12
Perfluorohexanoic acid (PFHxA)	163/208	---	---	1200	0.460 J	GPVP-19-05
Perfluorononanoic acid (PFNA)	84/208	---	---	14.0	0.530 J	GPVP-19-01
Perfluorooctanesulfonic acid (PFOS)	142/208	12	28	880	1.00 J	GPVP-18-12
Perfluorooctanoic acid (PFOA)	163/208	29	53	200	0.510 J	GPVP-19-01
Perfluorotetradecanoic acid (PFTA)	0/208	---	---	---	---	---
Perfluorotridecanoic acid (PFTrDA)	0/208	---	---	---	---	---
Perfluoroundecanoic acid (PFUnA)	6/208	---	---	3.30	0.870 J	GPVP-19-01
EPA LHA	---	41	---	919	1.70	GPVP-18-12
MassDEP GW-1	---	---	129	1160	2.40	GPVP-18-12

ng/L = nanograms per liter
EPA Life-time Health Advisory (LHA) is the individual or sum of PFOS and PFOA = 70 ng/L.
MassDEP GW-1 is the individual concentration or sum of PFOA, PFOS, PFHpA, PFHxS, PFNA, PFDA = 20 ng/L.

Table 6-3
Grove Pond Summary of Groundwater Results from Monitoring Wells in Overburden
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Parameter	Sample Count with Detected Concentrations	Number of Samples Exceeding EPA LHA	Number of Samples Exceeding MassDEP GW-1	Maximum Detected Concentration (ng/L)	Minimum Detected Concentration (ng/L)	Location of Maximum Detected Concentration
6:2 Fluorotelomer sulfonate (6:2 FTS)	4/13	---	---	19 J	6.6 J	MNG-6R
8:2 Fluorotelomer sulfonate (8:2 FTS)	1/13	---	---	3 J	3 J	MNG-6R
N-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0/13	---	---	---	---	---
N-Methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0/13	---	---	---	---	---
Perfluorobutanesulfonic acid (PFBS)	13/13	---	---	8.40	0.920 J	MNG-2R
Perfluorodecanoic acid (PFDA)	7/13	---	---	13.0	0.470 J	MNG-6R
Perfluorododecanoic acid (PFDoA)	0/13	---	---	---	---	---
Perfluoroheptanoic acid (PFHpA)	12/13	---	7	480	1.50 J	MNG-2R
Perfluorohexanesulfonic acid (PFHxS)	13/13	---	3	65.0	3.10	MNG-2R
Perfluorohexanoic acid (PFHxA)	13/13	---	---	360	0.680 J	MNG-2R
Perfluorononanoic acid (PFNA)	8/13	---	---	11.0	0.670 J	MNG-6R
Perfluorooctanesulfonic acid (PFOS)	13/13	---	4	36.0	1.30 J	CSMS-11-01
Perfluorooctanoic acid (PFOA)	13/13	5	7	200	4.40	MNG-2R
Perfluorotetradecanoic acid (PFTA)	0/13	---	---	---	---	---
Perfluorotridecanoic acid (PFTrDA)	0/13	---	---	---	---	---
Perfluoroundecanoic acid (PFUnA)	1/13	---	---	1.40 J	1.40 J	MNG-6R
EPA LHA	---	6	---	212	3.56	GPMW-19-01A
MassDEP GW-1	---	---	9	749	7.58	MNG-2R

ng/L = nanograms per liter
EPA Life-time Health Advisory (LHA) is the individual or sum of PFOS and PFOA = 70 ng/L.
MassDEP GW-1 is the individual concentration or sum of PFOA, PFOS, PFHpA, PFHxS, PFNA, PFDA = 20 ng/L.

Table 7-1
Patton Well Area/AOC 40 Field Activities
Area 1 Preliminary Site Characterization
Devens PFAS Remedial Investigation

	Location	North Coordinate (ft NAD83)	East Coordinate (ft NAD83)	Construction Method	Establishing Date	Surface Elevation (ft NAVD88)	Total Depth (ft BGS)	Description of Total Depth	Top of Casing Elevation (ft NAVD88)	Depth to Top of Screen (ft BGS)	Depth to Bottom of Screen (ft BGS)	Elevation of Top of Screen (ft NAVD88)	Elevation of Bottom of Screen (ft NAVD88)
Vertical Profiles													
Initial Set of Vertical Profiles	PWVP-19-01	3020037.83	626699.4	GP	05/24/2019	263.29	27	Refusal	NA	NA	NA	NA	NA
	PWVP-19-02	3018047.62	627010.55	GP	05/28/2019	287.19	101	EOB	NA	NA	NA	NA	NA
	PWVP-19-03	3019038.18	627604	GP	06/4/2019	251.96	69	Refusal	NA	NA	NA	NA	NA
	PWVP-19-04	3018282.39	628186.07	GP	05/28/2019	259.9	106	EOB	NA	NA	NA	NA	NA
	PWVP-19-05	3018548.45	626877.05	GP	05/31/2019	249.45	56.5	Refusal	NA	NA	NA	NA	NA
	PWVP-19-06	3018991.14	629350.01	GP	06/24/2019	247.03	88	Refusal	NA	NA	NA	NA	NA
	PWVP-19-07	3017800.39	629411.02	GP	06/20/2019	260.19	69	Refusal	NA	NA	NA	NA	NA
	PWVP-19-08	3019328.79	626466.48	GP	06/26/2019	264.88	27	Refusal	NA	NA	NA	NA	NA
Second Set of Vertical Profiles	PWVP-19-09	3019177	628836.7	GP	10/29/2019	305.36	135.75	Refusal	NA	NA	NA	NA	NA
	PWVP-19-10	3019425	629733.7	GP	11/4/2019	249.06	85	Refusal	NA	NA	NA	NA	NA
	PWVP-19-11	3019103.36	630177.38	GP	11/20/2019	237.2	34.5	Refusal	NA	NA	NA	NA	NA
	PWVP-19-12	3018441	630045	GP	11/15/2019	253.61	24.5	Refusal	NA	NA	NA	NA	NA
	PWVP-19-13	3018113.4	627859.82	GP	10/23/2019	266.2	106	Refusal	NA	NA	NA	NA	NA
Third Set of Vertical Profiles	PWVP-20-01	3017415.4	627565.95	GP	02/26/2020	278.2	123.5	Refusal	NA	NA	NA	NA	NA
Soil Borings													
Soil Boring	PWSB-19-01	3018289.04	628193.36	GP	11/26/2019	259.53	20	EOB	NA	NA	NA	NA	NA
	PWSB-19-02	3018462.74	629075.64	GP	03/10/2020	242.22	0.5	EOB	NA	NA	NA	NA	NA
	PWSB-19-03	3018519.22	629087.71	GP	03/10/2020	242.19	0.5	EOB	NA	NA	NA	NA	NA
	PWSB-19-04	3018370.44	628122.22	GP	11/26/2019	261.76	25	EOB	NA	NA	NA	NA	NA
Piezometers													
Piezometers	PWPZ-19-01	3019177.4	628836.7	GP	11/1/2019	305.36	70	EOB	304.94	60	70	245.36	235.36
	PWPZ-19-02	3019425.1	629733.7	GP	11/6/2019	249.06	22	EOB	251.52	12	22	237.06	227.06
	PWPZ-19-03	3018441	630045.3	GP	11/18/2019	253.61	23	EOB	256.02	13	23	240.61	230.61
	PWPZ-19-04-F1*	3016816.68	629767.37	GP	11/8/2019	296.173	45	Refusal	NA	NA	NA	NA	NA
	PWPZ-19-04-F2*	3016928.42	629238.35	GP	11/22/2019	300.674	81	Refusal	NA	NA	NA	NA	NA
	PWPZ-19-04	3017203.4	629277.9	GP	12/9/2019	284.58	46.2	EOB	288.00	36.2	46.2	248.38	238.38
	PWPZ-19-05	3017150.1	628514.8	GP	11/12/2019	312.69	80	EOB	312.43	70	80	242.69	232.69
	PWPZ-19-06	3018162.8	628252.4	GP	10/28/2019	266.56	30	EOB	266.22	20	30	246.56	236.56
	PWPZ-19-07	3017814.9	629411.3	GP	10/11/2019	260.65	26	EOB	260.29	16	25.9	244.65	234.75
	PWPZ-19-08	3018358.7	628023.5	GP	12/3/2019	253.18	19.3	EOB	256.53	9.3	19.3	243.88	233.88

Table 7-1
Patton Well Area/AOC 40 Field Activities
Area 1 Preliminary Site Characterization
Devens PFAS Remedial Investigation

	Location	North Coordinate (ft NAD83)	East Coordinate (ft NAD83)	Construction Method	Establishing Date	Surface Elevation (ft NAVD88)	Total Depth (ft BGS)	Description of Total Depth	Top of Casing Elevation (ft NAVD88)	Depth to Top of Screen (ft BGS)	Depth to Bottom of Screen (ft BGS)	Elevation of Top of Screen (ft NAVD88)	Elevation of Bottom of Screen (ft NAVD88)
Piezometers	PWPZ-19-09	3018422.6	627777.7	GP	12/3/2019	250.12	15.6	EOB	253.09	5.6	15.6	244.52	234.52
	PWPZ-19-10	3018039.3	627087.5	GP	12/4/2019	285.99	53.5	EOB	288.42	43.5	53.5	242.49	232.49
	PWPZ-20-01	3017415.45	627565.95	GP	03/3/2020	278.20	68	EOB	0	58	68	220.20	210.20
Surface Water and Sediment													
Surface Water and Sediment	CP-20-01	3018507.9	628163.59	NA	03/27/2020	243.12	NA	NA	NA	NA	NA	NA	NA
	CP-20-02	3018837.07	629335.59	NA	03/27/2020	241.48	NA	NA	NA	NA	NA	NA	NA
	CP-20-03	3018750.88	628608.29	NA	03/27/2020	241.84	NA	NA	NA	NA	NA	NA	NA
	CSB-20-01	3019412.37	630027.31	NA	03/27/2020	233.69	NA	NA	NA	NA	NA	NA	NA
	ML-20-01	3016630.87	625625.03	NA	03/30/2020	241.42	NA	NA	NA	NA	NA	NA	NA
Staff Gauges													
Staff Gauges	CPSG-01	3018744.8	627621.7	V	12/12/2019	247.28	NA	NA	NA	NA	NA	NA	NA
	CPSG-02	3018918.8	629358.3	V	12/12/2019	244.09	NA	NA	NA	NA	NA	NA	NA
	CSBSG-01	3019399	630022.5	V	12/12/2019	236.8	NA	NA	NA	NA	NA	NA	NA
	MLSG-01	3016884.81	625779.1	V	03/18/2020	243.59	NA	NA	NA	NA	NA	NA	NA
Irrigation Well													
Irrigation Well	RTG-IG01	3019614.9	628650.3	NA	08/23/2000	268.00	72	EOB	NA	56	66	212.00	202.00

BGS = below ground surface
EOB = end of boring
ft = feet
GP = Geoprobe
NA = not applicable
SB = soil boring
V = driven
VP = vertical profile
NAD83 = North American Datum 1983.
NAVD88 = North American Vertical Datum 1988
* = water was not encountered during drilling

Table 7-2
Patton Well Area/AOC 40 Summary of PFAS Exceedances from Vertical Profile Samples
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Parameter	Sample Count with Detected Concentrations	Number of Samples Exceeding EPA LHA	Number of Samples Exceeding MassDEP GW-1	Maximum Detected Concentration (ng/L)	Minimum Detected Concentration (ng/L)	Location of Maximum Detected Concentration
6:2 Fluorotelomer sulfonate (6:2 FTS)	0/84	---	---	---	---	---
8:2 Fluorotelomer sulfonate (8:2 FTS)	0/84	---	---	---	---	---
N-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0/84	---	---	---	---	---
N-Methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0/84	---	---	---	---	---
Perfluorobutanesulfonic acid (PFBS)	69/84	---	---	30.0	0.430 J	PWVP-19-05
Perfluorodecanoic acid (PFDA)	13/84	---	---	1.80 J	0.580 J	PWVP-19-04
Perfluorododecanoic acid (PFDoA)	3/84	---	---	3.70	0.790 J	PWVP-19-04
Perfluoroheptanoic acid (PFHpA)	53/84	---	9	200	0.630 J	PWVP-19-04
Perfluorohexanesulfonic acid (PFHxS)	77/84	---	2	22.0	0.410 J	PWVP-19-10
Perfluorohexanoic acid (PFHxA)	59/84	---	---	180	0.520 J	PWVP-19-04
Perfluorononanoic acid (PFNA)	33/84	---	---	3.50 J	0.520 J	PWVP-19-13
Perfluorooctanesulfonic acid (PFOS)	55/84	---	6	28.0	1.10 J	PWVP-19-08
Perfluorooctanoic acid (PFOA)	67/84	5	21	380	0.590 J	PWVP-19-04
Perfluorotetradecanoic acid (PFTA)	0/84	---	---	---	---	---
Perfluorotridecanoic acid (PFTrDA)	2/84	---	---	1.70 J	1.40 J	PWVP-19-04
Perfluoroundecanoic acid (PFUnA)	1/84	---	---	0.700 J	0.700 J	PWVP-19-03
EPA LHA	---	8	---	394	1.80	PWVP-19-04
MassDEP GW-1	---	---	42	607	2.50	PWVP-19-04

ng/L = nanograms per liter
EPA Life-time Health Advisory (LHA) is the individual or sum of PFOS and PFOA = 70 ng/L.
MassDEP GW-1 is the individual concentration or sum of PFOA, PFOS, PFHpA, PFHxS, PFNA, PFDA = 20 ng/L.

Table 8-1
Shabokin Well Area Field Activities
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

	Location	North Coordinate (ft NAD83)	East Coordinate (ft NAD83)	Construction Method	Establishing Date	Surface Elevation (ft NAVD88)	Total Depth (ft BGS)	Description of Total Depth	Top of Casing Elevation (ft NAVD88)	Depth to Top of Screen (ft BGS)	Depth to Bottom of Screen (ft BGS)	Elevation of Top of Screen (ft NAVD88)	Elevation of Bottom of Screen (ft NAVD88)
Vertical Profiles													
Initial Set of Vertical Profiles	SWVP-19-01	3015815.08	625598.71	GP	05/17/2019	244.64	89	Refusal	NA	NA	NA	NA	NA
	SWVP-19-02	3014740.64	626755.38	GP	05/20/2019	359.58	73	Refusal	NA	NA	NA	NA	NA
	SWVP-19-03	3014012.64	626152.94	GP	05/21/2019	278.50	93	Refusal	NA	NA	NA	NA	NA
	SWVP-19-04	3014479.3	625367.56	GP	05/22/2019	247.31	95.75	Refusal	NA	NA	NA	NA	NA
	SWVP-19-05	3014706.75	626143.02	GP	06/26/2019	243.70	101	EOB	NA	NA	NA	NA	NA
Second Set of Vertical Profiles	SWVP-19-06	3015572.51	623923.55	GP	10/9/2019	240.20	44	Refusal	NA	NA	NA	NA	NA
	SWVP-20-01	3016220.83	624504.24	GP	02/21/2020	357.65	91	Refusal	NA	NA	NA	NA	NA
	SWVP-20-02	3017851.89	623791.15	GP	02/19/2020	363.20	22.5	Refusal	NA	NA	NA	NA	NA
	SWVP-20-03	3017046.56	623481.11	GP	02/20/2020	333.30	23.5	Refusal	NA	NA	NA	NA	NA
	SWVP-20-04	3016882.03	625453.27	GP	02/21/2020	269.20	97	Refusal	NA	NA	NA	NA	NA
Piezometers and Monitoring Well													
Piezometers	SWPZ-19-01	3014476.89	625364.58	GP	10/10/2019	247.47	26.50	EOB	250.62	16.5	26.5	230.97	220.97
	SWPZ-19-02*	3017684.34	625630.18	GP	10/11/2019	292.58	37	Refusal	NA	NA	NA	NA	NA
	SWPZ-19-03	3015861.33	625580.68	GP	10/17/2019	245.39	13	EOB	245.26	3	13	242.39	232.39
	SWPZ-19-04	3015553.23	623974.71	GP	10/10/2019	237.86	14	EOB	240.63	4	14	233.86	223.86
	SWPZ-20-01	3017049.19	623460.84	GP	02/20/2019	333.58	20	EOB	333.38	10	20	323.58	313.58
	SWPZ-20-02	3016909.36	625457.38	GP	02/20/2019	267.48	33	EOB	267.19	23	33	244.48	234.48
Monitoring Wells	SWMW-20-01	3017855.05	623813.13	W	03/6/2020	362.96	27	EOB	NA	NA	NA	NA	NA
	SWMW-20-01A	3017855.05	623813.13	W	03/6/2020	362.96	27	EOB	362.55	5	15	357.96	347.96
Suface Water and Sediment Sampling													
Surface Water and Sediment Sample	ML-20-01	3016630.87	625625.03	NA	03/30/2020	NA	NA	NA	NA	NA	NA	NA	NA
Staff Gague													
Staff Gauge	MLSG-01	3016884.81	625779.1	V	03/18/2020	243.59	0.00	NA	NA	NA	NA	NA	NA

BGS = below ground surface
EOB = end of boring
ft = feet
GP = Geoprobe
NA = not applicable
V = driven
VP = vertical profile
NAD83 = North American Datum 1983.
NAVD88 = North American Vertical Datum 1988
* = water was not encountered during drilling and a piezometer was not installed

Table 8-2
Shabokin Well Area Summary of PFAS Exceedances from Vetical Profiles
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Parameter	Sample Count with Detected Concentrations	Number of Samples Exceeding EPA LHA	Number of Samples Exceeding MassDEP GW-1	Maximum Detected Concentration (ng/L)	Minimum Detected Concentration (ng/L)	Location of Maximum Detected Concentration
6:2 Fluorotelomer sulfonate (6:2 FTS)	0/46	---	---	---	---	---
8:2 Fluorotelomer sulfonate (8:2 FTS)	0/46	---	---	---	---	---
N-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0/46	---	---	---	---	---
N-Methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0/46	---	---	---	---	---
Perfluorobutanesulfonic acid (PFBS)	36/46	---	---	2.40	0.45 J	SWVP-20-03
Perfluorodecanoic acid (PFDA)	0/46	---	---	---	---	---
Perfluorododecanoic acid (PFDoA)	0/46	---	---	---	---	---
Perfluoroheptanoic acid (PFHpA)	34/46	---	---	14.0	0.58 J	SWVP-19-06
Perfluorohexanesulfonic acid (PFHxS)	45/46	---	1	23.0	0.65 J	SWVP-19-01
Perfluorohexanoic acid (PFHxA)	40/46	---	---	17.0	0.46 J	SWVP-19-06
Perfluorononanoic acid (PFNA)	11/46	---	---	1.3 J	0.65 J	SWVP-20-04
Perfluorooctanesulfonic acid (PFOS)	34/46	---	1	28.0	1.3 J	SWVP-19-05
Perfluorooctanoic acid (PFOA)	45/46	---	3	23.0	0.53 J	SWVP-19-06
Perfluorotetradecanoic acid (PFTA)	0/46	---	---	---	---	---
Perfluorotridecanoic acid (PFTrDA)	0/46	---	---	---	---	---
Perfluoroundecanoic acid (PFUnA)	0/46	---	---	---	---	---
EPA LHA	---	---	---	38.0	1.95	SWVP-20-04
MassDEP GW-1	---	---	19	48.3	3.39	SWVP-20-04

ng/L = nanograms per liter
EPA Life-time Health Advisory (LHA) is the individual or sum of PFOS and PFOA = 70 ng/L.
MassDEP GW-1 is the individual concentration or sum of PFOA, PFOS, PFHpA, PFHxS, PFNA, PFDA = 20 ng/L.

Table 8-3
Shabokin Well Field Summary of Groundwater Results from Monitoring Wells
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Parameter	Sample Count with Detected Concentrations	Number of Samples Exceeding EPA LHA	Number of Samples Exceeding MassDEP GW-1	Maximum Detected Concentration (ng/L)	Minimum Detected Concentration (ng/L)	Location of Maximum Detected Concentration
6:2 Fluorotelomer sulfonate (6:2 FTS)	0/1	---	---	---	---	---
8:2 Fluorotelomer sulfonate (8:2 FTS)	0/1	---	---	---	---	---
N-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0/1	---	---	---	---	---
N-Methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0/1	---	---	---	---	---
Perfluorobutanesulfonic acid (PFBS)	1/1	---	---	0.82 J	0.82 J	SWMW-20-01A
Perfluorodecanoic acid (PFDA)	0/1	---	---	---	---	---
Perfluorododecanoic acid (PFDoA)	0/1	---	---	---	---	---
Perfluoroheptanoic acid (PFHpA)	1/1	---	---	3.7	3.7	SWMW-20-01A
Perfluorohexanesulfonic acid (PFHxS)	1/1	---	1	1.7 J	1.7 J	SWMW-20-01A
Perfluorohexanoic acid (PFHxA)	1/1	---	---	3.2	3.2	SWMW-20-01A
Perfluorononanoic acid (PFNA)	1/1	---	---	1.4 J	1.4 J	SWMW-20-01A
Perfluorooctanesulfonic acid (PFOS)	1/1	---	1	19	19	SWMW-20-01A
Perfluorooctanoic acid (PFOA)	1/1	---	3	9.5	9.5	SWMW-20-01A
Perfluorotetradecanoic acid (PFTA)	0/1	---	---	---	---	---
Perfluorotridecanoic acid (PFTrDA)	0/1	---	---	---	---	---
Perfluoroundecanoic acid (PFUnA)	0/1	---	---	---	---	---
EPA LHA	---	---	---	28.5	28.5	SWMW-20-01A
MassDEP GW-1	---	---	1	35.3	35.3	SWMW-20-01A

ng/L = nanograms per liter
EPA Life-time Health Advisory (LHA) is the individual or sum of PFOS and PFOA = 70 ng/L.
MassDEP GW-1 is the individual concentration or sum of PFOA, PFOS, PFHpA, PFHxS, PFNA, PFDA = 20 ng/L.

Table 9-1
AOC 43J Field Activities
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

	Location	North Coordinate (ft NAD83)	East Coordinate (ft NAD83)	Construction Method	Establishing Date	Surface Elevation (ft NAVD88)	Total Depth (ft BGS)	Description of Total Depth	Top of Casing Elevation (ft NAVD88)	Depth to Top of Screen (ft BGS)	Depth to Bottom of Screen (ft BGS)	Elevation of Top of Screen (ft NAVD88)	Elevation of Bottom of Screen (ft NAVD88)
Existing Wells													
First Round of Sampling	2446-03	3018185.36	623519.52	UKN	UKN	368.7	UKN	UKN	368.36	8	18	360.7	350.7
	HA-1B	3018026.98	623550.04	UKN	UKN	365.5	UKN	UKN	370.7	21	31	344.5	334.5
	HA-1S	3018024.81	623546.78	UKN	UKN	365.6	UKN	UKN	370.6	3.5	16.5	362.1	349.1
	HA-2B	3018078.41	623648.13	UKN	UKN	365.6	UKN	UKN	365.3	31	39	334.6	326.6
	HA-4B	3018170.43	623729.51	UKN	UKN	365.6	UKN	UKN	365.3	35.8	43.8	329.8	321.8
	HA-4S	3018172.16	623724.52	UKN	UKN	365.8	UKN	UKN	365.5	4	17	361.8	348.8
	HA-5S	3018140.12	623478.15	UKN	UKN	UKN	UKN	UKN	368	5.5	15.5	UKN	UKN
	XJM-93-01X	3018256.15	623416.31	UKN	UKN	368.4	UKN	UKN	370.6	6.5	16.5	361.9	351.9
	XJM-93-04X	3018150.54	623399.7	UKN	UKN	367.9	UKN	UKN	370.37	4.5	14.5	363.4	353.4
	XJM-94-07X	3018055.81	623743.83	UKN	UKN	361.4	UKN	UKN	364.24	3.7	13.7	357.7	347.7
	XJM-97-12X	3018120.6	623496.13	UKN	UKN	368.0	UKN	UKN	367.6	20	30	348	338
Second Round of Sampling	HA-2S	3018082.06	623652.13	UKN	UKN	365.6	14	UKN	UKN	4	14	361.6	351.6
	XJM-94-08X	3017979.67	623635.64	UKN	UKN	365.9	14	UKN	368.5	7.6	17.6	358.3	348.3
	XJM-97-13X	3017979.53	623640.48	NA	UKN	365.8	UKN	UKN	368.5	41.5	51.5	324.3	314.3

BGS = below ground surface
ft = feet
NA = not applicable
UKN = unknown
NAD83 = North American Datum 1983.
NAVD88 = North American Vertical Datum 1988

Table 9-2
AOC 43J Summary of PFAS Exceedances from Monitoring Wells
Area 1 Preliminary Site Characterization Summary
Devens PFAS Remedial Investigation

Parameter	Sample Count with Detected Concentrations	Number of Samples Exceeding EPA LHA	Number of Samples Exceeding MassDEP GW-1	Maximum Detected Concentration (ng/L)	Minimum Detected Concentration (ng/L)	Location of Maximum Detected Concentration
6:2 Fluorotelomer sulfonate (6:2 FTS)	1/14	---	---	8.9 J	8.9 J	XJM-93-04X
8:2 Fluorotelomer sulfonate (8:2 FTS)	0/14	---	---	---	---	---
N-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0/14	---	---	---	---	---
N-Methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0/14	---	---	---	---	---
Perfluorobutanesulfonic acid (PFBS)	7/14	---	---	3.30	0.57 J	XJM-94-07X
Perfluorodecanoic acid (PFDA)	5/14	---	---	2.20	0.44 J	XJM-93-04X
Perfluorododecanoic acid (PFDoA)	0/14	---	---	---	---	---
Perfluoroheptanoic acid (PFHpA)	12/14	---	---	9.80	0.69 J	XJM-94-07X
Perfluorohexanesulfonic acid (PFHxS)	11/14	---	---	2.80	0.41 J	XJM-94-07X
Perfluorohexanoic acid (PFHxA)	11/14	---	---	5.70	0.50 J	XJM-94-07X
Perfluorononanoic acid (PFNA)	11/14	---	---	1.9 J	0.48 J	XJM-93-01X
Perfluorooctanesulfonic acid (PFOS)	10/14	---	---	7.60	1.0 J	XJM-94-07X
Perfluorooctanoic acid (PFOA)	12/14	---	1	29.0	1.4 J	XJM-94-07X
Perfluorotetradecanoic acid (PFTA)	0/14	---	---	---	---	---
Perfluorotridecanoic acid (PFTrDA)	0/14	---	---	---	---	---
Perfluoroundecanoic acid (PFUnA)	0/14	---	---	---	---	---
EPA LHA	---	---	---	36.6	2.90	XJM-94-07X
MassDEP GW-1	---	---	1	51.0	4.77	XJM-94-07X

ng/L = nanograms per liter
EPA Life-time Health Advisory (LHA) is the individual or sum of PFOS and PFOA = 70 ng/L.
MassDEP GW-1 is the individual concentration or sum of PFOA, PFOS, PFHpA, PFHxS, PFNA, PFDA = 20 ng/L.