DEPARTMENT OF THE AIR FORCE
AIR FORCE CIVIL ENGINEER CENTER
HANSCOM AIR FORCE BASE, MA 01731-1905

September 29, 2022

FROM: AFCEC/CZO
72 Dow Street
Hanscom AFB, MA 01731-1905

TO: Mr. Shawn Lowry, Remedial Program Manager
Superfund Federal Facilities & Information Management Section
Superfund & Emergency Management USEPA Region 1 (07-3)
5 Post Office Square, Suite 100
Boston, MA 02109

SUBJECT: Final PFAS Site Inspection Addendum Report, Hanscom Air Force Base, MA

Dear Mr. Lowry:

Attached please find the Final PFAS Site Inspection Addendum Report, Hanscom Air Force Base, MA and the Response to Comments received from United States Environmental Protection Agency (4/19/2022) and Massachusetts Department of Environmental Protection (4/27/2022) on the Draft Final PFAS Expanded Site Inspection Report, Hanscom Air Force Base, MA. Note that the title of this document has changed from an Expanded Site Inspection Report to a Site Inspection Addendum Report.

Please let me know if you have any follow-up questions by 13 October 2022. Thank you.

MATTHEW GREENBERG, AFCEC/CZOE
Remedial Project Manager

Attachments:
Final PFAS Site Inspection Addendum Report, Hanscom Air Force Base, MA
Comment and Response Worksheet, Final PFAS Site Inspection Addendum Report, Hanscom Air Force Base, MA

cc:
Ms. Randi Augustine, MassDEP

Ms. Anni Loughlin, USEPA Region 1
Ms. Erin Kirby, USACE NER
Mr. William Eaton, AECOM

FINAL
PFAS Site Inspection Addendum Report

Hanscom Air Force Base, MA

September 2022

Prepared for:

Hanscom Air Force Base 55 Grenier St Hanscom AFB, MA 01731	**U.S. Air Force Civil Engineer Center** AFCEC/CZRE 485 Quentin Roosevelt Rd, San Antonio, TX 78226	**U.S. Army Corps of Engineers, Baltimore District** 2 Hopkins Plaza Baltimore, MD 21201 and **U.S. Army Corps of Engineers, Philadelphia District** 100 Penn Square East, Philadelphia, PA 19107

Contract No. W912DR18D0005
Task Order W912DR18F0706

Prepared by:

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Acronyms and Abbreviations

AECOM	AECOM Technical Services, Inc.
Aerostar	Aerostar SES LLC
AFCEC	Air Force Civil Engineer Center
AFFF	aqueous film-forming foam
APPL	APPL, Inc.
BTEX	benzene, toluene, ethylbenzene, xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSM	conceptual site model
CVOCs	chlorinated volatile organic compounds
DO	dissolved oxygen
DoD	Department of Defense
DPT	Direct Push Technology
Dup	Field Sample Duplicate
°F	Degrees Fahrenheit
EA	EA Engineering, Science, and Technology, Inc.
ESI	Expanded Site Inspection
FFA	Federal Facility Agreement
FTA	fire training area
ft	feet
ft bgs	feet below ground surface
gINT	geotechnical integrator
GWTP	groundwater treatment plant
HAFB	Hanscom Air Force Base
HDPE	high-density polyethylene
IDW	investigation-derived waste
IRP	Installation Restoration Program
JRB	Associates
LC/MS/MS	Liquid Chromatography Tandem Mass Spectrometry
MassDEP	Massachusetts Department of Environmental Protection
Massport	Massachusetts Port Authority
mg/kg	milligrams per kilogram
ml	milliliter
msl	mean sea level
NAVD88	North American Vertical Datum of 1988
ng/L	nanograms per liter
NPL	National Priorities List
NTU	Nephelometric Turbidity Unit
ORP	oxidation-reduction potential
OSD	Office of Secretary of Defense
OUs	operable units

PA	preliminary assessment
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutane sulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
pH	hydrogen potential
PID	Photoionization Detector
POL	petroleum, oil, and lubricant
PVC	poly-vinyl chloride
QSM	Quality Systems Manual
RI	Remedial Investigation
SC	specific conductivity
SI	site inspection
SIA	Site Inspection Addendum
SU	Standard Units
1,1,1-TCA	1,1,1-trichloroethane
TCE	trichloroethylene
TOC	Total organic carbon
TPH	Total Petroleum Hydrocarbons
UFP-QAPP	Uniform Federal Policy- Quality Assurance Project Plan
µg/L	micrograms per liter
µg/kg	micrograms per kilogram
U.S.	United States
USACE	United States Army Corps of Engineers
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
Vista	Vista Analytical Laboratory, Inc.
VOC	volatile organic compound

Executive Summary

AECOM Technical Services, Inc. (AECOM) completed a Site Inspection Addendum (SIA) at Hanscom Air Force Base (HAFB) on behalf of the U.S. Air Force Civil Engineer Center (AFCEC) and the United States (U.S.) Army Corps of Engineers (USACE) Baltimore District. The SIA was performed to determine if the use of aqueous film-forming foam (AFFF) on various locations at HAFB and Lawrence G. Hanscom Field (referred to as "Hanscom Field") has resulted in the presence of per- and polyfluoroalkyl substances (PFAS) at or beyond the various property boundaries and pose an offsite migration potential. The four AFFF Areas studied during the SIA were identified during a Site Inspection (SI) (Aerostar, 2018) at HAFB, included:

- AFFF Area 1 (Taxiway Echo Release Area);
- AFFF Area 2 (Former Fire Training Area [FTA] II; Installation Restoration Program [IRP] Site No. 1)
- AFFF Area 3 (Outfall 001)
- AFFF Area 4 (Motor Pool Release Area)

At all four AFFF release areas, PFAS were detected in all media sampled (soil and groundwater at AFFF Area 1, and groundwater; soil, surface water, and sediment at AFFF Areas 2, 3, and 4), and one or more screening levels evaluated in the SI were exceeded for groundwater and surface water at all locations where these media were sampled during the SI.

The SIA scope of work included:

- Installation of monitoring wells (AFFF Areas 1 and 4);
- Collection of soil samples for PFAS, total organic carbon (TOC), and pH analysis (AFFF Areas 1 and 4);
- Collection of groundwater samples for PFAS analysis (all 4 AFFF Areas);
- Collection of surface water samples for PFAS analysis and sediment samples for PFAS, TOC, and pH analyses (all 4 AFFF Areas);
- Surveying of new wells; and,
- Investigation derived waste (IDW) management.
- Groundwater and soil results were compared to the screening levels presented in the Office of the Secretary of Defense (OSD) September 15, 2021 PFAS memo (Department of Defense (DoD), 2021b). Surface water results were screened using the groundwater screening values. Sediment results were screened using the soil screening values. The Office of the Secretary of Defense has accepted the use of EPA's May 2022 screening levels for PFOS and PFOA. However, because this SIA is nearing completion, and because the changes in those values do not change the conclusions related to the 4 AFFF areas, the updated screening levels were not incorporated for use in SIA tables, figures, and text.

The SIA results indicate that PFAS are at or beyond the various property boundaries and pose an offsite migration potential; therefore, a remedial investigation (RI) is recommended to determine the nature and extent of PFAS at each of the four AFFF areas addressed by this SIA. Specific AFFF Area conclusions and recommendations are:

- AFFF Area 1 (Taxiway Echo Release Area): Offsite migration of PFAS via surface water flow along storm water drainage ditches at the northwestern Hanscom Field boundary likely is occurring. Seepage of the PFAS-impacted water from the drainage ditches into shallow groundwater may be occurring along the drainage ditch and may result in PFAS impacted groundwater near the drainage ditches, although there are no monitoring wells along the drainage ditch to assess this probability. If PFAS seepage into shallow groundwater is occurring, groundwater PFAS concentrations may exceed OSD (DoD, 2021b) PFAS screening levels based on the SIA observation that the drainage ditch surface water PFAS concentrations exceed OSD (DoD, 2021b) tap water screening levels. SIA monitoring wells not close to the drainage ditch confirm PFAS in groundwater at the northwestern Hanscom Field boundary, but at concentrations less than OSD (DoD, 2021b) screening levels. An RI is recommended to assess the occurrence and distribution of PFAS at and beyond this AFFF release area and further evaluate preliminary evidence that PFAS migration from this AFFF release area may be via the storm sewer system.
- AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001): Groundwater PFAS concentrations exceeded OSD (DoD, 2021b) screening levels. Soil PFAS concentrations did not exceeded OSD (DoD, 2021b) screening levels. Offsite migration of PFAS via groundwater flow is occurring, at concentrations above OSD (DoD, 2021b) screening levels. An RI is recommended to assess the occurrence and distribution of PFAS at and beyond this AFFF release area.
- AFFF Area 4 (Motor Pool Release Area): PFAS have been detected in groundwater above OSD (DoD, 2021b) screening levels at the downgradient property boundary of Hanscom Field and HAFB. An RI is recommended to assess the occurrence and distribution of PFAS at and down-gradient (northeast) of the AFFF Area 4 release area.

1. Introduction

In accordance with Contract W912DR18D0005; Delivery Order W912DR18F0706 issued by the United States (U.S.) Army Corps of Engineers (USACE) Baltimore District on behalf of the U.S. Air Force Civil Engineer Center (AFCEC) and Hanscom Air Force Base (HAFB), AECOM Technical Services, Inc. (AECOM) completed a Site Inspection Addendum [formerly called an Expanded Site Inspection (ESI)] at HAFB. The SIA was performed to determine if the use of aqueous film-forming foam (AFFF) at HAFB and Lawrence G. Hanscom Field (referred to as "Hanscom Field") has resulted in the presence of per- and polyfluoroalkyl substances (PFAS) at or beyond the various property boundaries and pose an offsite migration potential. The four AFFF Areas studied during the SIA are listed in **Section 1.1.3**.

1.1 Site Background

1.1.1 Base Description

HAFB and the adjacent Hanscom Field (a general aviation airport operated by the Massachusetts Port Authority [Massport]) are located within the central part of Middlesex County, Massachusetts, approximately 17 miles northwest of downtown Boston. The complex occupies land in the towns of Bedford, Concord, Lexington, and Lincoln (**Figure 1**). In May 1952, the Commonwealth of Massachusetts leased Hanscom Field to the US Government for use as a military installation. During this timeframe, the primary HAFB mission was the operational maintenance of fighter aircraft, as well as research and development support (Weston, 1983). Following the termination of Air Force flying activities in 1973, the US Government subsequently (August 1974) cancelled the lease that had permitted Air Force operation and maintenance of the runway and flight line activities. Hanscom Field reverted to control by the Commonwealth of Massachusetts in August 1974 and is currently operated by Massport as a civilian airport. Today, HAFB is part of the Air Force Life Cycle Management Center, managing the development and acquisition of command, control, communications, computer, intelligence, surveillance, and reconnaissance systems (US Air Force, 2019).

1.1.2 Regulatory Background

HAFB, including Hanscom Field, was listed on the National Priorities List (NPL) in 1994. EPA and the U.S. Air Force signed a Federal Facility Agreement (FFA) in September 2009, whereby Air Force performs cleanup investigations and work with oversight by EPA, in cooperation with Massachusetts Department of Environmental Protection. HAFB has been performing assessment and remediation activities for over two decades within numerous operable units (OUs). Most of these areas have been evaluated under guidance established by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; United States Environmental Protection Agency [USEPA], 1980), also known as Superfund.

The SIA project elements for the four AFFF release areas identified in the SI (discussed in **Section 1.1.3**) were performed in compliance CERCLA, as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations [CFR] Part 300; USEPA, 1994), and in compliance with USACE requirements and guidance for field investigations, including specific requirements for sampling and analysis of PFAS, which includes perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and perfluorobutane sulfonic acid (PFBS).

OU2/Site 4 Sanitary Landfill (also called LF0004) was not included in this SIA. Site 4 has not been subject to a PA/SI for PFAS and is not a confirmed PFAS release area. However, AFCEC is currently completing a UFP-QAPP that will include the collection of PFAS samples at OU2/Site 4 per EPA request.

1.1.3 AFFF Release Areas and Background

A Site Inspection (SI) was conducted in 2018 at HAFB to determine if PFAS have been released into the environment at locations where PFAS-containing material (i.e., AFFF) is suspected to have been used or leaked. The SI (Aerostar SES, LLC. (Aerostar) 2018) confirmed PFAS releases at the four AFFF release areas listed below, which are the subject of this SIA (**Figure 1**):

- AFFF Area 1 (Taxiway Echo Release Area); identified as the Taxiway Whiskey Release Area in the HydroGeoLogic, Inc. (HGL) 2015 Preliminary Assessment (PA);
- AFFF Area 2 (Former Fire Training Area [FTA] II; Installation Restoration Program [IRP Site No. 1);
- AFFF Area 3 (Outfall 001); and
- AFFF Area 4 (Motor Pool Release Area).

At all four AFFF release areas, PFAS were detected in all media sampled (soil and groundwater at AFFF Area 1, and groundwater; soil, surface water, and sediment at AFFF Areas 2, 3, and 4), and one or more screening levels were exceeded for groundwater and surface water at all locations where these media were sampled during the SI (see **Section 3.1.3**) . Aqueous screening levels considered during the SI were 70 ng/L for PFOS and PFOA and 400 ng/L for PFBS. Non-aqueous screening levels considered during the SI were 1,260 micrograms per kilogram (µg/kg) for PFOS and PFOA and 1,300,000 µg/kg for PFBS. The SI was completed in 2018, and these screening levels predate those included in the OSD 2021 Memo (DoD, 2021b) and OSD 2022 Memo (DoD, 2022), AFFF Area 1 (Taxiway Echo Release Area).

1.1.3.1 AFFF Area 1 (Taxiway Echo Release Area)

AFFF Area 1 (Taxiway Echo Release Area) is located off HAFB and on Hanscom Field, approximately 240 ft south of Taxiway Echo (**Figure 1** and **Figure 2**). The release area is surrounded by light grass vegetation to the east, south, and west and bordered by Taxiway Echo to the north. Flushing of hoses containing residual AFFF were historically performed at AFFF Area 1. When the testing and hose flushing were performed, AFFF was released directly to the ground surface.

Storm sewers are present at AFFF Area 1. **Figure 2** shows the location of the portion of the Hanscom Field storm sewer system that conveys storm water from the vicinity of AFFF Area 1 to the northwest corner of Hanscom Field, where the storm water is then discharged into surface water drainage ditches and then into Elm Brook beyond the northwestern Hanscom Field boundary. The storm sewer locations shown in **Figure 2** are based on the Compiled Utility Plan, L.G. Hanscom Field, Bedford, Concord, Lexington & Lincoln, MA, Massachusetts Port Authority, Capital Programs Department, September 2020. Storm sewer inlet locations are not shown. **Section 3.1** presents a summary of the AFFF Area 1 surface runoff, groundwater flow, and SI investigation analytical results.

1.1.3.2 AFFF Area 2 (Former FTA II)

AFFF Area 2 (Former FTA II) is located at the northern portion of the Hanscom Field, approximately 4,000 ft north of the HAFB installation boundary (**Figure 1** and **Figure 3**). The site elevation (about 140 ft above mean sea level [msl]) is about 15 ft higher than the elevation of Hanscom Field Runway 5-23 (elevation of about 125 ft msl) located immediately southeast of this AFFF release area. AFFF Area 2 is currently overgrown with vegetation and is surrounded by moderately to heavily vegetated vacant areas. In May 1952, the Commonwealth of Massachusetts leased Hanscom Field to the US Government for use as a military installation. During this time frame, hazardous wastes were generated by support operations and disposed of at different areas on Hanscom Field. Fire training activities were routinely conducted at AFFF Area

2. The 1984 IRP Phase I Record Search Report states that AFFF Area 2 operated from the late 1960s through 1973 (JRB Associates (JRB), 1984).

AFFF Area 2 reportedly contained two burn pits and a water runoff area (**Figure 3**). The pits were used to dispose, by ignition, drums of degreasing chemicals, paint thinners, solvents, and waste soils. On several occasions, the remains from aircraft wrecks and burned fuselages were burned at the pits. Fire training activities were conducted at the site until termination of all HAFB flying activities (JRB Associates, 1984).

AFFF Area 2 in OU1 is the only AFFF area that overlaps with an FFA define site (IRP Site 1). Site 1 is currently undergoing remedial activities to achieve cleanup of groundwater contaminated with chlorinated volatile organic compounds (CVOCs). The remedial activities include removal of contaminated groundwater through extraction wells and a shallow groundwater collection trench (**Figure 3**). Extracted groundwater is treated by pumping it to the groundwater treatment plant (GWTP) via underground pipes. Effluent from the GWTP is currently managed by discharging it to the surface at Outfall 001 (**Figure 3**) which is further discussed in **Section 1.1.3.3**.

Historically, the treated effluent was also piped to two locations at Hanscom Field, where it was used to flush contaminated soil. One location (IRP Site 2) was centered about 2,000 ft southeast of AFFF Area 2 (Former FTA II), and the other (IRP Site 3) was centered about 4,000 ft southwest of AFFF Area 2 (Former FTA II). At each location, the flushing was facilitated by constructing an above ground, enclosed dike that created an infiltration basin into which GWTP effluent was discharged. Roughly coincident with and below the dike, a shallow groundwater collection trench, which recycled collected, shallow groundwater back to the GWTP for treatment of collected CVOCs, was constructed (Versar, 2018a). Versar (2018b) state that from August 2017 through September 2018, seven million gallons of groundwater were processed by the GWTP to remove CVOCs, including trichloroethylene (TCE). Neither of the two soil flushing areas are included in the SIA investigative scope because neither area was recommended for further investigation in the Aerostar PFAS SI report (Aerostar, 2018).**Section 3.2** presents a summary of the AFFF Area 2 surface runoff, groundwater flow, and SI investigation analytical results.

1.1.3.3 AFFF Area 3 (Outfall 001)

Outfall 001 is located near the northern boundary of Hanscom Field, approximately 230 ft east of the northern portion of Runway 5-23 (**Figure 1** and **Figure 3**). The outfall discharges storm sewer water collected from eastern portions of Hanscom Field. Immediately next to Outfall 001, a GWTP pipeline discharges effluent from the GWTP. Versar (2017) reported a PFOS+PFOA concentration of 161 nanograms per liter (ng/L) in a surface water sample (RAP1-SW) collected from a location approximately 400 ft downstream (northeast) of Outfall 001, along the unnamed tributary to the Shawsheen River, which flows across the Hartwell Town Forest. Aerostar (2018) collected another surface water sample (HNSCM03-001-SW-001) from a location about 600 ft further downstream from the Versar sample and reported a PFOS+PFOA concentration of 100 ng/L. Versar (2017) also reported GWTP influent and effluent PFOS+PFOA concentrations of 205 and 203 ng/L, respectively. The probable GWTP influent PFAS source is the AFFF Area 2 (Former FTA II) groundwater extraction system. The GWTP was not designed to remove PFAS from influent groundwater; therefore, PFAS are present in the GWTP effluent discharged at Outfall 001.

The PFOS+PFOA concentrations summarized above for surface water and GWTP influent and effluent exceeded 40 ng/L, which is a value published by DoD (2021) and is representative of a screening level for both PFOS and PFOA in groundwater. **Section 3.2** presents a summary of the AFFF Area 3 surface runoff, groundwater flow, and SI investigation analytical results.

1.1.3.4 AFFF Area 4 (Motor Pool Release Area)

The HAFB Motor Pool (Building 1642) is at the intersection of Chenault Street and Grenier Street (**Figure 1** and **Figure 4**). On October 30, 2002, approximately 8 to 10 gallons of AFFF were

accidentally released from a P-19 Crash Response Vehicle during the demonstration of a "No Foam Unit for Aircraft Rescue and Fire Fighting Vehicles". The release location was at the northeast corner of the Motor Pool paved parking area. Although HAFB fire department personnel responded to the incident with the intent to contain the released AFFF, it flowed northwestward, across the pavement, and into a storm sewer inlet located at the northeast corner of the release area prior to arrival of HAFB fire department personnel. The underground piping associated with the storm sewer allows storm sewer water (and the AFFF) to flow into the catch basin located immediately adjacent to the northern side of the release area.

Monitoring wells unrelated to the AFFF Area 4 (Motor Pool Release Area) historically were installed during investigation of petroleum, oil, and lubricant (POL) releases associated with the Motor Pool (Building 1642) (**Figure 4**). The inferred shallow groundwater flow direction reported in the Motor Pool (Building 1642) site investigation report (EA Engineering, Science, and Technology, Inc. (EA), 1997) is shown in **Figure 4**. The groundwater direction (northwestward) inferred by EA differs from the more westward groundwater flow direction inferred by Aerostar (2018), probably because the EA monitoring well network (not shown in **Figure 4**) is located closer to the Shawsheen River culvert and provides water level data and inferred flow directions for the area near the culvert (EA, 1997). **Section 3.3** presents a summary of the AFFF Area 1 surface runoff, groundwater flow, and SI investigation analytical results.

1.2 SIA Investigation Focus

The SIA was conducted because the results of the SI confirmed PFAS were released to the environment from AFFF Area 1 (Taxiway Echo Release Area), AFFF Area 2 (Former FTA II), AFFF Area 3 (Outfall 001), and AFFF Area 4 (Motor Pool Release Area).The purpose of the SIA was to determine if the released PFAS have impacted environmental media at downgradient HAFB and Lawrence G. Hanscom Field (referred to as "Hanscom Field") property boundaries and pose an offsite migration potential. Therefore, the scope of the SIA was focused on analysis of PFAS in environmental media samples collected from downgradient HAFB and Hanscom field property boundaries, and from beyond these boundaries at AFFF Areas 2 (Former FTA II) and 3 (Outfall 001) where there is an existing monitoring well network on the downgradient property. The SIA scope was exclusive of Remedial Investigation (RI) activities intended to assess detailed occurrence and distribution of PFAS in environmental media.

1.2.1 AFFF Area 1 (Taxiway Echo Release Area)

The SIA investigative efforts were focused along the Hanscom Field boundary located northwestward of AFFF Area 1 (Taxiway Echo Release Area) (**Figure 2**). Although the town of Bedford's Hartwell Road Well Field (currently on stand-by and not being pumped) is only about 3,000 ft north-northeast of the northwestward boundary of Hanscom Field, investigation of the well field was outside the scope of the SIA (**Figure 1**).

1.2.2 AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)

The SIA investigative efforts were focused to the northeast of the property boundary. Surface water and sediment were evaluated from the property boundary to about 1 mile northeastward of AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001) to where the unnamed tributary that flows northeastward through the Hartwell Town Forest crosses South Road (**Figure 3**).

1.2.3 AFFF Area 4 (Motor Pool Release Area)

The SIA investigative efforts were focused along: (1) the downgradient HAFB boundary, (2) the area where the Shawsheen River flows underground within a culvert, and (3) the southern side of the Shawsheen River, along the segment between where the river surfaces from the culvert and flows eastward for a distance of about 1,500 ft (**Figure 4**). The SIA investigation efforts did

not include the vicinity of a geothermal well located at the HAFB Environmental Building No. 1825 at 72 Dow Street because this is a closed-loop geothermal well that would not have influenced groundwater movement. Surface water and sediments were evaluated along the Shawsheen River to 585 ft upstream of the location where Kiln Brook enters the Shawsheen River (the confluence is located about 4,000 ft northeast of AFFF Area 4).

1.3 SIA Scope Summaries

The investigative activities completed during the SIA included sampling of various environmental media (groundwater, sediment, soil, and surface water). The investigative efforts completed during the SIA are briefly summarized below for AFFF Area 1 (Taxiway Echo Release Area), AFFF Area 2 (Former FTA II), AFFF Area 3 (Outfall 001), and AFFF Area 4 (Motor Pool Release Area).

1.3.1 AFFF Area 1 (Taxiway Echo Release Area)

The SIA scope at AFFF Area 1 (Taxiway Echo Release Area) is discussed in detail in **Section 4.1** and focused on the following efforts:

- Monitoring wells were constructed along the northwest Hanscom Field property boundary, and targeted the three main aquifers: the surface aquifer in unconsolidated overburden, the till aquifer, and the bedrock aquifer;
- Sampling and analysis of soil samples from the borings used to construct the monitoring wells;
- Surface water and sediment sampling in storm water drainage ditches downgradient of storm sewer outfalls, and downgradient of the confluence of the drainage canals and Elm Brook; and
- Two rounds of groundwater sampling/analysis from the new groundwater monitoring wells (the second round results are presented and discussed in **Appendix A**).

All samples from the investigation locations were analyzed for a list of 24 PFAS compounds specified in the QAPP (AECOM, 2020). The names of the 24 PFAS compounds are presented in **Table 1**. Soil and sediment samples were also analyzed for hydrogen potential (pH) and total organic carbon (TOC). The fate and transport of some PFAS can be influenced by soil pH and TOC. These parameters for the HAFB soil samples may prove useful during future RI PFAS fate and transport considerations.

1.3.2 AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)

The SIA scope at AFFF Area 2 (Former FTA II) and: AFFF Area 3 (Outfall 001) is discussed in detail in **Section 4.2** and focused on the following efforts:

- Surface water and sediment sampling along the unnamed tributary through the Hartwell Forest; and
- Two rounds of groundwater sampling/analysis from existing groundwater monitoring wells and interceptor well screened in the three main aquifers at the site: the surface aquifer in unconsolidated overburden, the till aquifer, and the bedrock aquifer.

All samples from the investigation were analyzed for the list analyses described in **Section 1.3.1**.

1.3.3 AFFF Area 4 (Motor Pool Release Area)

The SIA scope at AFFF Area 4 (Motor Pool Area) is discussed in detail in **Section 4.3** and focused on the following efforts:

- Monitoring wells were constructed to target two of the main aquifers at the site: the surface aquifer in unconsolidated overburden, and the till aquifer;
- Sampling and analysis of soil samples from the borings used to construct the monitoring wells;
- Surface water and sediment sampling along the Shawsheen River; and
- Two rounds of groundwater sampling/analysis from the existing and new groundwater monitoring wells (the second round results are presented and discussed in **Appendix A**).

All samples from the investigation were analyzed for the list analyses described in **Section 1.3.1**.

1.4 SIA Findings and Recommendations Summary

The SIA findings and recommendations are summarized below for AFFF Area 1 (Taxiway Echo Release Area), AFFF Area 2 (Former FTA II), AFFF Area 3 (Outfall 001), and AFFF Area 4 (Motor Pool Release Area).

1.4.1 AFFF Area 1 (Taxiway Echo Release Area)

PFAS were detected in the following media at AFFF Area 1: groundwater and surface water. The PFAS in this media represent an offsite migration potential. It is recommended that an RI be performed to further assess the nature and extent of PFAS in groundwater and surface water.

1.4.1 AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)

PFAS were detected in the following media at AFFF Area 2 and AFFF Area 3: groundwater, surface water, and sediment. The PFAS in this media represent an offsite migration potential. It is recommended that an RI be performed to further assess the nature and extent of PFAS in groundwater and surface water.

1.4.2 AFFF Area 4 (Motor Pool Release Area)

PFAS were detected in the following media at AFFF Area 4: groundwater, surface water, and sediment. The PFAS in this media represent an offsite migration potential. It is recommended that an RI be performed to further assess the nature and extent of PFAS in groundwater, surface water, and sediment.

1.5 SIA Report Organization

This SIA report discusses the investigative activities performed, the results of sample analysis, a summary of screening level exceedances, conclusions regarding migration of PFAS compounds, and recommendations. This SIA report is organized into the following seven sections:

- **Section 1** includes an introduction and general overview of the SIA scope, conclusions, and recommendations.
- **Section 2** summarizes the base-wide physical setting, geology, and hydrogeology.

- **Section 3** summarizes the local physical setting and historic PFAS findings for AFFF Area 1 (Taxiway Echo Release Area), AFFF Area 2 (Former FTA II), AFFF Area 3 (Outfall 001), and AFFF Area 4 (Motor Pool Release Area).
- **Section 4** summarizes the investigative methods used during the SIA.
- **Section 5** discusses findings of the SIA investigative efforts.
- **Section 6** presents conclusions that may be drawn from this SIA.
- **Section 7** lists references cited throughout this report.

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2. Site Conditions

This section summarizes conditions on and surrounding the HAFB and Hanscom Field, and it also provides a generalized conceptual site model (CSM) that incorporates geologic data obtained during historic investigative efforts as well as information obtained during the SIA field efforts.

2.1 Location and Land Usage

HAFB and the adjacent Hanscom Field (a general aviation airport operated by Massport) are located within the central part of Middlesex County, Massachusetts, approximately 17 miles northwest of downtown Boston. The complex occupies land in the towns of Bedford, Concord, Lexington, and Lincoln.

In May 1952, the Commonwealth of Massachusetts leased Hanscom Field to the US Government for use as a military installation. During this timeframe, the primary HAFB mission was the operational maintenance of fighter aircraft as well as research and development support (Weston, 1983). Following the termination of Air Force flying activities in 1973, the US Government subsequently (August 1974) cancelled the lease that had permitted Air Force operation and maintenance of the runway and flight line activities. Hanscom Field reverted to control by the Commonwealth of Massachusetts in August 1974 and is currently operated by Massport as a civilian airport. Today, HAFB is part of the Air Force Life Cycle Management Center and manages the development and acquisition of command, control, communications, computer, intelligence, surveillance, and reconnaissance systems (US Air Force, 2019).

2.2 Climate

General: The source of the following climate discussion is for Bedford, Massachusetts and is from Weatherspark (2020), unless otherwise indicated. Annually, the temperature typically varies from 18 degrees Fahrenheit (°F) to 83°F and is rarely below 2°F or above 91°F.

Temperature: The warm season lasts for 3.4 months, from June 2 to September 13, with an average daily high temperature above 74°F. The hottest day of the year is July 20, with an average high of 83°F and low of 63°F.

Precipitation (rain): Bedford experiences significant seasonal variation in monthly rainfall. Most rain falls during the 31 days centered around October 14, with an average total accumulation of 3.9 inches. The least rain falls around January 24, with an average total accumulation of 1.7 inches. JRB (1984) reports average annual rainfall of 44.0 inches.

Precipitation (snow): The snowy period of the year lasts for 5.6 months, from October 28 to April 15, with a sliding 31-day liquid-equivalent snowfall of at least 0.1 inches. The most snow falls during the 31 days centered around January 26, with an average total liquid-equivalent accumulation of 1.2 inches. The snowless period of the year lasts for 6.4 months, from April 15 to October 28. JRB (1984) reports average annual snow (as snow) of 56.6 inches.

Wind: The windier part of the year lasts for 5.7 months, from November 1 to April 22, with average wind speeds of more than 5.8 miles per hour. The windiest day of the year is February 23, with an average hourly wind speed of 7.6 miles per hour. The calmer time of year lasts for 6.3 months, from April 22 to November 1. The calmest day of the year is July 30, with an average hourly wind speed of 4.1 miles per hour. The predominant average hourly wind direction in Bedford is from the west throughout the year.

2.3 Topography and Surface Drainage

HAFB is located within a low-lying basin with three adjacent named hills with top elevations of up to approximately 100 ft above the basin ground elevation. The hills are named Hartwells Hill (north of Hanscom Field), Pine Hill (west of Hanscom Field), and Katahdin Hill (southeast of Hanscom Field) (**Figure 5**). The ground surface of the relatively flat runway portion of Hanscom Field ranges from about 120 to 130 ft above msl, as shown by the topographic contours in **Figure 5**.

Surface water drainage from HAFB is controlled by a series of storm sewers that discharge into natural water bodies. Throughout roughly the western half of Hanscom Field, encompassing AFFF Area 1 (Taxiway Echo Release Area), the storm sewers direct flow northwestward into Elm Brook, which bounds Hanscom Field to the southwest, west, and north (**Figures 2** and **6**). Absent the storm drains at AFFF Area 1 surface water would collect/pond within the area bounded by the various Hanscom Field runways and taxiways. Elm Brook flows along the western and northern perimeters of Hanscom Field and then discharges into the Shawsheen River, approximately 1.3 miles northeast of the northeastern boundary of Hanscom Field.

Throughout roughly the eastern half of Hanscom Field/Hanscom AFB encompassing the other three AFFF release areas, storm water is generally directed eastward and into either an unnamed tributary to the Shawsheen River that originates at AFFF Area 3 (Outfall 001) (**Figures 3** and **6**) or into the Shawsheen River along the eastern boundary of Hanscom Field. An approximately 1,500-ft long segment of the Shawsheen River flows underground, within a culvert located immediately northwest of AFFF Area 4 (Motor Pool Release Area) (**Figures 4** and **6**).

2.3.1 Geology

Figure 5 illustrates the surficial geology at Hanscom Field and HAFB. The geologic formations consist of Quaternary unconsolidated deposits atop granitic bedrock. The unconsolidated deposits were deposited during glacial retreat during Wisconsin glaciation and infilling of an irregular granitic bedrock surface, including sediments related to Glacial Lake Concord created by poorly drained glacial melt water (Stone and Stone, 2006; Koteff, 1964; cited in Tehama, 2020a). The variability of the elevation of the top of bedrock controls the thickness of the unconsolidated deposits. The maximum depth to the top of bedrock is about 100 ft near the northeastern boundary of Hanscom Field, and the maximum height of bedrock above ground surface is about 175 ft at Katahdin Hill southeast, of AFFF Area 4 (Motor Pool Release Area).

Basin fill progressed upward from sediments deposited directly by glacial ice (tills and unstratified drift) to sediments deposited by sub-glacial (below-ice) meltwater, and finally, to sediments deposited in front of the retreating glacial ice (glaciolacustrine sediments, outwash, and other stratified drift). Glacial Lake Concord water levels were not high enough to overtop many of the till mantled bedrock highs in the area, so many of the hills remain free of glaciolacustrine sediments; at these locations, granitic bedrock commonly occurs at or near the surface. Till tends to be continuous from basin margins to basin center and, though heterogeneous in composition, it locally has high sand and gravel content and acts as an aquifer. Water flowing between the bottom of the glacier and the top of the till (subglacial meltwater) caused channel formation and winnowing of fine grain material at the top of the till.

Tehama (2020a) describe the following types of glacial parent materials deposits at Hanscom Field and HAFB:

- Distal Outwash and Lacustrine Deltaics: Grey, brown, and yellow brown medium to fine sands, moderately to well sorted. May locally include minor amounts of silt, coarse sand, or gravel. Thin- to thick-bedded, bedding may be disrupted where subject to ice-collapse following deposition.

- Kame Deposits and Alluvial Fans: Brown, grey, orange silty sand with gravel generally coarsening upward to coarse sands and sandy gravels, sub angular to angular clasts. Typically associated with topographic highs such as Hartwells Hill and of lower degree of sorting and stratification than deltaic units.
- Potentially Channelized Stratified Drift: Orange, tan, and red-brown fine to coarse sand with fine to medium gravel, rounded and loose to low density. Fining upward packages appearing incised into adjacent lacustrine deposits. Occurs in vicinity of Shawsheen River, potentially drainage associated with final spillway (lake water outlet) of Glacial Lake Concord.

The bedrock unit underlying most of the HAFB area is known as the Andover Granite, which is part of the plutonic series of the Nashoba Block. The Andover Granite dates to about 420 million years ago (NPS, 2017) and is characterized by a series of foliated and unfoliated, garnet-bearing, muscovite-biotite granites and pegmatite (Hepburn and Munn, 1984). Bedrock is exposed at the surface or is present close to the surface at the few locations illustrated in **Figure 5.** Tehama (2020a) describe bedrock fractures in bedrock exposed near Pine Hill occurring as orthogonal (intersection at approximate right angles) sets of vertical and horizontal fractures. Despite the occurrence of such fractures (also described by Tehama (2020a) as a complex network of sub-horizontal and vertical joints and fractures), Tehama states that groundwater flow pathways cross-cutting elevated bedrock areas (i.e., Hartwells Hill) appears unlikely. Groundwater flow along the interconnected network of transmissive orthogonal and random fractures results in a tortuous groundwater flow path.

2.3.2 Aquifers

Groundwater is described as occurring in three interconnected aquifers at HAFB: Upper/Surface Aquifer, Lower/Till Aquifer, and Bedrock Aquifer. The Lacustrine Aquitard occurs between the Upper/Surface and Lower/Till Aquifers.

Upper/Surface Aquifer: The Upper/Surface Aquifer is comprised primarily of unconsolidated lacustrine sandy material and has the highest porosity and permeability of the three aquifers. Tehama (2020a) gives this description of the Upper/Surface Aquifer at HAFB: "*The Upper/Surface Aquifer is present throughout the site and comprises primarily the distal outwash and lacustrine deltaic facies. The aquifer is of variable thickness from less than 10-ft to approximately 40-ft, averaging 15 to 20-ft thick. It is thickest where associated with prograding fan deltas on northern and northwestern margins of the basin.".*

Tehama (2020a) describes Upper/Surface Aquifer facies as follows:

- *Disturbed Ground and Artificial Fill: Sand, silt and gravel sized materials emplaced artificially to level ground or in the aftermath of excavation. May incorporate organic and inorganic refuse in landfill areas.*
- *Holocene Alluvium: Silty, sandy gravel and gravelly sand, moderately sorted brown to yellow in color, associated with Shawsheen River and minor waterways throughout the Hanscom AFB. Typically, less than 10 ft thick.*
- *Peat: Fibrous organics observed sporadically atop or within the top 10 ft of the distal outwash and deltaic units.*
- *Distal Outwash and Lacustrine Deltaics: Grey, brown, and yellow brown medium to fine sands, moderately to well sorted. May locally include minor amounts of silt, coarse sand, or gravel. Thin- to thick-bedded, bedding may be disrupted where subject to ice-collapse following deposition.*

- *Kame Deposits and Alluvial Fans: Brown, grey, orange silty sand with gravel generally coarsening upward to coarse sands and sandy gravels, sub angular to angular clasts. Typically associated with topographic highs such as Hartwells Hill and of lower degree of sorting and stratification than deltaic units. A kame is a glacial landform, an irregularly shaped hill or mound composed of sand, gravel and till that accumulates in a depression on a retreating glacier, subsequently deposited on the land surface after the glacier retreats.*

- *Potentially Channelized Stratified Drift: Orange, tan, and red-brown fine to coarse sand with fine to medium gravel, rounded and loose to low density. Fining upward packages appearing incised into adjacent lacustrine deposits. Occurs in vicinity of Shawsheen River, potentially drainage associated with final spillway of Glacial Lake Concord*.

Lacustrine Aquitard: The Lacustrine Aquitard is comprised of finer-grained lake deposits that generally are less permeable than the overlying Upper/Surface Aquifer and the underlying Lower/Till Aquifer. In this context the term 'aquitard' signifies relatively lower vertical permeability than the over- and underlying deposits, thus reducing (but not eliminating) vertical movement of water through the aquitard. In places where the lacustrine aquitard is absent, the upper and lower aquifers are hydraulically connected (Tehama, 2020a). Tehama (2020a) gives this description of the Lacustrine Aquifer at HAFB: "*The lacustrine aquitard is extensive and thickest toward the basin center where it is up to 45 ft thick. It thins toward bedrock highs and the basin margins and is thin or missing under a portion of the flight line between Reservoir and Hartwells Hills.*"

Tehama (2020a) describes Lacustrine Aquifer facies as follows:

- *Fine-Grained Lacustrine Basin Deposits:* Inorganic silts, clayey silts, and silty clays, trace fine sand. Grey and greenish grey in color. Grade from massive to thinly bedded (varved) at depth. These are deep-water (profundal) sediments deposited from suspension within Glacial Lake Concord through all stages of its infilling. Includes bottomset beds associated with distal fan deltas.

- *Fine-Grained Subaqueous Fan Deposits:* Silty fine sands with trace gravel in some areas; grey. Fine grained facies associated with waning stages of a density flow or distal location. Deposited in flat lying beds paralleling the lake bottom and on some slopes of basin margin.

Tehama (2020a) emphasize that the Fine-Grained Lacustrine Basis Deposits facies form the primary aquitard and are much less leaky compared to the Fine-Grained Subaqueous Fan Deposits facies. The more permeable Fine-Grained Subaqueous Fan Deposits facies provides the potential for hydraulic communication across the Lacustrine Aquitard, between the overlying Upper/Surface Aquifer and underlying Till Aquifer.

Lower/Till Aquifer: Tehama (2020a) provide the following descriptions of the Lower/Till Aquifer. It consists of compact sand and sandy gravel; it can be differentiated into either till or coarse-grained subaqueous flow deposits. The till ranges in thickness from 0 to 25 ft, with thickest tills were observed in basin lows, particularly in area east of Hartwells Hill, off the northern end of the flight line; the elevation of the till surface mimics bedrock basin shape. Generally, the upper 5 ft of the till aquifer is less compact and contains a higher proportion of boulders and gravelly sands than the lower portions of the unit, potentially reflecting alteration of the till through re-working by sub-glacial meltwater. The sandy basal till ranges in thickness from greater than 5 to 15 ft thick, with a top contact that mimics bedrock basin shape. The Lower/Till Aquifer thinly mantles bedrock basin slopes and thickens toward lows. On the steepest margins of the bedrock basin, the till may be very thin or absent.

Tehama (2020a) describe these two Lower/Till Aquifer facies:

- *Coarse Grained Subaqueous Fan Deposits:* Coarse to fine sand and sandy gravel, minor silt content. Gravel ranging from fine to coarse, minor cobble and boulder content; Grey color. Distinct coarsening upward grainsize profile. Generally located atop till or near till surface in basin lows. Lower density (medium) and lower blow counts (10 to 40 blows per 6-inches) than underlying till.
- *Basal Till:* Sandy gravel, gravelly fine to coarse sand, with some silt and minor amounts of clay; deposited directly upon bedrock; brown to grey; generally, very dense and compacted (blow counts 50 to greater than 100 blows per 6-inches); boulders and cobbles common. The upper 5 ft may have a higher sand content associated with subglacial meltwater alteration and/or variation in till type (incorporation of deformation, flow, or minor ablation tills near basin margins).

Bedrock Aquifer: The bedrock aquifer is the deepest aquifer and is comprised primarily of weathered and fractured granite. Groundwater movement through such bedrock is primarily through secondary fractures that have not been extensively mapped at HAFB. Where bedrock is exposed at the surface bedrock, fractures and fracture planes (joints) are visible and mappable.

Bedrock out-crops are present at the surface at several locations near Hanscom Field (**Figure 5**), including near Hartwells Hill and Pine Hill. At such locations, the surface and till aquifers are absent. The elevation of the top of bedrock varies across Hanscom Field. For example, the depth/elevation of the top of bedrock varies at each of the four AFFF release areas and are estimated to be the following:

- AFFF Area 1 (Taxiway Echo Release Area): ~72 feet below ground surface (ft bgs) / 57 ft msl; (monitoring well B231)
- AFFF Area 2 (Former FTA II): ~18 ft bgs/ 118 ft msl (monitoring well RAP1-3S boring log)
- AFFF Area 3 (Outfall 001): ~50 ft bgs/ 73 ft msl (monitoring well RAP1-6R boring log)
- AFFF Area 4 (Motor Pool Release Area): ~20 ft bgs/ 110 ft msl (Weston, 1983; Figure 6)

2.3.3 Groundwater Occurrence at HAFB

The following discussion is based on historic, synoptic, project-wide water level measurements. Groundwater flow directions in all aquifers are generally to the northeast (Versar, 2014). The depth to the groundwater table ranges from 3.63 to 5.62 ft bgs across AFFF Area 1, 0.01 to 9 ft bgs across AFFF Area 2, AFFF Area 3, and the Hartwell Forest, and 9.38 to 21.95 ft bgs across AFFF Area 4.

Localized groundwater flow directions at each of the AFFF release areas are shown on **Figure 7** (Aerostar, 2018). The localized groundwater flow is not always northeastward and has been observed to be radial near topographic highs, such as Hartwells Hill, as illustrated in **Figure 7** (Resolution Consultants, 2016). At topographic highs, localized groundwater flow directions tend to follow topography (i.e., flow from high ground elevations toward low ground elevations). A very localized area of northwestward groundwater flow is reported at the extreme northwestern portion of Hanscom Field, as illustrated in **Figure 7** (Weston, 1983).

As a result of variable geologic conditions, each aquifer may be absent at some locations. In general, where the lower aquifer is present, it is closely associated with the bedrock aquifer because the two are hydraulically connected (CH2M HILL, 2000). Groundwater is not used as a drinking water source at HAFB. A geothermal heat pump well is located at the HAFB environmental office located at 72 Dow Street, approximately 1,200 ft northeast of AFFF Area 4. The heat pump is a closed system design involving no extraction or discharge of groundwater; therefore, there is no concern that the well may influence groundwater flow.

2.3.4 Receptors and Pathways

Ecological and human risk assessments are beyond the scope of the SIA; however, both are briefly described below.

2.3.4.1 Ecological

Ecological receptors are defined to include any living organisms other than humans, the habitat that supports such organisms, or natural resources that could be adversely affected by environmental contamination resulting from a release at or migration from an identified area. The primary HAFB aquatic features, where such receptors reside, include Elm Brook, the Shawsheen River, and the unnamed tributary to the Shawsheen River that originates at AFFF Area 3 (Outfall 001). These tributaries are considered primary ecological receptors for HAFB, including associated plant species and animal species. Furthermore, HAFB is surrounded by multiple sensitive environments, including wetlands, conservation areas, reservations, preserves, sanctuaries, and a wildlife refuge. These sensitive environments and the diversity of plants and animal species that inhabit them are considered ecological receptors for HAFB (Environmental Data Resources, Inc., 2015).

Ecological pathways at HAFB primarily consist of:

- Contact with surface water, pore water, and sediment.
- Incidental ingestion of soil and sediment.
- Ingestion of water (surface water and groundwater as it discharged and becomes surface water).
- Ingestion of prey.

2.3.4.2 Human

Conceptual on-site human receptors primarily include grounds maintenance personnel engaged in landscaping activities (i.e., cutting grass) and environmental contractors who would, for example, collect water samples from locations including groundwater monitoring wells and soil, surface water or sediment sample collection locations. For such on-site human receptors potential exposures routes could include incidental ingestion of groundwater, soil, surface water, and sediment. Under conditions when impacted surface soil may become dry, inhalation of impacted fugitive dust could cause exposure.

Conceptual offsite human receptors include (assuming impacted offsite media) individuals inclined to interact with surface water and sediment (such as individuals engaged in recreational activities) and users of groundwater. Groundwater near HAFB is not currently used as a drinking water source; however, it may be used for irrigation purposes. **Figure 1** shows the location of the Town of Bedford's municipal wells along Hartwell Road north of HAFB, also referred to as the Hartwell Road Well Field. These wells are currently on stand-by and are not being used. **Figure 1** also shows the location of the Shawsheen Well Field northeast of HAFB which are also not currently being used. Also located approximately 5.3 miles to the Northeast of HAFB is the Mill Pond Reservoir, a drinking water source for the Town of Burlington.

3. AFFF Release Areas

This section summarizes the local physical setting and historic PFAS findings for AFFF Area 1 (Taxiway Echo Release Area), AFFF Area 2 (Former FTA II), AFFF Area 3 (Outfall 001), and AFFF Area 4 (Motor Pool Release Area). The descriptions consider the SIA findings discussed in **Section 5**.

3.1 AFFF Area 1 (Taxiway Echo Release Area)

Testing with AFFF and flushing of hoses containing residual AFFF were historically performed at AFFF Area 1. When the testing and hose flushing were performed, AFFF was released directly to the ground surface (AECOM, 2020). Released AFFF and associated PFAS may leach into groundwater and be transported with surface runoff and enter the storm sewer system.

3.1.1 Topography and Surface Water Runoff

AFFF Area 1 (Taxiway Echo Release Area) is situated on the runway portion of Hanscom Field, with ranges in elevation from about 120 to 130 ft msl. Pine Hill is located to the west and has an elevation of 230 ft msl (**Figure 5**), Hartwell Hill is located to the north and has an elevation of 210 ft msl, and wetlands and Elm Brook are located to the northwest. The relief between Pine Hill and Elm Brook is about 110 ft, and the relief between Harwell Hill and Elm Brook is about 90 ft.

Surface water drainage is primarily controlled by a system of interconnected storm sewers that conveys storm water from the vicinity of AFFF Area 1 to the northwest corner of Hanscom Field and ultimately discharges to Elm Brook. The storm sewer locations shown in **Figures 2** and **6** are based on the Compiled Utility Plan, L.G. Hanscom Field, Bedford, Concord, Lexington & Lincoln, MA, Massachusetts Port Authority, Capital Programs Department, September 2020. The storm sewer system conveys water from AFFF Area 1 to the property boundary to the north. The topography further direct surface runoff to the northeast and east towards Elm Brook. Elm Brook flows along the western and northern perimeters of Hanscom Field and then discharges into the Shawsheen River, approximately 1.3 miles northeast of the northeastern boundary of Hanscom Field (**Figure 6**).

3.1.2 Hydrogeology and Groundwater Flow Directions

The groundwater is encountered in three aquifers at AFFF Area 1, which include the surface, the till, and the bedrock aquifers. The thickness of the aquifers varies across AFFF 1 depending on the depth of the bedrock surface encountered at depths ranging from 20 to 42 ft bgs. The groundwater table is encountered within the lake bottom deposits of the shallow aquifer (**Figure 5**) at depths ranging from 3.63 to 5.62 ft bgs across AFFF Area 1. **Figure 7** shows the regional groundwater flow directions (light blue arrows), and the localized groundwater flow directions (dark blue arrows). Regional groundwater flow directions in all aquifers across the HAFB, including at AFFF Area 1, are generally to the northeast (Versar, 2014). However, localized groundwater flow is inferred to be northwestward at the northwestern Hanscom Field boundary located northwest of AFFF Area 1 based on the SIA groundwater elevations measured in the northwestern boundary monitoring wells and compared to the estimated elevation of Elm Brook. This inferred northwestward boundary groundwater flow at the northwestern Hanscom Field boundary is illustrated by the groundwater flow arrows discussed in **Section 5.1.1.2**. The groundwater potentiometric elevation maps presented in Tehama (2020b) Figures 5 through 7 (presented in **Appendix B** of this SIA report) do not encompass the western most components of the SIA monitoring well network at the northwestern Hanscom Field boundary northwest of AFFF Area 1 (Taxiway Echo Release Area). Rather, these four Tehama figures present potentiometric contours at AFFF Area 1 for these aquifers, respectively: surficial, till, till(revised) and bedrock.

The potentiometric elevations are similar for all aquifers, implying good vertical connectivity at AFFF Area 1.

3.1.3 Historic Groundwater and Surface Water Chemistry

The Hanscom Field storm sewer system represents a potential migration pathway for PFAS, confirmed in shallow groundwater at AFFF Area 1 (Taxiway Echo Release Area), northwestward from the AFFF Area 1 (Taxiway Echo Release Area) toward the northwestern boundary area of Hanscom Field, by two possible mechanisms: (1) by impacted surface water entering storm sewer inlets when AFFF Area 1 (Taxiway Echo Release Area) was operational and releasing AFFF, and/or (2) by infiltration of PFAS-impacted shallow groundwater into the storm sewer system (AECOM, 2020).

Regarding potential contaminated groundwater seepage into the buried storm sewer system, Weston (1984) collected storm drain samples (#0-2, #0-3, #0-4, and #0-5) for analysis of volatile organic carbon (VOC) chemicals associated with the investigation of IRP Site 3, located immediately adjacent (south) of AFFF Area 1 (Taxiway Echo Release Area). These sample locations are shown on **Figure 2**. One of the primary IRP Site 3 groundwater chemicals of concern (TCE) was detected at a concentration of 25 micrograms per liter (µg/L) in storm sewer sample #0-3 located at the northwestern Hanscom Field boundary. There are no obvious TCE sources upstream from the location of sample #0-3 other than IRP Site 3. Thus, these events may have occurred to cause TCE to be present in sample #0-3:

- TCE-impacted shallow groundwater near AFFF Area 1 (Taxiway Echo Release Area) seeped into the buried storm sewer system,
- The storm sewer transported the TCE to the northwestern Hanscom Field property boundary where the storm water was discharged into the surface drainage system,
- Surface water in the surface drainage system (ditches) then seeped into ground and impacted nearby groundwater with TCE.
- TCE-impacted groundwater derived from the vicinity of AFFF Area 1 (Taxiway Echo Release Area), and which seeped into the storm sewer system.

By these mechanisms, the storm sewer system may serve as a migration pathway for shallow contaminated groundwater near AFFF Area 1 (Taxiway Echo Release Area), which could include PFAS confirmed in shallow groundwater at AFFF Area 1 (Taxiway Echo Release Area).

Sample #0-4 was collected from a storm sewer segment that does not receive input (as surface water or infiltrating groundwater) from the vicinity of IRP Site 3. TCE was not detected in Sample #0-4. Water exiting the storm sewer at sample location #0-3 (includes potential shallow groundwater infiltrate from the vicinity of AFFF Area 1 [Taxiway Echo Release Area]) enters an above ground surface water drainage ditch in which the water then flows westward. This drainage ditch water then re-enters another buried storm sewer segment associated with storm sewer sample #0-2. The TCE concentration in sample #0-2 was 9 µg/L. The last storm sewer sample location (#0-5) was collected from a box culvert that conveys Elm Brook under Hartwell Road, close to the Town of Bedford's municipal wells (Hartwell Road Well Field) that are currently on stand-by (not being used). No TCE was detected in storm sewer sample #0-5.

To further assess the potential for groundwater contamination from the vicinity of AFFF Area 1 (Taxiway Echo Release Area) and IRP Site 3 to have migrated via the storm sewer to the northwestern Hanscom Field boundary area, historic groundwater monitoring data for monitoring wells that used to be present in this northwestern area (they no longer exist) were reviewed. Two of the chemicals detected in one or more of the storm sewer samples (methylene chloride and TCE) were also detected in the decommissioned northwestern boundary area monitoring wells. Laboratory contamination may have influenced the detected concentrations of methylene

chloride, considering that it was also detected in some laboratory method blanks (Weston, 1984). Ten additional VOCs not detected in any storm sewer sample were also detected in one or more of the northwestern boundary area monitoring wells.

Overall, the data do not indicate a significant threat for northwestward offsite migration of VOCs. However, the data indicate the likelihood that a complete migration pathway from the vicinity of AFFF Area 1 (Taxiway Echo Release Area) to the Hanscom Field northwest boundary area exists or previously existed, resulting in groundwater VOC concentrations ranging up to concentrations such as the following:

- 3.7 µg/L of TCE in monitoring well BR-1,
- 24 µg/L of 1,1,1-trichloroethane (1,1,1-TCA) in monitoring well CW-2, and
- 94 µg/L of methylene chloride in well CW-20.

Monitoring wells BR-1, CW-2, and CW-20 are shown on **Figure 2**.

3.2 AFFF Area 2 (Former Fire Training Area II) and AFFF Area 3 (Outfall 001)

AFFF Area 2 reportedly contained two burn pits and a water runoff area (**Figure 3**). The pits were used to dispose, by ignition, drums of degreasing chemicals, paint thinners, solvents, and waste soils. On several occasions, the remains from aircraft wrecks and burned fuselages were burned at the pits. Released AFFF and associated PFAS may leach into groundwater and be transported with surface runoff (AECOM, 2020).

Outfall 001 discharges storm sewer water collected from eastern portions of Hanscom Field. Immediately next to Outfall 001, a GWTP pipeline discharges effluent from the GWTP (AECOM, 2020). Released AFFF and associated PFAS may leach into groundwater and be transported with surface runoff. Released AFFF and associated PFAS may directly enter surface water (AECOM, 2020).

3.2.1 Topography and Surface Water Runoff

AFFF Area 2 (Former FTA II) is located at the northern portion of the Hanscom Field. Surface elevation (about 140 ft above msl) is about 15 ft higher than the elevation of Hanscom Field Runway 5-23 (elevation of about 125 ft msl) located immediately southeast of this AFFF release area. Hartwell Hill is located to the northwest and has an elevation of 210 ft msl, and wetlands and an unnamed tributary are located to the northeast and have an elevation of approximately 118 ft msl. AFFF Area 3 (Outfall 001) is located near the northern boundary of Hanscom Field, approximately 230 ft east of the northern portion of Runway 5-23 (**Figure 1** and **Figure 3**). The outfall discharges storm sewer water collected from eastern portions of Hanscom Field. Immediately next to (co-incident with) Outfall 001, a GWTP pipeline discharges effluent from the GWTP.

The surface topography of Hartwell Hill to the northwest results in surface water drainage from AFFF Area 2 (Former FTA II) via overland flow to the north to the wetlands and the unnamed tributary, as well as through the storm sewers catch basins across Hanscom Field that conveys water to the Out Fall 001 at AFFF Area 3. Water in the unnamed tributary ultimately discharges into the Shawsheen River, approximately 1.5 miles northeast of Outfall 001 (**Figure 6**).

3.2.2 Hydrogeology and Groundwater Flow Direction

The shallow, till, and bedrock aquifers at are present at AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001), as well as the lacustrine aquifer in the area offsite in the Hartwell Forest to

the northeast (Tehama, 2020a). The groundwater table is encountered within lake bottom deposits and swamp deposits (**Figure 5**) at depths ranging from 3.97 to 5.75 ft bgs across the northeastern boundary of Hanscom Field where AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001) are located, from 6.62 to 9.3 ft bgs beneath the Hartwell Forest, and from 0.1 to 3.6 within the wetland and surrounding areas. Groundwater flow directions in all aquifers across the HAFB are generally to the northeast (Versar, 2014). **Figure 7** shows the regional groundwater flow directions (light blue arrows), and the localized groundwater flow directions (dark blue arrows). While the localized groundwater flow at AFFF Area 1 is to the northeast, the groundwater across AFFF Area 2 (Former FTA II) is to the southeast, possibly due to the presence of Hartwell Hill which is located to the northwest. The SI inferred local surface aquifer groundwater flow direction is from the former burn pits toward the active groundwater collection trench. Beyond the vicinity of this trench, the groundwater flow direction is presumably toward the groundwater extraction wells (**Figure 3**) when the wells are operational. Beyond the areas of influence associated with topography, the groundwater collection trench, and the groundwater extraction wells, the groundwater flow direction is expected to align with the regional northeastward flow direction. The groundwater potentiometric elevation maps presented in Tehama (2020b) Figures 5 through 7 (presented in **Appendix B** of this SIA report) are consistent with the inferred groundwater flow directions described above.

3.2.3 Groundwater and Surface Water Chemistry

During the SI (Aerostar, 2018), sampled media were soil, groundwater, surface water and sediment. Based on the PFAS screening results, groundwater and surface water are the media of concern. The principal SI groundwater findings were the following:

- Groundwater samples were not collected from any of the shallow direct push technology (DPT) borings; they were used only to collect two subsurface soil samples for PFAS analysis,
- No subsurface soil samples exceed any PFAS screening levels,
- Surface soil samples were not collected because soil was removed from the area during a previous remediation effort conducted prior to the SI (Aerostar, 2018),
- The Aerostar (2018) groundwater sampling focused on existing surface aquifer monitoring wells. The PFOS+PFOA concentration measured in existing wells (B103, B238, B239, B240, P01-4SA, and RAP1-3S) ranged from 69 (B103) to 11,790 ng/L (B240). The PFOS+PFOA screening level (70 ng/L, see **Section 1.1.3**) was exceed at all locations except B238,
- Surface water sample HNSCM03-001-SW-001, located about 1,000 ft downstream of Outfall 001, had a PFOS+PFOA concentration of 100 ng/L, and
- Sediment sample HNSCM03-001-SD-001, co-located with surface water sample HNSCM03-001-SW-001, had a PFOS+PFOA concentration of 0.049 J µg/kg.

Figures showing the locations of these SI sample locations are presented in Aerostar (2018).

3.3 AFFF Area 4 (Motor Pool Release Area)

On 30 October 2002, approximately 8 to 10 gallons of AFFF were accidentally released from a P-19 Crash Response Vehicle during the demonstration of a “No Foam Unit for Aircraft Rescue and Fire Fighting Vehicles”. The release location was at the northeast corner of the Motor Pool paved parking area (**Figure 4**). Although HAFB fire department personnel responded to the incident with the intent to contain the released AFFF, it flowed northwestward, across the pavement, and into a storm sewer inlet located at the northeast corner of the release area prior to arrival of HAFB fire

department personnel. The underground piping associated with the storm sewer allows storm sewer water (and the AFFF) to flow into the catch basin located immediately adjacent to the northern side of the release area (AECOM, 2020).

3.3.1 Topography and Surface Water Runoff

The HAFB Motor Pool (Building 1642) is at the intersection of Chenault Street and Grenier Street (**Figure 1** and **Figure 4**). Surface elevation ranges from about 127 to 135 ft msl across the Motor Pool Area, and Reservoir Hill immediately to the east has a maximum elevation of 226 ft msl (**Figure 5**). The elevation of the Shawsheen River where it exits the culvert at the boundary between HAFB and Hanscom Field is 118 ft msl (**Figure 4** and **Figure 5**).

Surface water drainage is via overland flow to the north to the Shawsheen River, as well as through the storm sewers catch basins that discharge to the culverted portion of the Shawsheen River (**Figure 6**). The Shawsheen River runs eastward along the boundary between HAFB and Hanscom Field and past the eastern end of Runway 29 for about 3126 ft to where it exits the property.

3.3.2 Hydrogeology and Groundwater Flow Directions

The groundwater is encountered in the shallow and till aquifers at AFFF Area 4 (Motor Pool Release Area). The groundwater table is encountered within lake bottom deposits (**Figure 5**) at depths ranging from 8.86 to 15.09 ft bgs (**Table 4**). Groundwater flow directions in all aquifers across the HAFB are generally to the northeast (Versar, 2014). **Figure 7** shows the regional groundwater flow directions (light blue arrows), and the localized groundwater flow directions (dark blue arrows). The groundwater flow across AFFF Area 4 (Motor Pool Release Area) is to the west, possibly due to the presence of Reservoir Hill to the east. The groundwater potentiometric elevation maps presented in Tehama (2020b) Figures 5 through 7 (presented in **Appendix B** of this SIA report) are consistent with the inferred groundwater flow directions described above.

3.3.3 Historic Groundwater and Surface Water Chemistry

Sampled media were soil, groundwater, surface water and sediment. Based on the PFAS screening results, groundwater is the medium of concern. The principal SI groundwater findings were the following:

- PFOS+PFOA concentrations measured in the water samples from three shallow temporary monitoring wells ranged from 65 J (HNSCM04-003) to 649 ng/L (HNSCM04-001).
- The PFOS+PFOA screening level 70 ng/L was exceeded by the PFOS+PFOA concentration of 649 ng/L and 185 ng/L collected from locations HNSCM04-001-GW-012 and HNSCM04-002-GW-009, respectively.

Figures showing the locations of these SI sample locations are presented in Aerostar (2018).

These results are consistent with the observations that: (1) the location of the lowest detected PFOS+PFOA concentration 65 J ng/L is upgradient of the catch basin into which the released AFFF entered, and (2) the two locations with the screening level exceedances are located immediately adjacent to the catch basin.

A surface water sample (HNSCM04-004-SW-001) was collected from the Shawsheen River culvert outfall located approximately 1,250 ft north of AFFF Area 4 (Motor Pool Release Area), and the PFOS+PFOA concentration in this surface water sample was 160 J ng/L. Localized groundwater flow at the AFFF Area 4 (Motor Pool Release Area) is toward this culvert. If the bottom of the culvert is at or greater than about 5.5 ft bgs, that would position the bottom of the

culvert at or below the depth to the water table observed in AFFF Area 4 (Motor Pool Release Area) well borings HNSCM04-002 and HNSCM04-003 during drilling. The implication is that PFAS-impacted shallow groundwater may infiltrate the culvert. Sediment sample HNSCM04-004-SD-001, co-located with surface water sample HNSCM04-004-SW-001, had a PFOS+PFOA concentration of 1.0 µg/kg.

A geothermal heat pump well is associated with the HAFB Building No. 1825, which is the HAFB environmental office located at 72 Dow Street. The heat pump is a closed system design involving no extraction or discharge of groundwater. Therefore, there is no concern that the well may influence groundwater flow or PFAS migration.

4. Field Activities and Analyses

The SIA investigation encompassed sampling and analysis of onsite groundwater, soil, surface water, and sediment.

All non-drinking water samples collected during this investigation were analyzed for 24 PFAS compounds using liquid chromatography tandem mass spectrometry (LC/MS/MS) with isotope dilution or internal standard quantification in accordance with Table B-15 of DoD Quality Systems Manual (QSM) version 5.3 (DoD, 2021a). At the time the samples were analyzed, the EPA did not have an isotope dilution reference method. Therefore, the available analytical method is described as PFAS Isotope Dilution/LC-MSMS Method Compliant with Table B-15 of DoD QMS 5.3. All soil and sediment samples were also analyzed for pH by EPA Method 9045C and TOC by Walkley Black In Soil. Vista Analytical Laboratory, Inc. (Vista) of El Dorado Hill, California performed the PFAS analyses, and APPL, Inc. (APPL) of Clovis, California performed the TOC and pH analyses.

4.1 AFFF Area 1 (Taxiway Echo Release Area)

4.1.1 Groundwater

The groundwater scope, procedures and findings are individually discussed.

4.1.1.1 Scope of Work

The groundwater scope involved two rounds of activities. The first round (June through August 2021) included the following activities:

- Site Water Sampling
- Installation and development of new shallow, till, and bedrock aquifer monitoring wells;
- Field analysis of the following parameters during well development: temperature, pH, and specific conductivity (SC);
- Field analysis of the following parameters during well purging: temperature, pH, SC, dissolved oxygen (DO), and oxidation-reduction potential (ORP);
- Surveying the new monitoring wells to be sampled;
- Collection of groundwater samples from new and existing monitoring wells; and
- Laboratory analysis of the water samples for 24 PFAS compounds.

The second round groundwater monitoring results are presented and discussed in **Appendix A.**

4.1.1.2 Monitoring Well Installation

Figure 8 shows the six locations where SIA monitoring wells were installed to assess potential PFAS occurrence in groundwater along the northwestern boundary of Hanscom Field. New groundwater monitoring wells were installed because all previous groundwater monitoring wells in this area were decommissioned. The new monitoring well network was placed across the three groundwater aquifers and closer to the property boundary than the original wells to address the SIA goal of assessing if PFAS pose an offsite migration potential (see **Section 1.2**).

Well pairs are planned at three locations:

- A1-MW1(T) and A1-MW1(R)

- A1-MW2(S) and A1-MW2(R)
- A1-MW3(S) and A1-MW3(R)

Three-well clusters are planned at three locations:

- A1-MW4(S); A1-MW4(T) and A1-MW4(R)
- A1-MW5(S); A1-MW5(T) and A1-MW5(R)
- A1-MW6(S); A1-MW6(T) and A1-MW6(R)

For each location, “S” signifies a well with a planned screened interval within the surface aquifer, “T” signifies a well with a planned screened interval within the till aquifer, and “R” signifies a well with a planned screened interval within the bedrock aquifer. **Table 2** presents construction data for the new monitoring wells. All new monitoring wells were installed by Cascade Drilling using the sonic drilling technology. At each new well pair or three well cluster, adjacent 6-inch diameter borings were drilled and generally located within about 5 to 6 feet of each other. Soil cores were collected continuously from the deep borings to facilitate examination of lithology and determine well screen placement in bedrock and/or till borings. Soil samples were described based on the Unified Soil Classification System (USCS), which allows for standard description of soils based on grain size, texture, color, and other characteristics. The placement of the surface aquifer monitoring well screens were decided such that approximately 3 feet of the shallow well screens would be above the water table and 7 feet would be submerged below the water table. The till aquifer wells were screened across the ten feet of till and overburden sediments on top of the bedrock surface, and the bedrock aquifer wells were screened in the competent bedrock interval from 5 to 15 feet below the competent bedrock surface. The average total depths of the surface, till, and bedrock aquifer wells were 13 ft bgs, 28 ft bgs, and 44 ft bgs, respectfully.

Appendix C presents field activity photographs. Borehole lithology descriptions and completed well construction diagrams are presented on the geotechnical integrator (gINT) boring logs presented in **Appendix D**.

Installed wells generally had the following characteristics:

- Two-inch diameter schedule 40 poly-vinyl chloride (PVC) riser;
- Two-inch diameter, 10-foot long, PVC screen with 0.01-inch slots. The 0.01-inch screen slots were conservatively selected to prevent aquifer materials from entering the screen;
- Flush mounted completion;
- Well seals above the screens comprised of hydrated bentonite chips; and
- Annular seals comprised of a mixture of bentonite and cement.

4.1.1.3 Monitoring Well Development

The permanent monitoring wells were developed no sooner than 24 hours following installation, allowing adequate time for the well construction materials to set. A Typhoon PVC submersible pump was used to develop each monitoring well. During the pumping process, the submersible pump was periodically moved up and down within the well screen in an action similar to a surge block. The surge process included repeatedly lowering the pump to the bottom of the well and then quickly pulling the pump up through the screen interval into the well casing multiple times. This process agitates the water column, typically removing fine particles embedded in a well screen, suspending them in the well water column. After the surge process, the pump was then lowered into the screen interval and allowed to evacuate water for several minutes while water

quality parameters were measured on a periodic basis. Water quality parameters were actively measured using a YSI 556 water quality meter and a LaMotte 2020t turbidity meter. During well development, the following water quality parameters were monitored:

- pH;
- Temperature;
- SC; and
- Turbidity.

The monitoring wells were determined to be adequately developed when the pH, SC, and temperature of the groundwater had stabilized, and the turbidity had either stabilized or was below 10 Nephelometric Turbidity Units (NTUs). Stabilization was defined as pH constant within 0.2 Standard Units (SU), and temperature and SC constant within 10%. Additionally, a minimum of three well volumes were removed during well development. Well development logs completed for each well are included in **Appendix E**.

4.1.1.4 Monitoring Well Sampling

The new shallow, till, and bedrock aquifer monitoring wells (**Figure 8**) were sampled via low-flow sampling techniques using a peristaltic pump fitted with disposable high-density polyethylene (HDPE) tubing. All groundwater elevations were at an appropriate depth for the use of a peristaltic pump. Water quality measurements (pH, SC, temperature, DO, and ORP, and turbidity) were obtained during well purging. The water quality parameters were monitored using a YSI-556 MPS probe meter situated in a flow through cell that was connected to discharge tubing between the pump and 5-gallon bucket, and a LaMotte 2020t (for turbidity). Purge rates, water quality parameters and water levels during purging were recorded on groundwater sampling forms presented in **Appendix F**. After the field parameters stabilized during purging, and a minimum of one well volume was collected, purging was stopped, and the water samples for laboratory analysis were collected and containerized in two laboratory supplied 250-milliliter (ml) HDPE bottles. Well purge water was containerized for subsequent management as discussed in **Section 4.1.1.5**.

4.1.1.5 IDW Management

Solid investigation-derived waste (IDW) was containerized in 55-gallon drums (total of 6). At the request of Massport, drums were transported off the airfield and staged at the HAFB GWTP after each well location was finished. Two composite IDW soil samples were collected from the 6 drums and submitted for waste characterization analyses consisting of PFAS and VOCs. Concentrations of PFAS and VOCs were below analytical limits of quantitation. Solid IDW analytical results are included in **Appendix G**.

Liquid IDW consisted of well development water, purge water, and decontamination water from the SIA well installation and one subsequent groundwater sampling round. The water was containerized in 55-gallon steel drums (total of 27), which were staged at the HAFB GWTP. A composite liquid IDW sample was collected from the 27 drums and submitted for waste characterization analyses consisting of PFAS and VOCs. Detected concentrations of PFAS were below the Massachusetts Department of Environmental Protection (MassDEP) Drinking Water standard of 20 ng/L (MassDEP, 2019). Concentrations of VOCs were below analytical limits of quantitation. Liquid IDW analytical results are presented in **Appendix G**. Final management and treatment of solid and liquid IDW is also discussed in **Appendix G**.

4.1.2 Soil Sampling

4.1.2.1 Sonic Boring Soil Samples

Two subsurface soil samples were collected during boring advancement for the installation of monitoring wells. The samples were collected from the deepest boring advanced at each well pair or three well cluster (**Figure 8**). The first sample was collected from the shallow interval of 0 feet to 2 ft bgs, and the second sample was collected from the 2-foot interval above the water table. Samples from the upper five feet of the subsurface were collected with a stainless steel hand auger during the hand clearing of the borings to confirm the absence of utilities. Samples from subsurface soil below five feet were collected from the retrieved soil cores produced during sonic drilling of the borehole. Soil cores were collected continuously from five ft bgs to the borehole completion depth, inside 5 or 10-foot long, four-inch diameter stainless-steel sonic drill rig core barrels. Cores were then dispensed from the core barrel into HDPE liners (bags) to facilitate core soil inspection, photoionization detector (PID) head space screening, and description by an on-site geologist. Each boring soil sample was homogenized (not together) and containerized, pending laboratory analysis for PFAS, TOC, and pH. Soil boring logs are available in **Appendix D**.

4.1.3 Sediment and Surface Water Sampling

The SIA surface water and sediment sampling was performed in July and August 2021. Three collocated surface water and sediment samples were collected at locations downstream from storm sewer outfalls Storm Sewer 1, Storm Sewer 2, and Storm Sewer 3 (**Figure 8)**. The proposed location of surface water and sediment sample location (A1-SWSD3) was immediately upstream of where the sewer water discharges to Elm Brook to the northwest. However, due to numerous property fences and dense vegetation limiting safe access to this location, the sampling location was moved down stream of the confluence of the storm sewer discharge and Elm Brook.

The sediment samples were collected from 0 to 0.5 feet below the stream and brook bed surfaces using a decontaminated stainless-steel hand auger. The sediment sample was then homogenized and containerized, pending laboratory analysis for PFAS, TOC, and pH. The surface water samples were collected at the sediment sample collection location using peristaltic pump and disposable HDPE tubing. Surface water from the approximate middle of the surface water column was then pumped directly into laboratory supplied 250 ml HDPE bottles. Sediment and surface water sampling details and water quality measurements were summarized on sediment/surface water sampling forms included in **Appendix H**.

4.2 AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)

4.2.1 Groundwater

The groundwater scope, procedures and findings are individually discussed.

4.2.1.1 Scope of Work

The groundwater scope involved two rounds of activities performed in August 2020 and March and April 2021. Both rounds included the following activities:

- Field analysis of the following parameters during well purging: temperature, pH, SC, DO, and ORP;
- Collection of groundwater samples from existing monitoring wells; and
- Laboratory analysis of the water samples for 24 different PFAS compounds.

4.2.1.2 Monitoring Well Sampling

Figure 9 shows the locations of existing monitoring wells (total of 34) and groundwater interceptor wells (total of four) selected for monitoring during the SIA. The well construction information is summarized on **Table 2**. Many of the wells are clustered because they were designed to assess vertical variability of OU1 groundwater chemicals of interest, including groundwater chemistry information for the major water bearing zones (surface, lacustrine, till, and bedrock). The wells have one or more of the following characteristics that influenced the decision for use as SIA monitoring wells:

1) Proximity to the HAFB or Hanscom Field boundaries located downgradient from AFFF Areas 2 and 3;

2) Proximity to an OU1 groundwater interceptor well (IW-1, IW-2, IW-4, and IW-11) that potentially induced PFAS migration toward these interceptor wells and nearby HAFB or Hanscom Field downgradient boundaries; and

3) Distance from the downgradient boundary because they are not centrally located at HAFB or Hanscom Field.

The wells were sampled in the same manner as described in **Section 4.1.1.4** for AFFF Area 1 (Taxiway Echo Release Area). Purge rates, water quality parameters and water levels during purging were recorded on groundwater sampling forms presented in **Appendix F**.

4.2.1.3 IDW Management

Liquid IDW consisted of well development water, purge water, and decontamination water from the SIA groundwater sampling rounds. The water was containerized in 55-gallon steel drums (total of 3), which were staged at the HAFB GWTP. Two composite liquid IDW samples were collected from the 3 drums and submitted for waste characterization analyses consisting of PFAS, VOCs, and SVOCs. Liquid IDW analytical results are presented in **Appendix G**. Final management and treatment of solid and liquid IDW is also discussed in **Appendix G**.

4.2.2 Sediment and Surface Water Sampling

The SIA surface water and sediment sampling was performed in August 2021. Co-located surface water and sediment samples were collected from five locations along the unnamed tributary that originates at AFFF Area 3 (Outfall 001) and then flows northeastward across the Hartwell Town Forest to where the tributary exits the forest at South Road (**Figure 9**). The surface water and sediment samples were collected in the same manner as described in **Section 4.1.3** for AFFF Area 1 (Taxiway Echo Release Area). Sediment and surface water sampling details and water quality measurements were summarized on sediment/surface water sampling forms included in **Appendix H**.

4.3 AFFF Area 4 (Motor Pool Release Area)

4.3.1 Groundwater

The groundwater scope, procedures and findings are individually discussed.

4.3.1.1 Scope of Work

The groundwater scope AFFF Area 4 (Motor Pool Release Area) included four rounds of activities. The first three rounds were performed in August 2020, March and April 2021, and June through August 2021. The fourth round was performed in November 2021.

The August 2020 round and the March and April 2021 rounds included the following activities:

- Field analysis of the following parameters during well purging: temperature, pH, SC, DO, and ORP;
- Collection of groundwater samples from 10 existing monitoring wells; and
- Laboratory analysis of the water samples for 24 different PFAS compounds.

The June through August 2021 round included the following activities:

- Installation and development of four new shallow and till aquifer monitoring wells;
- Field analysis of the following parameters during well development: temperature, pH, and SC;
- Field analysis of the following parameters during well purging: temperature, pH, SC, DO, and oxygen reduction potential;
- Surveying the new monitoring wells to be sampled;
- Collection of groundwater samples from new and existing monitoring wells; and
- Laboratory analysis of the water samples for 24 different PFAS compounds.

The second round of groundwater sampling of the new monitoring wells is discussed in **Appendix A**.

4.3.1.2 Monitoring Well Installation

New shallow and till aquifer monitoring wells were installed at the locations shown in **Figure 10**. The drill water source was sampled for PFAS prior to drilling and was confirmed to not be impacted with PFAS (**Section 4.4**). This figure also shows the existing monitoring wells. **Table 2** presents construction information for the new monitoring wells. All new monitoring wells were installed as described previously in **Section 4.1.1.2** for AFFF Area 1 (Taxiway Echo Release Area). The average total depths of the surface and till aquifer wells were 23 ft bgs, and 39 ft bgs, respectfully.

Borehole lithology descriptions and completed well construction diagrams are presented on the gINT boring logs presented in **Appendix D**.

Installed wells generally had the following characteristics:

- Two-inch diameter schedule 40 PVC riser;
- Two-inch diameter, 10-foot long, schedule 40 PVC screen with 0.01-inch slots. The 0.01-inch screen slots were conservatively selected to prevent aquifer materials from entering the screen;
- Flush mounted completion;
- Well seals above the screens comprised of hydrated bentonite chips; and
- Annular seals comprised of a mixture of bentonite and cement.

4.3.1.3 Monitoring Well Development

Monitoring well development for the AFFF Area 4 (Motor Pool Release Area) was conducted in the same manner as described in **Section 4.1.1.3** for AFFF Area 1 (Taxiway Echo Release Area). Well development logs completed for each well are included in **Appendix E**.

4.3.1.4 Monitoring Well Sampling

Figure 10 shows the locations of existing monitoring wells (total of 10 at seven different locations) and new monitoring wells (total of four at two different locations) where groundwater was collected for analysis during SIA. The downgradient HAFB boundary that the existing monitoring wells are located along is also located immediately adjacent to the Shawsheen River; therefore, there are two PFAS transport mechanisms that could potentially cause PFAS to be present along this downgradient HAFB boundary: (1) PFAS transport with groundwater migrating toward the Shawsheen River, and (2) PFAS transport into shallow groundwater along the Shawsheen River on occasions when the Shawsheen River may be a losing stream, and if during these occasions, PFAS are present in the Shawsheen River. **Table 1** summarizes the well depth (ft bgs), monitored aquifer, and screened interval (ft bgs) for the existing and installed monitoring wells.

The first mechanism is most likely where the downgradient HAFB boundary is closest to the AFFF Area 4 (Motor Release Area) catch basin (i.e., about 400 ft northwest of the catch basin). New SIA monitoring wells A4-MW1(S,T) and A4-MW2(S,T), shown on **Figure 10**, were installed where no wells were currently present along this HAFB boundary. At each of these locations, well pairs were installed, with one well screened within the surface aquifer, and the other screened within the till aquifer.

The new shallow and deep monitoring wells and existing shallow and deep monitoring wells (**Figure 10**) were sampled in the same manner as described in **Section 4.1.1.4** for AFFF Area 1 (Taxiway Echo Release Area). Purge rates, water quality parameters and water levels during purging were recorded on groundwater sampling forms presented in **Appendix F**.

4.3.1.5 IDW Management

Soil IDW was containerized in 55-gallon drums (total of 4). Drums were transported and staged at the HAFB GWTP. A composite IDW soil sample was collected from the 4 drums and submitted for waste characterization analyses consisting of PFAS, BTEX (benzene, toluene, ethylbenzene, xylenes), and total petroleum hydrocarbons (TPH). Concentrations of PFAS and VOCs were below analytical limits of quantitation. Solid IDW analytical results are included in **Appendix G**.

Liquid IDW consisted of well development water, purge water, and decontamination water from the SIA well installation and groundwater sampling rounds. The water was containerized in 55-gallon steel drums (total of 7), which were staged at the HAFB GWTP. A composite liquid IDW sample was collected from the 27 drums and submitted for waste characterization analyses consisting of PFAS, BTEX, and TPH. Liquid IDW analytical results are included in **Appendix G**. Final management and treatment of solid and liquid IDW is also discussed in **Appendix G**.

4.3.1.6 Sonic Boring Soil Samples

Two subsurface soil samples were collected during boring advancement for the installation of monitoring wells. The samples were collected from the deepest boring advanced at each well pair (**Figure 10**). The first sample was collected from the shallow interval of 0 feet to 2 ft bgs, and the second sample was collected from the 2-foot interval above the water table. Samples from the upper five feet of the subsurface were collected with a stainless steel hand auger during the hand clearing of the borings to confirm the absence of utilities. The soil core samples were handled in the same manner as described in **Section 4.1.2.1** for AFFF Area 1 (Taxiway Echo Release Area).

4.3.2 Sediment and Surface Water Sampling

The SIA surface water and sediment sampling was performed in August 2021. Co-located surface water and sediment samples were collected from four locations along the Shawsheen River north and northeast of AFFF Area 4 (Motor Pool Release Area). Sample location A4-SWSD1 is located were the Shawsheen River exits at the north end of the Shawsheen River culvert. Sample

locations A4-SWSD2, A4-SWSD3, and A4-SWSD4 are roughly equally spaced downstream along the Shawsheen River to the location (A4-SWSD4) just upstream of where Kiln Brook flows into the Shawsheen River (**Figure 10**). The surface water and sediment samples were collected in the same manner as described in **Section 4.1.3** for AFFF Area 1 (Taxiway Echo Release Area). Sediment and surface water sampling details and water quality measurements were summarized on sediment/surface water sampling forms included in **Appendix H**.

4.4 PFAS Site Water Supply Sampling

Site water was required for drilling, monitoring wells installation, and equipment decontamination. The potable water at the GWTP was identified as the most appropriate water source for the SIA activities. On August 6, 2020, a sample was collected from a faucet in the GWTP laboratory to confirm that the water was free of PFAS. The potable water sample was submitted to Vista for PFAS. No PFAS was detected in the potable water sample, and the water was deemed suitable for use during the SIA. The Vista laboratory report is presented in **Appendix I.**

4.5 Field Equipment Calibration

Field meters (i.e., PIDs, YSIs, LaMotte 2020s, etc.) were calibrated at the start of each day to confirm the meters were recording accurate measurements. Calibration followed the procedures specified in the Uniform Federal Policy- Quality Assurance Project Plan (UFP-QAPP) (AECOM, 2020). Calibration checks were performed at the end of each day. Calibration forms are included in **Appendix J**.

4.6 Deviations from the UFP-QAPP

The PFAS SIA scope was performed in accordance with the UFP-QAPP with the following deviations:

- Due to a shallow depth to groundwater, the second deeper soil samples (below 2 ft bgs and above the groundwater table) were not collected at A1-MW1T, A1-MW3T, or A1-MW4T.
- Monitoring wells were completed as flush mounted road boxes rather than above ground surface standpipes at the request of Massport to prevent the wells from interfering with airfield lawn mowing activities.
- The collection of a groundwater sample from existing irrigation well (24553) at 696 Virginia Road, as specified in the UPF-QAPP, was not sampled during the SIA. Access to the well by the facility owner was not granted during the timeframe of the SIA field activities. The well may be evaluated during the RI.
- At AFFF Area 2 and 3, monitoring wells B128-MW and B129-MW were dry and groundwater samples were not collected. In addition, field reconnaissance revealed monitoring wells B256, B257, and B258 were shallow, till, and bedrock well triplets B256 (S,L,R), B257 (S,L,R), and B258 (S,L,R). Each well in the triplets were purged and sampled. Well locations are shown on **Figure 9**.
- At AFFF Area 4, field reconnaissance was unable to locate wells MW-09 and MW-11. Monitoring well MW-10 was sampled as a replacement. Monitoring well locations are shown on **Figure 10**.
- Surface water and sediment location A1-SWSD3 was collected along Elm Brook and not upstream of the above ground drainage discharge to Elm Brook because chain-link fences and heavy vegetation prevented safe access to the original scoped location. The original scope location and the actual sampled location are shown on Figure 17-1 from the UFP-QAPP and **Figure 8** of this SIA Report, respectively.

- The deep soil samples (below 2 ft bgs) from soil borings and the sediment samples from the above ground storm water drainage ditch, Unnamed Tributary, and Shawsheen River were collected from the Rotosonic core and stainless steel hand-augers into Ziplock bags and homogenized prior to filling the laboratory supplied bottles rather than using stainless steel bowls. The modified procedure was used to eliminate the small potential for cross contamination from decontaminated stainless steel bowls.
- During the collection of some of the groundwater samples, the stabilization criteria in the UFP-QAPP were not achieved. These deviations were the result of poor water recharge and excessive water drawdown at a well and stabilization criteria not being met after excessive purge time (i.e., two hours).

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5. SIA Findings

Appendix I presents the laboratory analytical reports and data validation reports, including laboratory and data validation data qualifier (flags) definitions. This section presents the following analytical results for each of AFFF Area 1 (Taxiway Echo Release Area), AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001), and AFFF Area 4 (Motor Pool Release Area):

- PFAS in groundwater, soil, surface water and sediments; and
- TOC and pH in soil and sediments.

Additionally, groundwater elevations and inferred groundwater flow directions are discussed in **Sections 5.1.1.2, 5.2.1.2, and 5.3.1.2** for AFFF Area 1 (Taxiway Echo Release Area), AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001), and AFFF Area 4 (Motor Pool Release Area).

5.1 AFFF Area 1 (Taxiway Echo Release Area)

5.1.1 Groundwater

5.1.1.1 Chemistry

Table 3 and **Figure 11** present the groundwater sampling results for PFAS from August 2021 compared against the Office of the Secretary of Defense (OSD) screening levels (DoD, 2021b) (**Appendix K**). The analytical limits of quantitation for all samples were below the OSD (DoD, 2021b) screening levels. No detections exceeded the OSD (DoD, 2021b) screening levels; therefore, no detections are highlighted in **Table 3** or **Figure 11**. The limits of detection for all analytes and samples are presented in Table 3. The limits of detection ranged from 4.13 ng/L to 4.42 ng/L. In addition to the screening levels presented in **Table 3**, MassDEP has promulgated drinking water standards for PFAS, corresponding to the summed concentrations for six PFAS, as presented in the footnotes to **Table 3** for information purposes. All monitoring wells are located to the north and northwest of the Taxiway Echo Release Area along the Hanscom Field Property Boundary. A review of the results is summarized below:

- Shallow Aquifer Wells:
  - Wells sampled: A1-MW2S, A1-MW3S, A1-MW4S, A1-MW5S, and A1-MW6S.
  - Perfluorobutanesulfonic acid (PFBS), PFOS, and PFOAddd compounds were not detected above the analytical limits of quantitation in the five shallow aquifer monitoring wells with the exception of a concentration of PFOA at monitoring well A1-MW3S (9.67 ng/L), which was below the OSD (DoD, 2021b) screening level.
- Till Aquifer Wells:
  - Wells sampled: A1-MW1T, A1-MW4T, A1-MW5T, and A1-MW6T.
  - PFBS was not detected in the four till aquifer monitoring wells.
  - PFOA was detected at A1-MW5T and A1-MW6T (8.02 ng/L and 3.49 / 3.08 (Field Sample Duplicate [Dup]) ng/L), and PFOS was detected at A1-MW5T (6.16 ng/L). The detected concentrations were below the OSD (DoD, 2021b) screening levels.
- Bedrock Aquifer Wells:
  - Wells sampled: A1-MW1R, A1-MW2R, A1-MW3R, A1-MW4R, A1-MW5R, and A1-MW6R.

- PFBS, PFOS , and PFOA were not detected above the analytical limits of quantitation in the six bedrock aquifer wells with the exception of PFOA at A1-MW5R and A1-MW6R (4.15 ng/L and 8.75 ng/L), and PFOS at A1-MW6R (4.23 ng/L). The detected concentrations were below the OSD (DoD, 2021b) screening levels.

5.1.1.2 Groundwater Elevations and Inferred Flow Directions

Table 4 presents water level measurements for AFFF Area 1 (Taxiway Echo Release Area) made during the sampling round in August 2021. **Figure 12** present water table elevations from Shallow, Till, and Bedrock Aquifer wells installed in 2021. The highest groundwater elevations were measured at the farthest western boundary of Hanscom Field at near Pine Hill at A1-MW1R and A1-MW1T (128.92 and 128.64 ft North American Vertical Datum of 1988 [NAVD88], respectively), and the lowest elevations were measured at the northern boundary by the storm drainage channels at A1-MW4R, A1-MW4T, and A1-MW5S (120.22, 120.03, and 119.08 ft NAVD88, respectively).

Upward vertical hydraulic gradients were observed between the Bedrock, Till, and Shallow Aquifers at the six new two well pairs and three well clusters, such as at A1-MW1 where the potentiometric surface at A1-MW1R was 0.24 feet higher than at A1-MW1T (128.92 ft NAVD88 vs. 128.64 ft NAVD 88), and at A1-MW-5 where the potentiometric surface at A1-MW5R was 0.4 ft higher than was A1-MW5T (123.01 ft NAVD88 vs 122.61 ft NAVD88), which was 3.53 ft higher than at A1-MW5S (122.61 ft NAVD 88 vs 119.08 ft NAVD88).

The shallow groundwater flow arrows in **Figure 12** are based on the measured groundwater elevations and the surface topography compared to the wetlands and Elm Brook. The groundwater elevations at A1-MW1R and A1-MW-1T are higher than those to the north at A1-MW2R and A1-MW2S indicating a component of groundwater flow to the north. The shallow groundwater elevations beneath the airfield exceed the elevation of Elm Brook located to north-northwest, implying shallow groundwater flow towards Elm Brook. These observations indicate a north-northwesterly groundwater flow along the northwest Airfield property boundary.

5.1.2 Shallow and Deep Soil Samples from Sonic Borings

Table 5 presents the PFAS results for the shallow and deep soil samples collected from the borings for the newly installed SIA monitoring wells. No concentrations exceeded the OSD (DoD, 2021b) screening levels; therefore, none are highlighted. The analytical limits of quantitation for all samples were below the OSD (DoD, 2021b) screening levels. Observations include the following:

- Shallow Soil Samples:
  - Eight shallow soil samples (six field samples and two sample duplicates) were collected at the following locations: A1-MW1T-SB-INT1, A1-MW2S-SB-INT1, A1-MW3S-SB-INT1, A1-MW4S-SB-INT1, A1-MW4S-SB-INT1-DUP, A1-MW5S-SB-INT1, A1-MW5S-SB-INT1-DUP, and A1-MW6S-SB-INT1.
  - The PFAS compounds were not detected above the analytical limits of quantitation in the eight soil samples.
- Deep Soil Samples:
  - Three deep soil samples were collected at the following locations: A1-MW2S-SB-INT2, A1-MW5S-SB-INT2, and A1-MW6S-SB-INT2. Due to the shallow depth to groundwater, deep soil samples were not collected at A1-MW1T-SB, A1-MW3S-SB, or A1-MW4S-SB.

- The PFAS compounds were not detected above the analytical limits of quantitation in the three soil samples.

Table 6 presents the pH and TOC results for the shallow and deep soil samples collected from the borings for the newly installed deep SIA monitoring wells.

The range of reported values for shallow soil samples for pH is 4.32 to 6.46 SU and for TOC is 2,540 to 22,500 milligrams per kilogram (mg/kg). The range of reported values for deep soil samples for pH is 5.38 to 6.71 SU, and TOC is 580 to 807 mg/kg, respectively. These data may influence RI fate and transport assessments.

5.1.3 Surface Water and Sediment Samples

5.1.3.1 Surface Water

Table 7 and **Figure 13** present the surface water samples PFAS results. Three surface water samples were collected in AFFF Area 1 including A1-SWSD1-SW, A1-SWSD2-SW, and A1-SWSD3-SW. The following measurements are the maximum detected concentrations of PFBS, PFOS, and PFOA:

- PFBS 5.80 ng/L at A1-SWSD1-SW;
- PFOA 8.17 ng/L at A1-SWSD1-SW; and
- PFOS 208 ng/L at A1-SWSD1-SW.

The surface water locations were positioned at the storm water drain outfalls and along Elm Brook. The highest PFAS concentrations were detected immediately downgradient of the outfall from the storm sewer originating at AFFF Area 1. The surface water results were screened using the OSD (15SEP2021 Screening Memo) groundwater screening levels for PFBS, PFOS, and PFOA. The PFOS screening level was exceeded in surface water sample A1-SWSD1-SW. This exceedance is indicated by the yellow shading in **Figure 13**.

5.1.3.2 Sediment

Table 8 presents the sediment samples PFAS results. Three sediment samples were collected in AFFF Area 1, including A1-SWSD1-SD, A1-SWSD2-SD, and A1-SWSD3-SD. Concentrations of PFBS, PFOS, and PFOA were below analytical limits of quantitation. The locations of the sediment samples are shown alongside the surface water samples on **Figure 13**. The sediment results were screened using the OSD (15SEP2021 Screening Memo) soil screening levels for PFBS, PFOA, and PFOS. No screening value was exceeded.

Table 9 presents the sediment samples pH and TOC results. The range of reported values for sediment samples for pH is 6.25 to 6.77 SU and for TOC is 10,000 to 12,800 mg/kg. These data may influence RI fate and transport assessments.

5.2 AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)

5.2.1 Groundwater

5.2.1.1 Chemistry

Table 10 and **Figure 14** present the groundwater sampling results for PFAS from August 2020 and April 2021 sampling rounds compared against the OSD (DoD, 2021b). The analytical limits of quantitation for all samples were below the OSD (DoD, 2021b) screening levels. The limits of detection for all analytes and samples are presented in Table 10. The limits of detection ranged from 4.10 ng/L to 4.81 ng/L. There were ten exceptions where the upper end of this range was

exceeded, up to a maximum of 23.6 ng/L for PFHxS at IW-11-GW-P1 where very high concentrations of other PFAS were present which caused elevation of the PFHxS limit. All other occurrences (nine) of limits above the range of 4.10 ng/L to 4.81 ng/L were similarly due to very high PFAS concentrations. Concentrations above OSD (DoD, 2021b) screening levels are shaded gray and **Table 10** and yellow on **Figure 14**. A review of the results is summarized below.

Vicinity of Hanscom Airfield and HAFB Northeast Property Boundaries:

- Shallow Aquifer Wells:
  - Wells sampled: PO1-2S, RAP1-4S, and RAP1-6S.
  - No PFBS concentrations exceeded screening levels.
  - PFOS and PFOA concentrations exceeded the screening levels in one of the three wells (RAP1-6S located adjacent to the end of Runway 23) in August 2020 at concentrations of 2,300 ng/L and 1,570 ng/L, respectively, and PFOA exceed the screening level at the same well in August 2020 at a concentration of 70.6 ng/L.
- Till Aquifer Wells:
  - Well sampled: B111-MW, B126-GW, B242, RAP1-6T and RAP2-1T.
  - PFBS concentrations in August 2020 and March 2021 were all below their respective screening levels.
  - PFOA exceeded the screening levels in August 2020 and March 2021 at the five wells at concentrations of ranging from 163 ng/L (RAP2-1T, March 2021) to 3,370 ng/L (RAP1-6T, August 2021).
  - PFOS exceeded the screening level in August 2020 and March 2021 at three of five wells at concentrations ranging from of 88.5 ng/L (B126-MW, April 2021) to and 562 ng/L, (RAP1-6T, August 2020).
- Bedrock Aquifer Wells:
  - Wells sampled: B243, PO1-2R, RAP1-4RA, RAP1-6R, and RAP2-1R.
  - PFBS concentrations were all below their respective screening levels.
  - PFOA concentrations exceeded its screening level in four of five wells in August 2020 and March and April 2021 at concentrations ranging from 52.4 ng/L (RAP1-4RA, August 2020) to 8,860 ng/L (RAP1-6R, August 2020).
  - PFOS concentrations exceeded its screening level in three of five wells in August 2020 and March and April 2021 at concentrations ranging from 93.2 ng/L (P01-2R, August 2020) to 524 ng/L (RAP1-6R, March 2021).
- Interceptor Wells:
  - Wells sampled: IW-2, IW-4, IW-11.
  - PFBS concentrations were all below their respective screening levels.
  - PFOA concentrations exceeded its screening level in the three interceptor wells in August 2020 and April 2021 at concentrations ranging from 186 ng/L (IW-4, April 2021) to 2,560 ng/L (IW-11, August 2020).

- PFOS concentrations exceeded its screening level in two of three wells in August 2020 and April 2021 at concentrations ranging from 67.2 ng/L (IW-2, August 2020) to 748 ng/L (IW-4, August 2020).

Downgradient of Hanscom Airfield and HAFB Northeast Property Boundaries:

- Shallow Aquifer Wells:
  - Wells sampled: B246, B253, B256-S, B257-S, and B-258-S.
  - PFBS and PFOS concentrations were all below their respective screening levels.
  - PFOA concentrations exceeded the screening levels in one of five wells (B246) in August 2020 and April 2021 at concentrations 42.5 ng/L and 157 ng/L, respectively. These wells are part of a well triplet located downgradient of the Runway 23 and Hanscom Field property boundary and adjacent to the unnamed tributary.
- Till Aquifer Wells:
  - Well sampled: B245, B248, B254, B256-L, B257-L, B258-L, RAP1-1T, and RAP1-1R.
  - PFBS and PFOS concentrations were all below their respective screening levels.
  - PFOA concentrations exceeded the screening levels in one of eight wells (B245) in August 2020 and April 2021 at concentrations 88.0 ng/L and 92.8 ng/L, respectively. These wells are part of a well triplet located downgradient of the Runway 23 and Hanscom Field property boundary and adjacent to the unnamed tributary.
- Bedrock Aquifer Wells:
  - Wells sampled: B244A, B249, B255, B256-R, B257-R, B258-R,
  - PFBS and PFOS concentrations were all below their respective screening levels.
  - PFOA concentrations exceeded the screening levels in one of six wells (B244A) in August 2020 and April 2021 at concentrations 101 ng/L and 93.8 ng/L, respectively. These wells are part of a well triplet located downgradient of the Runway 23 and Hanscom Field property boundary and adjacent to the unnamed tributary.
- Interceptor Wells:
  - Wells sampled: IW-1.
  - PFBS concentrations were all below their respective screening level.
  - PFOS and PFOA concentrations exceeded the screening levels at the interceptor well. Concentrations of PFOA ranged from 100 ng/L to 138 ng/L, and concentrations of PFOA ranged from 143 ng/L to 237 ng/L, in April 2021 and August 2020), respectively.

5.2.1.2 Groundwater Elevations and Inferred Flow Directions

Table 4 presents water level measurements for AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001) made during the sampling round in August 2021. **Figure 15** presents water table elevations from Shallow, Till, and Bedrock Aquifer wells located along the northeastern HAFB and Hanscom Field property boundaries. The highest shallow groundwater elevation was measured to the east of Hartwells Hill at P01-2S (118.59 ft NAVD88) in the northeast corner of the Airfield, and the lowest elevation was measured at the boundary of the Hartwell Forest coincident with the wetlands at B257S (113.97 ft NAVD88).

Upward vertical hydraulic gradients were observed between the Bedrock/Till and Shallow Aquifers along the property boundaries at P01-2S and P01-2R (118.29 ft NAVD88 vs 121.39 ft NAVD88), at RAP1-4S and RAP1-4RA (116.71 ft NAVD88 vs 117.90 ft NAVD88), at B128-MW and B111-MW (117.39 ft NAVD88 vs 118.00 ft NAVD88), and at B244A, B245, and B246 (116.28 ft NAVD88 vs 116.40 ft NAVD88). Upward vertical gradients were also observed to the south of the wetlands at the B256 well cluster (note that the Till and the Bedrock wells at this location had artesian conditions during the gauging round). Downward vertical gradients were observed from the shallow to the till, and upward from the bedrock to the till at well cluster B253, B254, B255 coincident with the wetlands. Downward vertical gradients were also measured north of the property boundary at till well RAP1-1T and bedrock well RAP1-1R (117.93 ft NAVD88 vs 111.79 ft NAVD88), and in the northern part of the Hartwell Forest at the Shallow well B258S, the Till well B258L, and the Bedrock well B258R (115.61 ft NAVD88 vs 115.32 ft NAVD88 vs 113.34 ft NAVD88).

The predominant horizontal groundwater flow direction is to the northeast from the higher groundwater elevations along the property boundary (i.e., P01-2S 118.59 ft NAVD88, and B128-MW 117.39 ft NAVD88) to the lower elevations in the wetland and the along the Unnamed Tributary (B256S 114.87 ft NAVD88, B254 114.21 ft NAVD88, and B257S 113.97 ft NAVD88). A potential southeast ward flow across the Harwell Forest is also indicated by the higher elevation at B258S (115.61 ft NAVD88) compared to at the edge of the wet land at B257S (113.97 ft NAVD88).

5.2.2 Surface Water and Sediment Samples

5.2.2.1 Surface Water

Table 7 and **Figure 16** presents the surface water samples PFAS results. Five surface water samples were collected along the unnamed tributary downgradient of AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001) including A2A3-SWSD1-SW, A2A3-SWSD2-SW, A2A3-SWSD3-SW, A2A3-SWSD4-SW, and A2A3-SWSD5-SW. The following measurements are the maximum detected concentrations of PFBS, PFOS, and PFOA:

- PFBS 7.62 ng/L at A2A3-SWSD3-SW;
- PFOA 62.1 ng/L at A2A3-SWSD3-SW; and
- PFOS 17.4 ng/L at A2A3-SWSD3-SW.

A2A3-SWSD3-SW was collected midway along the unnamed tributary at approximately 2,630 feet downstream from Outfall 001. PFAS concentrations are similar from A2A3-SWSD1 to A2A3-SWSD-3 and then slightly decrease downstream. The surface water results were screened using the OSD (15SEP2021 Screening Memo) groundwater screening levels for PFBS, PFOS and PFOA. The PFOA screening level was exceeded in all five surface water samples collected along the unnamed tributary. These exceedances are indicated by the yellow shading shown in **Figure 16**.

5.2.2.2 Sediment

Table 8 and **Figure 16** presents the sediment samples PFAS results. Five sediment samples were collected from the unnamed tributary downgradient of AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001) including A2A3-SWSD1-SD, A2A3-SWSD2-SD, A2A3-SWSD3-SD, A2A3-SWSD4-SD, and A2A3-SWSD5-SD. The following measurements are the maximum detected concentrations of PFBS, PFOA, and PFOS:

- PFBS ND in all samples;

- PFOA 3.17 ng/L at A2A3-SWSD2-SD; and
- PFOS 3.83 ng/L at A2A3-SWSD5-SD.

The sediment results were screened using the OSD (15SEP2021 Screening Memo) soil screening levels for PFBS, PFOS and PFOA. No screening value was exceeded.

Table 9 presents the sediment samples pH and TOC results. The range of reported values for sediment samples for pH is 6.01 to 6.17 SU and for TOC is 21,000 to 220,000 mg/kg. These data may influence RI fate and transport assessments.

5.3 AFFF Area 4 (Motor Pool Release Area)

5.3.1 Groundwater

5.3.1.1 Chemistry

Table 11 and **Figure 17** present the groundwater sampling results for PFAS from August 2020, March and April 2021, and August 2021 compared against the OSD screening levels (DoD 2021). The analytical limits of quantitation for all samples were below the OSD (DoD, 2021b) screening levels. The limits of detection for all analytes and samples are presented in Table 11. The limits of detection ranged from 3.97 ng/L to 4.72 ng/L. There were four exceptions where the upper end of this range was exceeded, up to a maximum of 84.0 ng/L for PFHpS, PFHxS and PFOS in CH-107-GW-P2 where very high concentrations of PFOS (31,300 ng/L present in CH-107-GW-P2 which caused elevation of the PFHxS limit. The only other occurrence a limit above the range of 3.97 ng/L to 4.72 ng/L was in MW13-3-GW-P2 where very high concentrations of numerous PFAS occurred. Concentrations above screening levels are shaded gray and **Table 11** and yellow on **Figure 17**. A review of the results is summarized below:

- Shallow Aquifer Wells:
  - Wells sampled: A4-MW1S, A4-MW2S, CH-107, HB-11, MW6-116U, MW6-117U, MW-07, MW-10, and MW13-3.
  - PFBS was detected above its screening level at one of the nine wells in April 2021 (CH-107 located on the Hanscom Airfield) at a concentration of 848 ng/L.
  - PFOA concentrations exceeded its screening level in three of nine wells in August 2020, April 2021, and August 2021 at concentrations ranging from 147 ng/L (CH-107, August 2020) to 1,200 ng/L (MW13-3, April 2021).
  - PFOS concentrations exceeded its screening level in six of nine wells in August 2020 April 2021, and August 2021 at concentrations ranging from 62.4 ng/L (MW6-117U, August 2020) to 31,300 ng/L (CH-107, April 2021).
- Till Aquifer Wells:
  - Wells sampled: A4-MW1T, A4-MW2T, CH-106, MW6-116T, and MW6-117T.
  - PFBS concentrations were all below its respective screening level.
  - PFOA concentrations exceeded its screening level in one of five wells in August 2020 April 2021, and August 2021 at concentrations ranging from 90.7 ng/L to 104 ng/L (MW6-117T, April 2021 and August 2020, respectively.
  - PFOS concentrations exceeded its screening level in three of five wells in August 2020 April 2021, and August 2021 at concentrations ranging from 122 ng/L (CH-106, April 2021) to 251 ng/L (MW6-117T, August 2020).

5.3.1.2 Groundwater Elevations and Inferred Flow Directions

Table 4 presents water level measurements for AFFF Area 4 (Motor Pool Release Area). **Figure 18** present water table elevations from Shallow and Till Aquifer wells located along border of the Shawsheen River between the Hanscom AFB and Hanscom Field property boundaries. The highest shallow groundwater elevation was measured at HB-11 (118.42 ft NAVD88), and the at the lowest elevation was measured at MW6-116U (111.62 ft NAVD88).

Upward vertical hydraulic gradients were observed between the Till and Shallow Aquifers at A4-MW2T and A4-MW2S (118.90 ft NAVD88 vs 116.69 ft NAVD88), CH-106 and CH-107 (114.08 ft NAVD88 vs 113.75 ft NAVD88), at MW6-116T and MW6-116U (112.78 ft NAVD88 vs 111.62 ft NAVD88), and at MW6-117T and MW6-117U (112.37 ft NAVD88 vs 111.63 ft NAVD88). The vertical gradient at A4-MW1T and A4-MW1S was slightly downward (117.56 ft NAVD88 vs 117.72 ft NAVD88), which might be affected by Reservoir Hill to the east.

The apparent horizontal groundwater flow directions are toward the Shawsheen River, potentially including the segment of the River that is contained within the underground culvert located immediately west of AFFF Area 4 (Motor Pool Release Area) as presented in **Figure 18**. As the River traverses the study area, the orientation of the River channel changes from south to north (west of AFFF Area 4), west to east, and southwest to northeast (to the northeast property boundary), and the direction of groundwater flow changes accordingly.

5.3.2 Shallow and Deep Soil Samples from Sonic Borings

Table 5 presents the PFAS results for the shallow and deep soil samples collected from the borings for the newly installed SIA monitoring wells. No concentrations exceeded OSD (DoD, 2021b) screening levels; therefore, no detections are highlighted in **Table 5**. Observations include the following:

- Shallow Soil Samples:
  - Two shallow soil samples were collected at the following locations: A4-MW1S-SB-INT1 and, A4-MW2S-SB-INT1.
  - The PFAS compounds in the two soil samples were not detected above the analytical limits of quantitation.
- Deep Soil Samples:
  - Two deep soil samples were collected at the following locations: A4-MW1T-SB-INT2 and, A4-MW2T-SB-INT2.
  - The PFAS compounds in the two soil samples were not detected above the analytical limits of quantitation.

Table 6 presents the pH and TOC results for the shallow and deep soil samples collected from the borings for the newly installed deep SIA monitoring wells.

The range of reported values for shallow soil samples for pH is 5.51 to 5.94 SU and for TOC is 3,300 to 11,000 mg/kg. The range of reported values for deep soil samples for pH is 6.58 to 6.98 SU, and TOC is 120 to 1,900 mg/kg, respectively. These data may influence RI fate and transport assessments.

5.3.3 Surface Water and Sediment Samples

5.3.3.1 Surface Water

Table 7 and **Figure 19** present the surface water samples PFAS results. Four surface water samples were collected in AFFF Area 4 including A4-SWSD1-SW, A4-SWSD2-SW, A4-SWSD3-SW, and A4-SWSD4-SW, as well as two duplicate samples (A4-SWSD1-SW-DUP A4-SWSD2-SW-DUP). The following measurements are the maximum detected concentrations of PFBS, PFOS , and PFOA:

- PFBS 25.8 ng/L at A4-SWSD4-SW;
- PFOA 36.8 ng/L at A4-SWSD3-SW; and
- PFOS 348 ng/L at A4-SWSD3-SW.

The surface water locations were positioned at the storm water drain outfalls and along the Shawsheen River between Hanscom Field and Hanscom AFB to the property boundary. The highest PFAS concentrations were detected immediately to the east of the end of Runway 29.

Figure 19 shows the measured concentrations of PFBS, PFOS, and PFOA in surface water. The surface water results were screened using the OSD (15SEP2021 Screening Memo) groundwater screening levels for PFBS, PFOS and PFOA. The PFOS screening level was exceeded in all four surface water samples collected along the Shawsheen River. These exceedances are indicated by the yellow shading shown in **Figure 19**. PFAS concentrations in surface water were observed to be higher in the two downstream locations (A4-SWSD3 and A4-SWSD4) compared to the two upstream locations (A4-SWSD1 and A4-SWSD2).

5.3.3.2 Sediment

Table 8 and **Figure 19** present the sediment samples PFAS results. Four sediment samples were collected in AFFF Area 4, including A4-SWSD1-SD, A4-SWSD2-SD, A4-SWSD2-SD-DUP, A4-SWSD3-SD, and A4-SWSD4-SD, as well as one duplicate sample (A4-SWSD1-SD-DUP). The following measurements are the maximum detected concentrations of PFBS, PFOA, and PFOS:

- PFBS and PFOA were ND in all samples; and
- PFOS 5.59 ng/g at A4-SWSD2-SD-DUP, the sample duplicate of parent sample A4-SWSD2-SD.

The sediment results were screened using the OSD (15SEP2021 Screening Memo) soil screening levels for PFBS, PFOS and PFOA. No screening value was exceeded.

Table 9 presents the sediment samples pH and TOC results. The range of reported values for sediment samples for pH is 5.8 to 6.48 SU and for TOC is 1,000 to 7,300 mg/kg. These data may influence RI fate and transport assessments.

5.3.4 Data Validation and Data Usability

Appendix I presents a detailed discussion of the results of the Stage 2B and 4 data validation conducted for the SIA. Data validation activities were conducted with reference to:

- Vista Analytical Laboratory SOP: Preparation and Analysis for the Determination of Per- and Poly-Fluorinated Compounds (SOP No. 49, Revision 24),
- DoD General Data Validation Guidelines (DoD, 2021a),

- DoD Data Validation Guidelines Module 3: Procedure for Per- and Polyfluoroalkyl Substances,
- Analysis by QSM Table B-15 (DoD, 2021a),
- Table B-15 from the Quality Systems Manual (QSM) for Environmental Laboratories, Version,
- 5.3 (DoD, 2021a),
- Project-specific Quality Assurance Project Plan, and the

The data were evaluated based on the following parameters (where applicable to the method):

- Data completeness (chain-of-custody (COC)/sample integrity,
- Holding times and sample preservation,
- Mass calibration,
- Initial calibration/continuing calibration verification,
- Laboratory blanks/field blanks/equipment blanks,
- Matrix spike (MS)/matrix spike duplicate (MSD) results,
- Laboratory control sample (LCS) results,
- Field duplicate results,
- Extracted internal standard results,
- Sample results/reporting issues,
- The Stage 4 validation was a minimum 10% of all PFAS sample results; specifically, *a minimum of 10% of the sample results data per SDG, focused on samples with the highest measured PFAS concentrations of analytes with PALs in QAPP WS#15, and*
- The Stage 4 validation included raw data checks and result recalculations.

The data validation results indicate that the analytical project data usability goals have been attained, evidenced by the **Appendix I** data validation reports and data qualifiers presented in the analytical results tables previously presented in **Section 5**.

Other factors that support the finding of data usability include:

- During validation only one ‘R’ (rejection) flag was applied, to PFBA in one groundwater primary sample from Area 2/3; however, a non-R value for PFBA was available for the duplicate sample,
- High correlation (percent difference generally below 10 percent) between primary and duplicate sample results:
  - Area 1, groundwater sample A1-MW6T-GW-P1 versus A1-MW6T-GW-P1-DUP:
    - PFBS and PFOS: non-detect in primary and duplicate samples
    - PFOA: 3.49 ng/L (primary) versus 3.08 ng/L (duplicate) = 13% difference
  - Area 2/3, groundwater sample B254-GW-P1 versus B254-GW-P1-DUP:
    - PFBS and PFOS: non-detect in primary and duplicate samples
    - PFOA: 12.5 ng/L (primary) versus 13.1 ng/L (duplicate) = 5% difference
  - Area 2/3, groundwater sample B257-S-GW-P1 versus B257-S-GW-P1 -DUP:

    - PFBS, PFOS and PFOA: non-detect in primary and duplicate samples
  - Area 2/3, groundwater sample RAP1-1R-GW-P1 versus RAP1-1R-GW-P1-DUP:
    - PFBS: 9.61 ng/L (primary) versus 9.11 ng/L (duplicate) = 5% difference
    - PFOA: non-detect in primary and duplicate samples
    - PFOS: 2.90 ng/L (primary) versus 2.39 ng/L (duplicate) = 21% difference
  - Area 2/3, groundwater sample P01-2R-GW-P2 versus P01-2R-GW-P2-DUP:
    - PFBS: 53.6 ng/L (primary) versus 54.2 ng/L (duplicate) = 1% difference
    - PFOA: 234 ng/L (primary) versus 221 ng/L (duplicate) = 6% difference
    - PFOS: 102 ng/L (primary) versus 101 ng/L (duplicate) = 1% difference
  - Area 4, groundwater sample MW6-116T-GW-P1 versus MW6-116T-GW-P1-DUP:
    - PFBS: 12.3 ng/L (primary) versus 11.0 ng/L (duplicate) = 12% difference
    - PFOA: 36.4 ng/L (primary) versus 33.4 ng/L (duplicate) = 9% difference
    - PFOS: 189 ng/L (primary) versus 177 ng/L (duplicate) = 7% difference
  - Area 4, groundwater sample A4-MW1S-GW-P1 versus A4-MW1S-GW-P1-DUP:
    - PFBS: 4.84 ng/L (primary) versus non-detect (duplicate)
    - PFOA: 5.97 ng/L (primary) versus 5.47 ng/L (duplicate) = 9% difference
    - PFOS: 109 ng/L (primary) versus 121 ng/L (duplicate) = 11% difference
- Proper samples chain of custody and uncompromised samples delivery to the laboratory,
- Clean field operations based on analysis of field QA samples such as field reagent blanks and equipment rinsate samples,
- Necessary samples to assess PFAS concentrations at the HAFB and Hanscom Field boundaries were collected and analyzed, despite the variations to the QAPP identified in Section 4.6
- PFAS limits of quantitation were less than the soil/sed and groundwater/surface water screening limits, and
- Field procedures described in the QAPP were followed with the exception that soil samples came into contact with zip-lock baggies.

6. Summary and Conclusions and Recommendations

A summary of the SIA findings, and conclusions and recommendations are discussed below for each of the four AFFF release areas.

6.1 AFFF Area 1 (Taxiway Echo Release Area)

6.1.1 Summary

The following media were monitored at AFFF Area 1 (Taxiway Echo Release Area):

- Groundwater
- Soil
- Surface Water, and
- Sediment

PFAS were detected in these media:

- Groundwater
- Surface Water, and
- Sediment

OSD (DoD 2021) screening levels were not exceeded for groundwater or soil. However, elevated PFAS concentrations in storm water drainage ditch surface water implies that seepage of this surface water into groundwater could cause groundwater PFAS concentrations to exceed OSD (DoD 2021) screening levels at the drainage ditch and the Hanscom Field boundary where no monitoring wells currently exist.

6.1.2 Conclusions and Recommendations

Offsite migration of PFAS via surface water flow along storm water drainage ditches at the northwestern Hanscom Field boundary likely is occurring. Seepage of the PFAS-impacted water from the drainage ditches into shallow groundwater may be occurring along the drainage ditch and may result in PFAS impacted groundwater near the drainage ditches, although there are no monitoring wells along the drainage ditch to assess this probability. If PFAS seepage into shallow groundwater is occurring, groundwater PFAS concentrations may exceed OSD (DoD, 2021b) PFAS screening levels based on the SIA observation that the drainage ditch surface water PFAS concentrations exceed OSD (DoD, 2021b) screening levels. SIA monitoring wells not close to the drainage ditch confirm PFAS in groundwater at the northwestern Hanscom Field boundary, but at concentrations less than OSD (DoD, 2021b) screening levels.

An RI is recommended to assess the occurrence and distribution of PFAS at and beyond this AFFF release area and further evaluate preliminary evidence that PFAS migration from this AFFF release area may be via the storm sewer system.

6.2 AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)

6.2.1 Summary

The following media were monitored at AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001):

- Groundwater

- Surface Water, and
- Sediment

PFAS were detected in these media:

- Groundwater
- Surface Water, and
- Sediment

Groundwater PFAS concentrations exceeded OSD (DoD, 2021b) screening levels. Soil PFAS concentrations did not exceeded OSD (DoD, 2021b) screening levels.

6.2.2 Conclusions and Recommendations

PFAS have been detected above the OSD (DoD, 2021b) screening levels at and downgradient of the Hanscom Field and HAFB property boundaries. Offsite migration of PFAS via shallow groundwater flow is occurring. An RI is recommended to assess the occurrence and distribution of PFAS at and beyond this AFFF release area.

6.3 AFFF Area 4 (Motor Pool Release Area)

6.3.1 Summary

The following media were monitored at AFFF Area 4 (Motor Pool Release Area):

- Groundwater
- Soil
- Surface Water, and
- Sediment

PFAS were detected in these media:

- Groundwater
- Surface Water, and
- Sediment

Groundwater PFAS concentrations exceeded OSD (DoD, 2021b) screening levels. Soil PFAS concentrations did not exceeded OSD (DoD, 2021b) screening levels.

6.3.2 Conclusions and Recommendations

PFAS have been detected in groundwater above OSD (DoD, 2021b) screening levels at the downgradient property boundary of Hanscom Field and HAFB. An RI is recommended to assess the occurrence and distribution of PFAS at and down-gradient (northeast) of the AFFF Area 4 release area.

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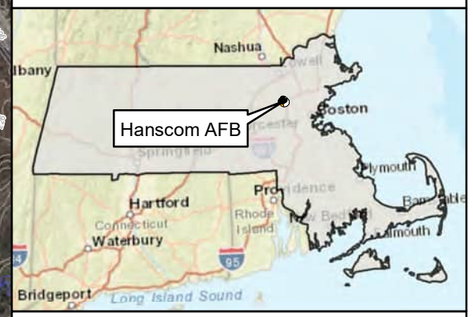
Figures



Legend

- Municipal Well
- Groundwater Interceptor/Extraction Well
- AFFF Area
- Hanscom AFB Boundary
- Approximate Airfield Boundary
- Water Body
- Wetland
- Shawsheen Well Field
- River/Stream
- Topographic Contour Line (10 Foot Interval)
- Surface Water Flow Direction

Note
Mill Pond Reservoir is located approximately 5.3 miles to the Northeast of HAFB.

N

0 1,000 2,000 4,000 Feet

Figure 1
Site Plan

Hanscom Air Force Base, Middlesex County, MA

GIS BY: MS	6/29/2022
CHK BY: BE	6/29/2022

Source
Imagery from MassGIS, 2019.

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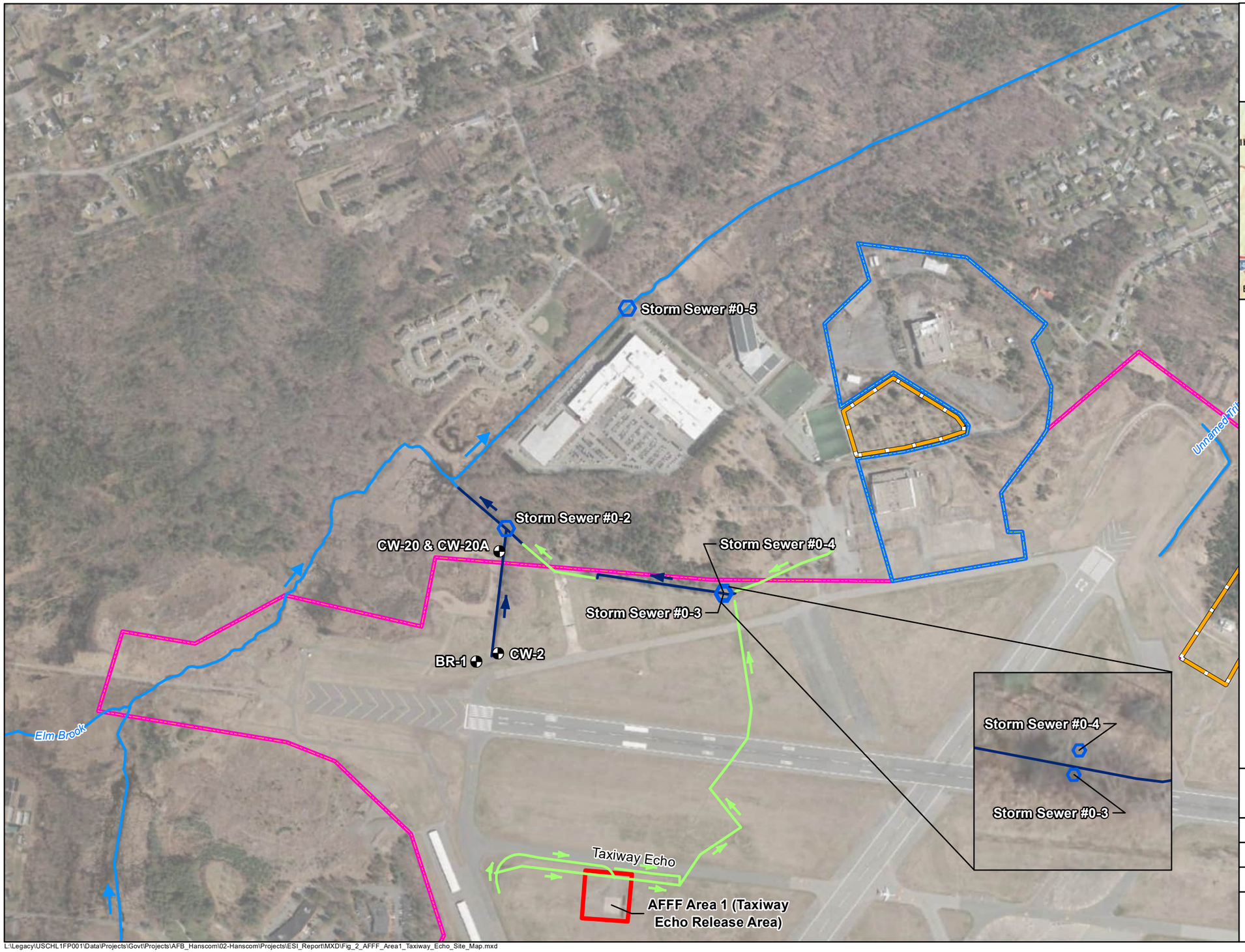

Legend

- Historic Well Location (decommissioned)
- Storm Sewer Sample
- AFFF Area
- Hanscom AFB Boundary
- NWIRP Boundary
- Approximate Airfield Boundary
- Underground Storm Sewer (Approximate inlets not shown)
- Storm Sewer Water Flow Direction (Weston, 1984)
- Surface Water
- Surface Water Flow
- Above Ground Drainage Ditch
- Above Ground Drainage Ditch Flow Direction

N

0 310 620 1,240 Feet

Figure 2
AFFF Area 1 (Taxiway Echo)
Site Map

Hanscom Air Force Base, Middlesex County, MA

GIS BY: JB	5/19/2022
CHK BY: BE	5/19/2022

Source
Imagery from MassGIS, 2019.

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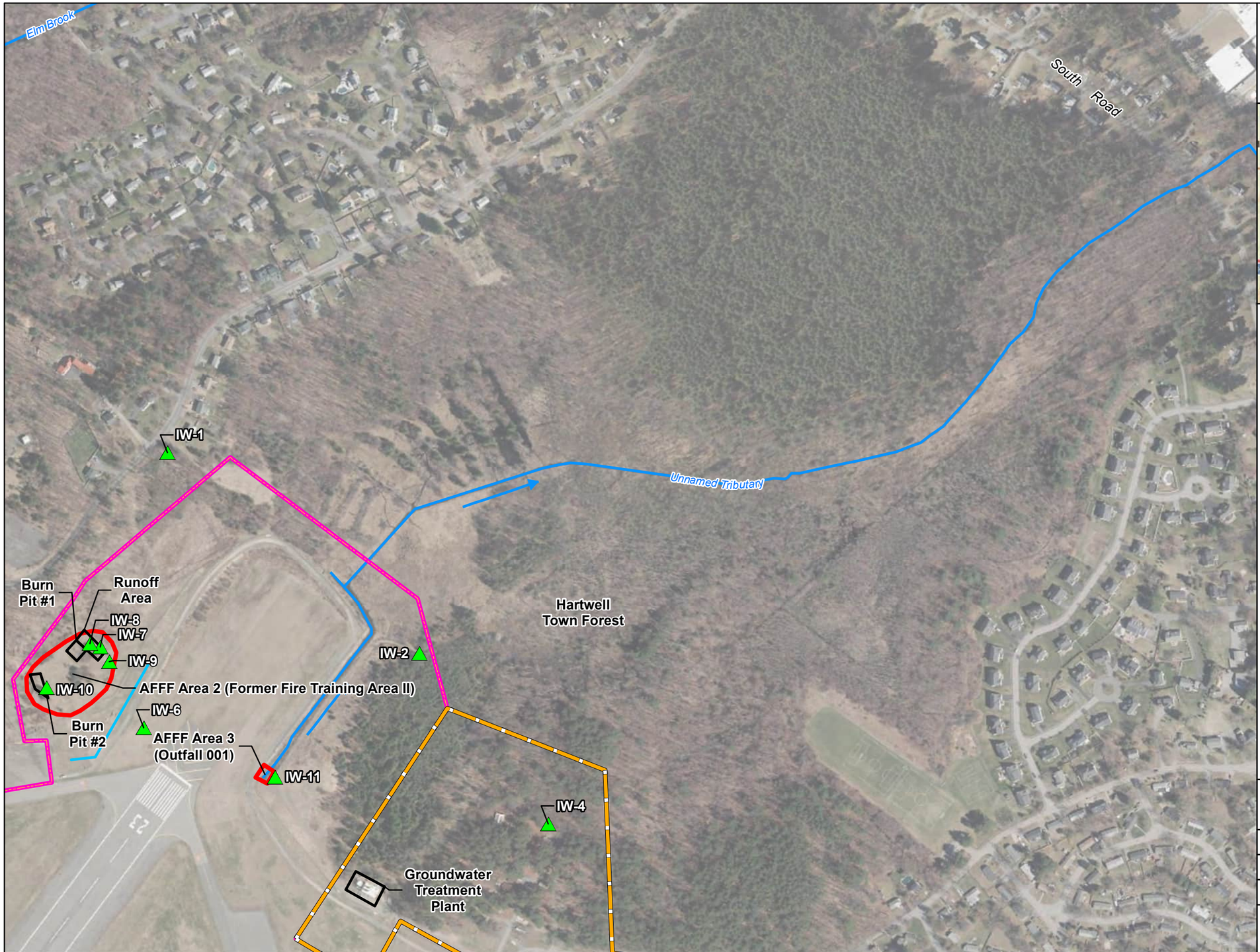

Legend

- Groundwater Interceptor/Extraction Well
- AFFF Area
- Hanscom AFB Boundary
- Approximate Airfield Boundary
- Surface Water
- Groundwater Collection Trench
- Surface Water Flow

N

0 200 400 800 Feet

Figure 3
AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001) Site Map

Hanscom Air Force Base, Middlesex County, MA

GIS BY: JB	12/22/2021
CHK BY: BE	12/22/2021

Source
Imagery from MassGIS, 2019.

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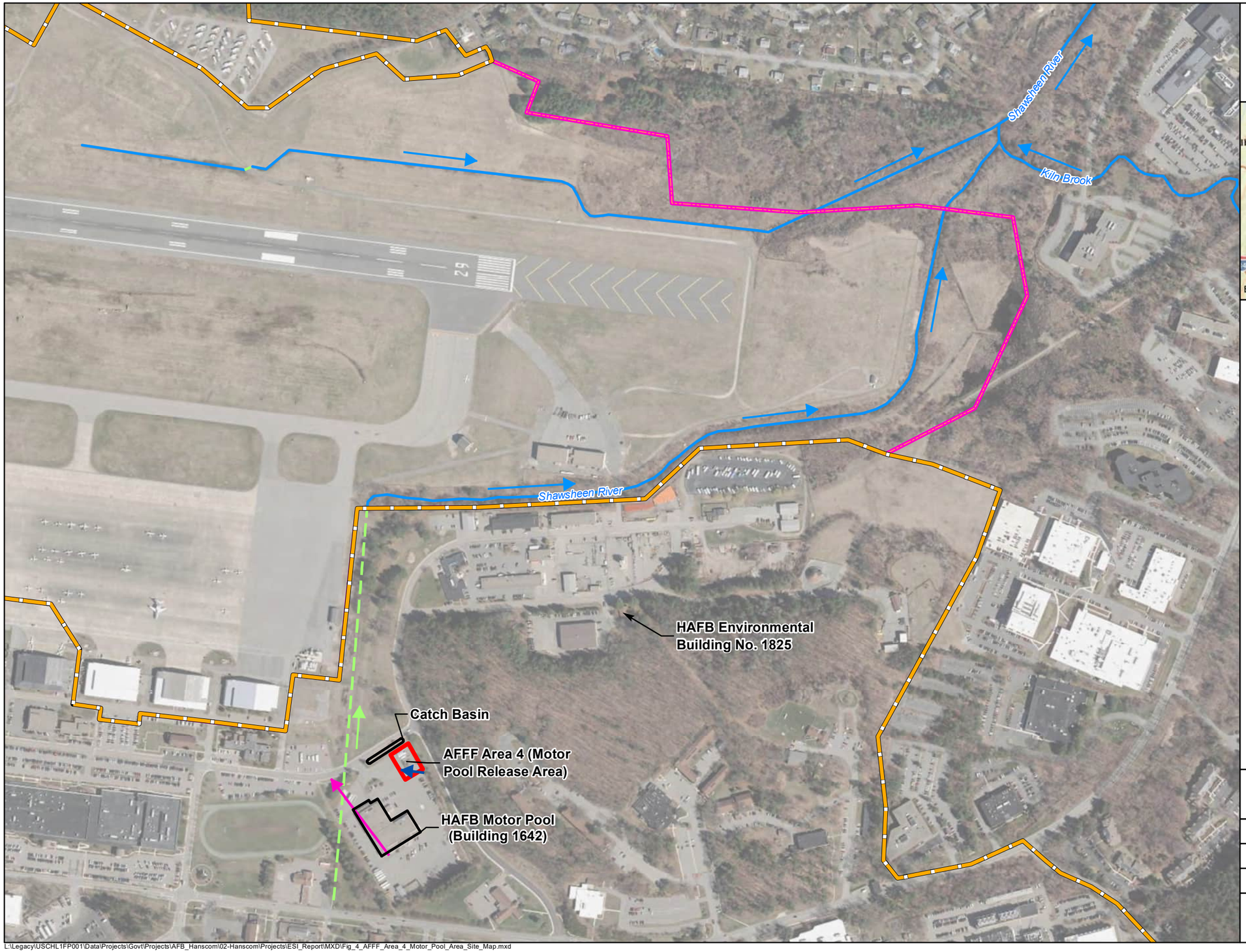

Legend

- AFFF Area
- Hanscom AFB Boundary
- Approximate Airfield Boundary
- Surface Water
- Surface Water Flow
- Segment of Shawsheen River within an Underground Culvert
- Storm Sewer and Culvert Flow Directions
- Shallow Groundwater Flow (Aerostar 2018)
- Shallow Groundwater Flow (EA 1997)

N

0 225 450 900 Feet

Figure 4
AFFF Area 4 (Motor Pool Area) Site Map

Hanscom Air Force Base, Middlesex County, MA

GIS BY: JB	12/23/2021
CHK BY: BE	12/23/2021

Source
Imagery from MassGIS, 2019.

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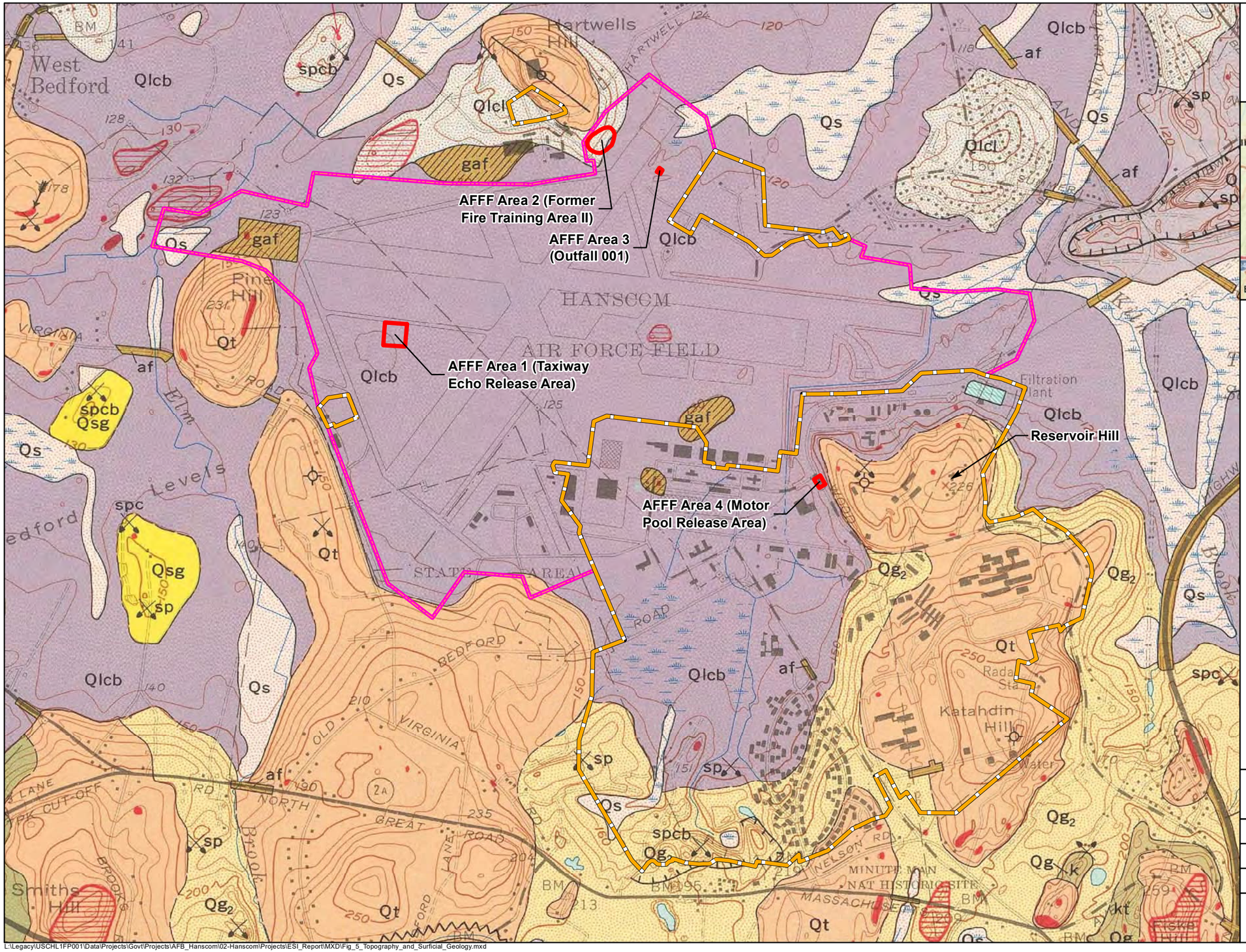

Legend

af - artificial fill
gaf - graded areas
Qg_2 - sand, gravel and silt
Qlcb - lake bottom deposits
Qlch - high stage lake deposits
Qlcl - low stage lake deposits
Qs - swamp deposits
Qsg - sand and gravel
Qt - till

AFFF Area
Hanscom AFB Boundary
Approximate Airfield Boundary
Shallow Depth to Bedrock
Bedrock Exposures

N

0 650 1,300 2,600 Feet

Figure 5
Topography and Surficial Geology

Hanscom Air Force Base, Middlesex County, MA

GIS BY: JB	5/19/2022
CHK BY: BE	5/19/2022

Source: U.S. Geological Survey Map GQ-331. Surficial Geology of the Concord Triangle. Carl Koteff, 1964.

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AFFF Area 2 (Former Fire Training Area II)

AFFF Area 3 (Outfall 001)

AFFF Area 1 (Taxiway Echo Release Area)

AFFF Area 4 (Motor Pool Release Area)

Elm Brook

Unnamed Tributary

Shawsheen River

Shawsheen River

Elm Brook

Elm Brook

Legend

- Groundwater Interceptor/Extraction Well
- AFFF Area
- Hanscom AFB Boundary
- Approximate Airfield Boundary
- Surface Water
- Segment of Shawsheen River within an Underground Culvert
- Surface Water Flow
- Underground Storm Sewer
- Storm Sewer and Culvert Flow Directions
- Above Ground Drainage Ditch
- Above Ground Drainage Ditch Flow Direction

N

0 1,000 2,000 4,000 Feet

Figure 6
Surface Water Flow

Hanscom Air Force Base, Middlesex County, MA

GIS BY: JB	6/29/2022
CHK BY: BE	6/29/2022

Source
Imagery from MassGIS, 2019.

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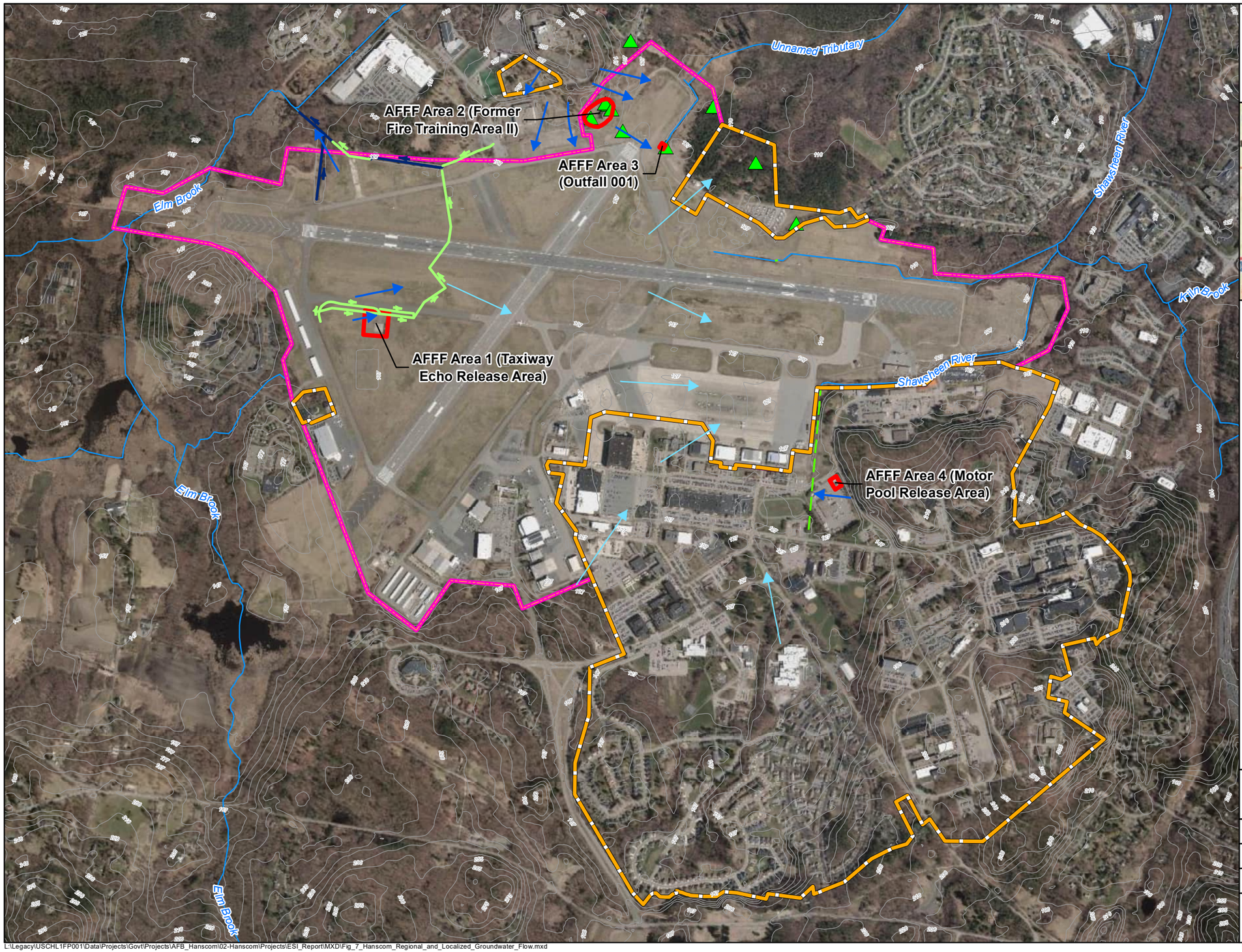

Legend

- Groundwater Interceptor/Extraction Well
- AFFF Area
- Hanscom AFB Boundary
- Approximate Airfield Boundary
- Topographic Contour Line (10 Foot Interval)
- Surface Water
- Segment of Shawsheen River within an Underground Culvert
- Localized Groundwater Flow (a)
- Regional Groundwater Flow (b)
- Underground Storm Sewer
- Storm Sewer and Culvert Flow Directions
- Above Ground Drainage Ditch
- Above Ground Drainage Ditch Flow Direction

(a) Aerostar 2018
(b) Tehama 2020

N

0 600 1,200 2,400 Feet

Figure 7
Regional and Localized Groundwater Flow

Hanscom Air Force Base, Middlesex County, MA

GIS BY: JB	6/29/2022
CHK BY: BE	6/29/2022

Source
Imagery from MassGIS, 2019.

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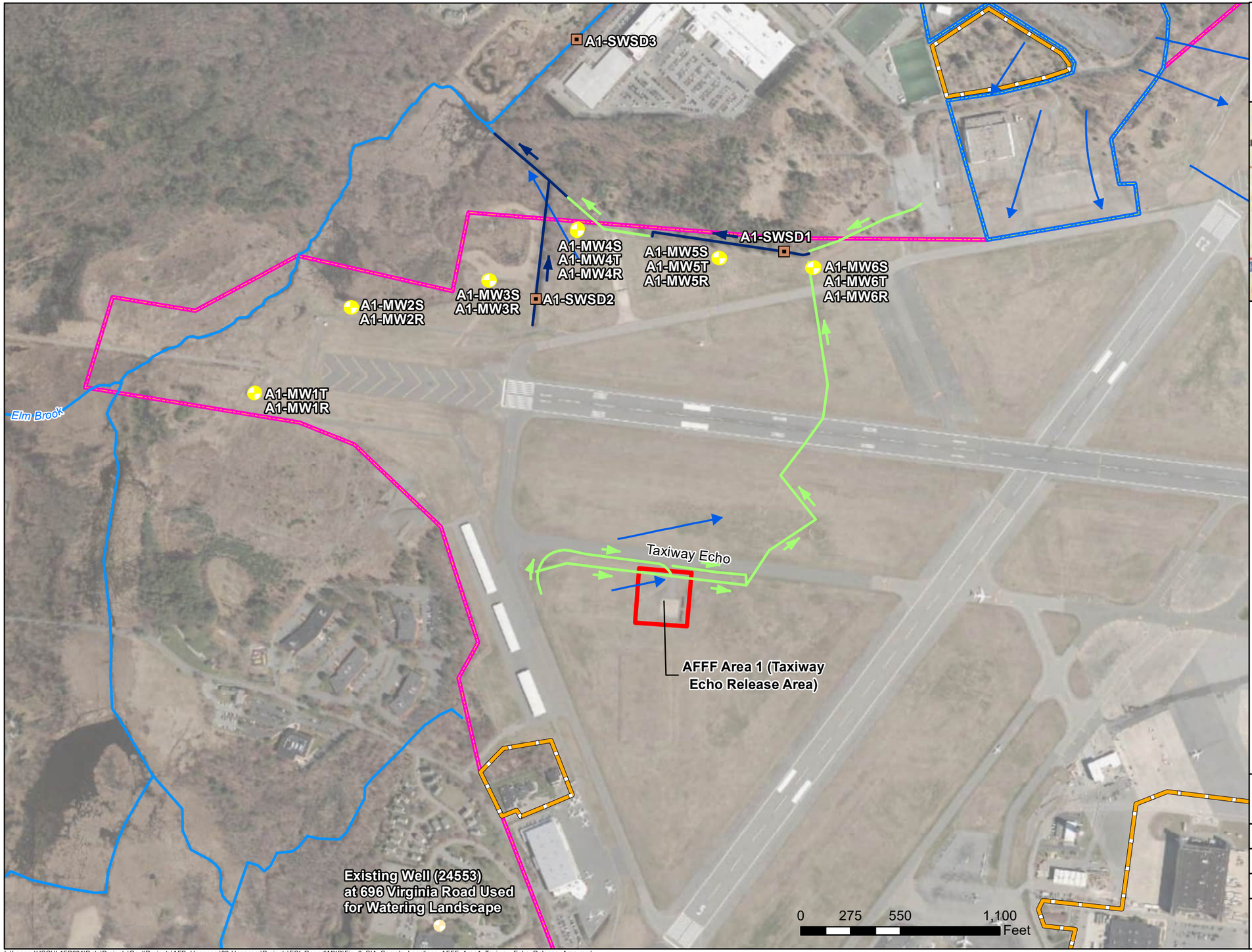

Legend

- Existing Well (24553) at 696 Virginia Road Used for Watering Landscape (Not Sampled)
- SIA New Monitoring Well Location
- SIA Surface Water & Sediment Sample
- AFFF Area
- Hanscom AFB Boundary
- NWIRP Boundary
- Approximate Airfield Boundary
- Underground Storm Sewer (Approximate inlets not shown)
- Storm Sewer Water Flow Direction
- Surface Water
- Above Ground Drainage Ditch
- Above Ground Drainage Ditch Flow Direction

N

S, T, R = ESI New Monitoring Well Screen Interval:
S: Surface Aquifer
T: Till Aquifer
R: Bedrock Aquifer

Figure 8
SIA Sample Locations
AFFF Area 1 (Taxiway Echo Release Area)

Hanscom Air Force Base, Middlesex County, MA

GIS BY: JB	6/29/2022
CHK BY: BE	6/29/2022

Source
Imagery from MassGIS, 2019.

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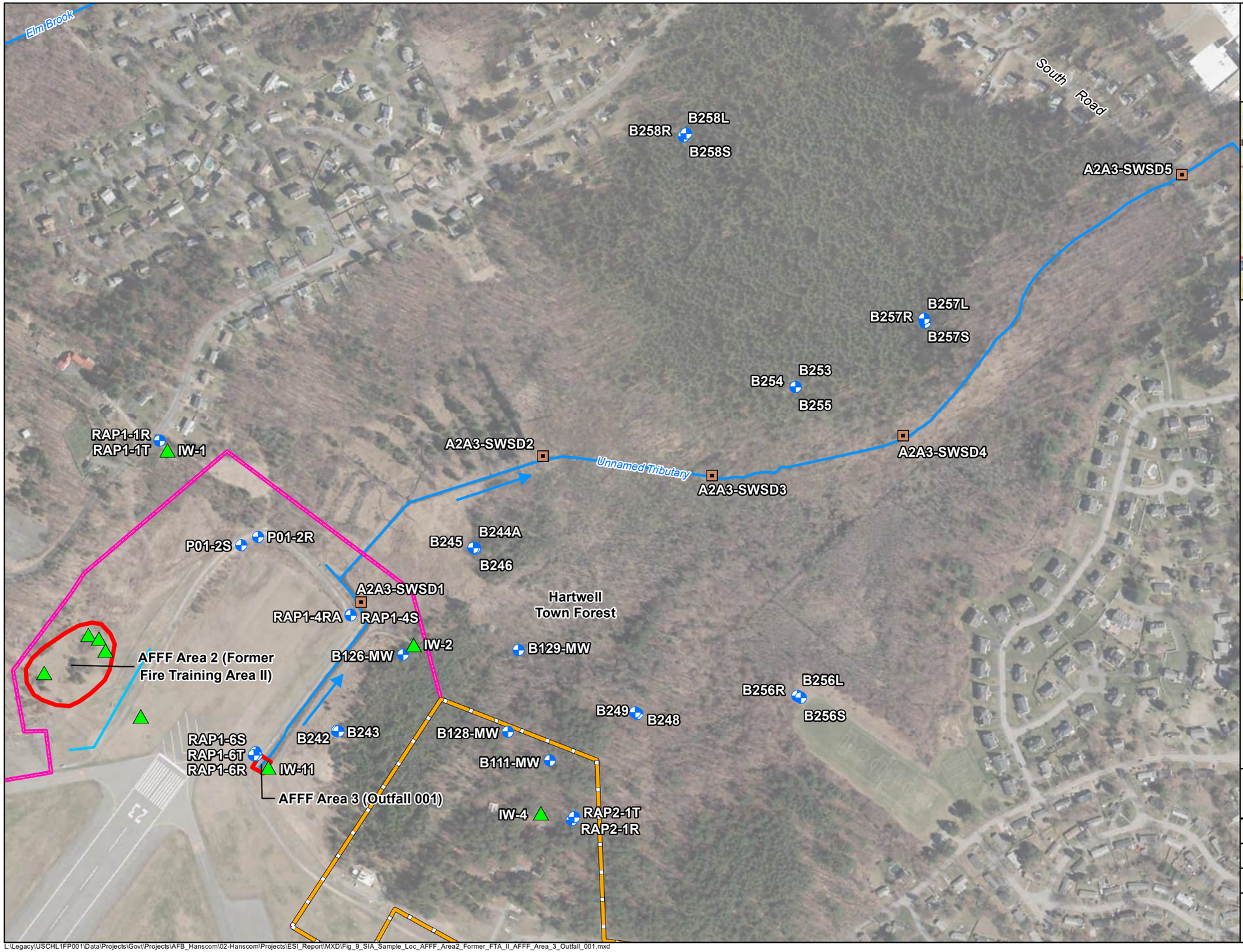

Legend

- Existing Interceptor Well
- Existing Monitoring Well
- SIA Surface Water & Sediment Sample
- AFFF Area
- Hanscom AFB Boundary
- Approximate Airfield Boundary
- Surface Water
- Groundwater Collection Trench
- Surface Water Flow

Note
Groundwater samples were collected from all the wells (blue and green symbols) shown on this figure.

N

0 200 400 800 Feet

Figure 9
SIA Sample Locations AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)

Hanscom Air Force Base, Middlesex County, MA

GIS BY: JB	6/29/2022
CHK BY: BE	6/29/2022

Source
Imagery from MassGIS, 2019.

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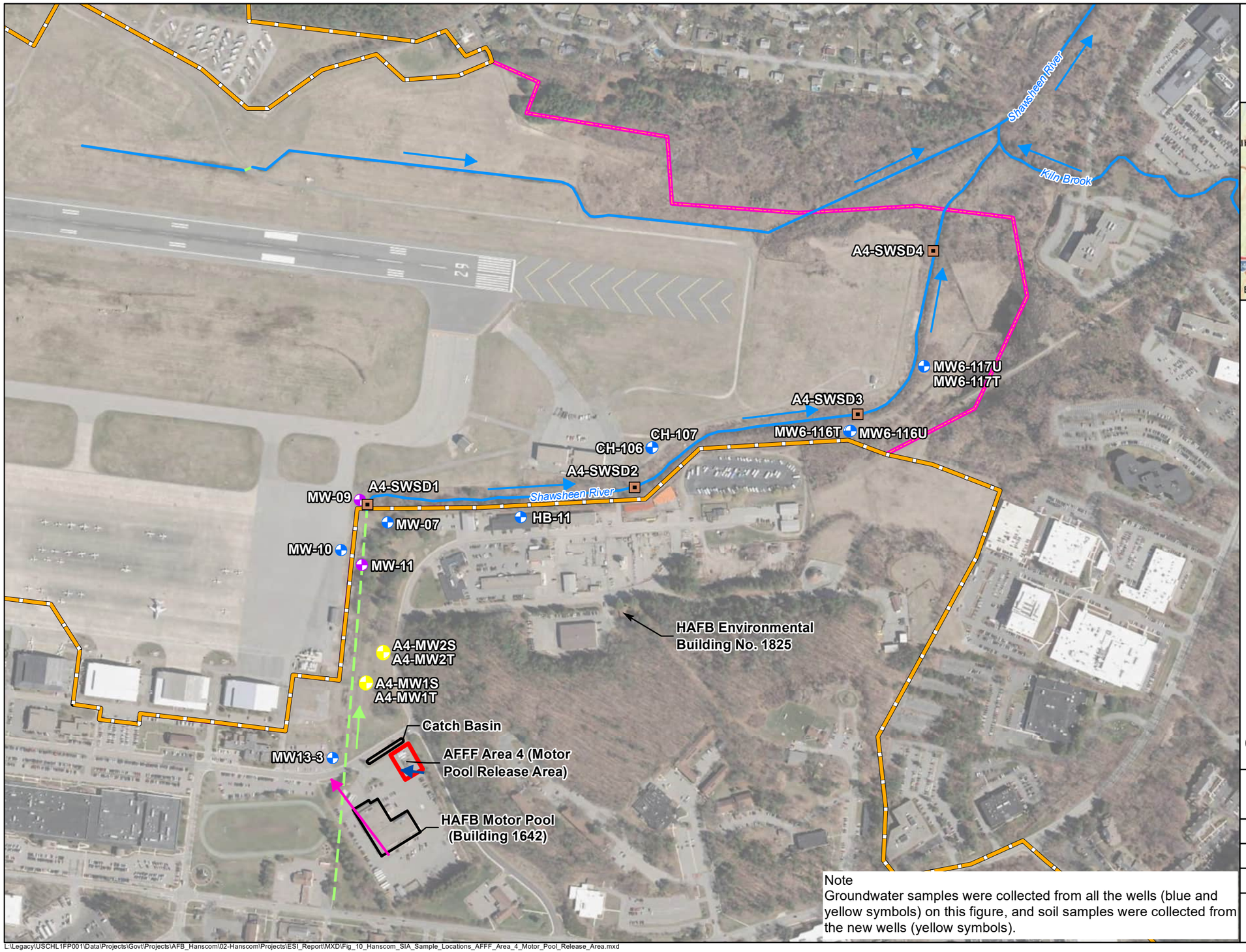

Legend

- Existing Monitoring Well
- Existing Monitoring Well Not Found and Not Sampled
- SIA New Monitoring Well Location
- SIA Surface Water & Sediment Sample
- AFFF Area
- Hanscom AFB Boundary
- Approximate Airfield Boundary
- Surface Water
- Surface Water Flow
- Segment of Shawsheen River within an Underground Culvert
- Storm Sewer and Culvert Flow Directions
- Shallow Groundwater Flow (Aerostar 2018)
- Shallow Groundwater Flow (EA 1997)

S, T = Screen Interval:
S: Surfure Aquifer
T: Till Aquifer

0 225 450 900 Feet

N

Note
Groundwater samples were collected from all the wells (blue and yellow symbols) on this figure, and soil samples were collected from the new wells (yellow symbols).

Figure 10
SIA Sample Locations AFFF Area 4 (Motor Pool Release Area)

Hanscom Air Force Base, Middlesex County, MA

GIS BY: JB	6/29/2022
CHK BY: BE	6/29/2022

Source
Imagery from MassGIS, 2019.

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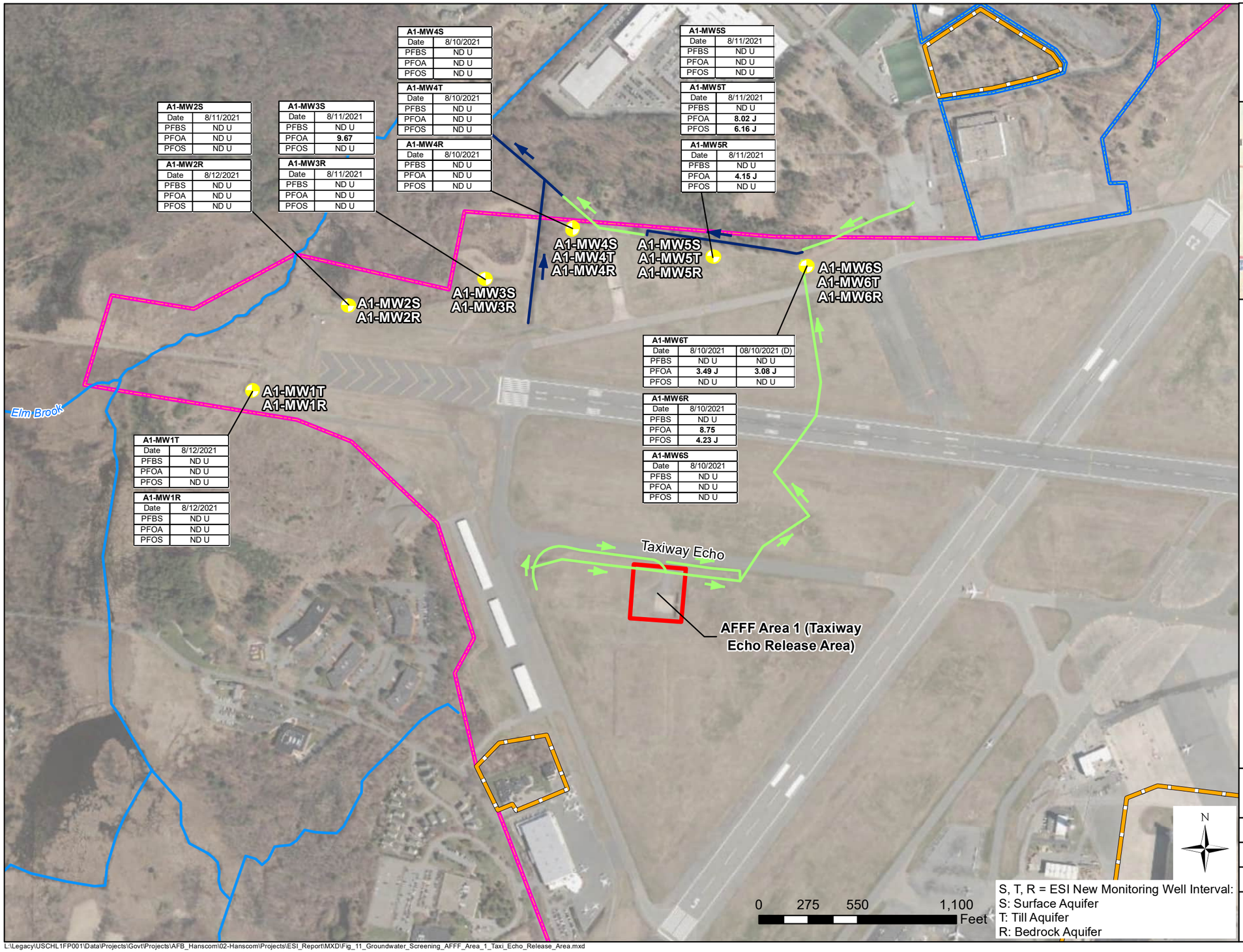

Legend

- SIA New Monitoring Well Location
- AFFF Area
- Hanscom AFB Boundary
- NWIRP Boundary
- Approximate Airfield Boundary
- Underground Storm Sewer (Approximate inlets not shown)
- Storm Sewer Water Flow Direction
- Surface Water
- Above Ground Drainage Ditch
- Above Ground Drainage Ditch Flow Direction

Notes
1. Office of the Secretary of Defense (OSD) Tap Water Screening Levels (SL) presented in OSD PFAS Memo, September 15, 2021.
2. All concentrations in nanograms per liter (ng/L).

PFAS Polyfluoroalkyl Substances
PFBS Perfluorobutanesulfonic Acid
PFOA Perfluorooctanoic Acid
PFOS Perfluorooctane Sulfonate
(D) Field Duplicate
J Estimated Concentration
J+ Estimated Concentration, Biased High
ND U No Detected, Below Detection Limit

Detected concentrations are bolded.

Figure 11
Groundwater Screening
AFFF Area 1 (Taxiway Echo Release Area)

Hanscom Air Force Base, Middlesex County, MA

GIS BY: JB	6/29/2022
CHK BY: BE	6/29/2022

Source
Imagery from MassGIS, 2019.

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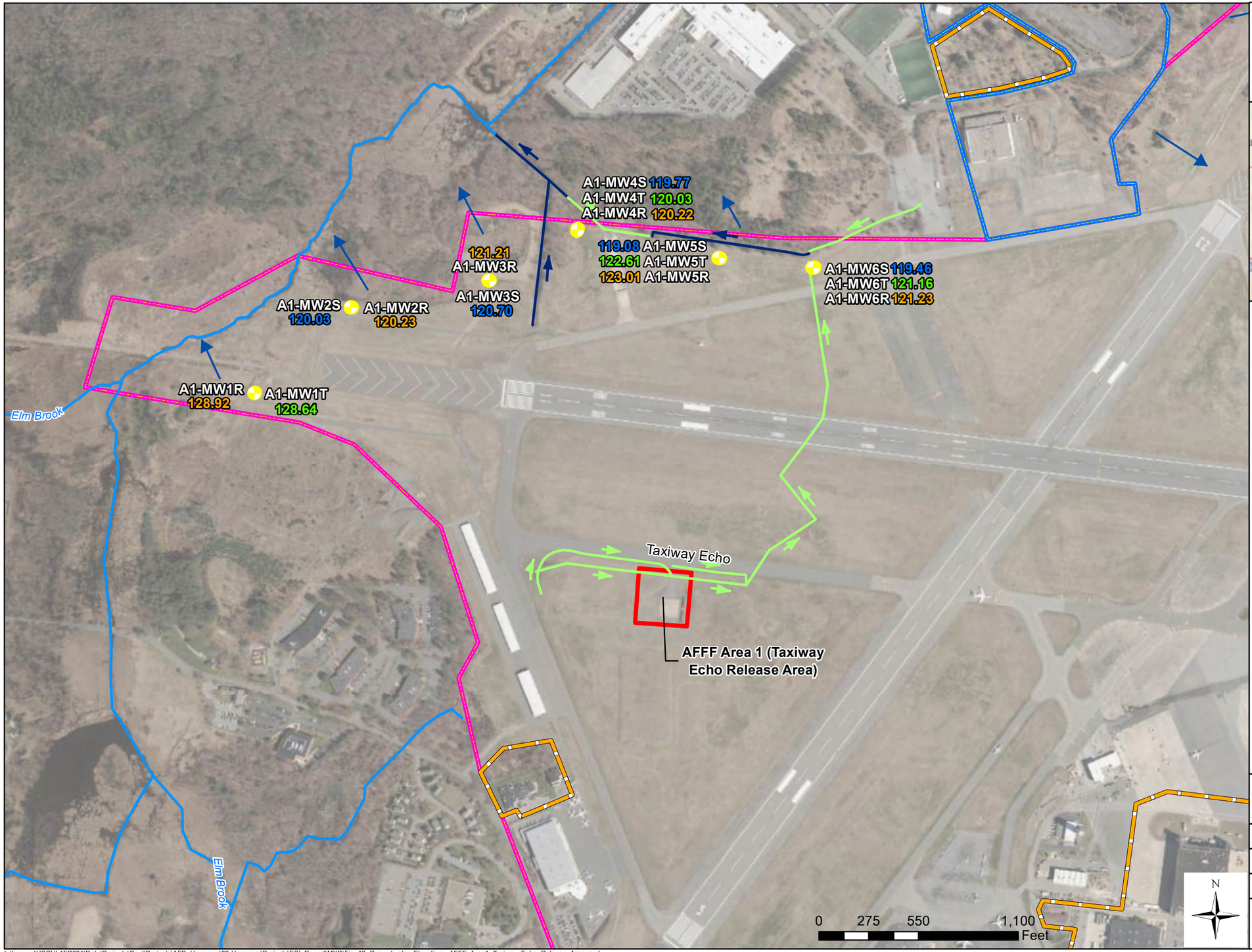

Legend

- 113.87 Bedrock Aquifer Groundwater Elevation
- 115.32 Till Aquifer Groundwater Elevation
- 113.97 Shallow Aquifer Groundwater Elevation
- SIA New Monitoring Well Location
- AFFF Area
- Hanscom AFB Boundary
- NWIRP Boundary
- Approximate Airfield Boundary
- Underground Storm Sewer (Approximate inlets not shown)
- Storm Sewer Water Flow Direction
- Above Ground Drainage Ditch
- Above Ground Drainage Ditch Flow Direction
- Shallow Groundwater Flow

Note
Groundwater elevations are in feet relative to the North American Verical Datum of 1988.
S, T, R = ESI New Monitoring Well Screen Interval:
S: Surface Aquifer
T: Till Aquifer
R: Bedrock Aquifer

Figure 12
Groundwater Elevations
AFFF Area 1 (Taxiway Echo Release Area)

Hanscom Air Force Base, Middlesex County, MA

GIS BY: JB	6/29/2022
CHK BY: BE	6/29/2022

Source
Imagery from MassGIS, 2019.

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Notes
1. All Surface Water (SW) PFAS concentrations in nanograms per liter (ng/L).
2. All Sediment (SD) PFAS concentration in nanograms per gram (ng/g).

PFAS Polyfluoroalkyl Substances
PFBS Perfluorobutanesulfonic Acid
PFOA Perfluorooctanoic Acid
PFOS Perfluorooctane Sulfonate
J Estimated Concentration
ND U No Detected, Below Detection Limit
Detected concentrations are bolded.

A1-SWSD3-SW	
Date	07/07/2021
PFBS	ND U
PFOA	**5.98 J**
PFOS	**12.7**

A1-SWSD3-SD	
Date	07/07/2021
PFBS	ND U
PFOA	ND U
PFOS	ND U

A1-SWSD1-SW	
Date	07/07/2021
PFBS	**5.80 J**
PFOA	**8.17 J**
PFOS	**208**

A1-SWSD1-SD	
Date	07/07/2021
PFBS	ND U
PFOA	ND U
PFOS	ND U

A1-SWSD2-SW	
Date	08/02/2021
PFBS	ND U
PFOA	ND U
PFOS	ND U

A1-SWSD2-SD	
Date	08/02/2021
PFBS	ND U
PFOA	**4.49 J**
PFOS	**7.77 J**

A1-SWSD3
A1-SWSD1
A1-SWSD2
Elm Brook
Taxiway Echo
AFFF Area 1 (Taxiway Echo Release Area)
Elm Brook

Legend

- SIA Surface Water & Sediment Sample
- AFFF Area
- Hanscom AFB Boundary
- NWIRP Boundary
- Approximate Airfield Boundary
- Underground Storm Sewer (Approximate inlets not shown)
- Storm Sewer Water Flow Direction
- Above Ground Drainage Ditch
- Above Ground Drainage Ditch Flow Direction
- Surface Water
- Surface Water Flow
- OSD SL Exceeded

N

0 275 550 1,100 Feet

Figure 13
Surface Water & Sediment Samples
AFFF Area 1 (Taxiway Echo Release Area)

Hanscom Air Force Base, Middlesex County, MA

GIS BY: JB	6/29/2022
CHK BY: BE	6/29/2022

Source
Imagery from MassGIS, 2019.

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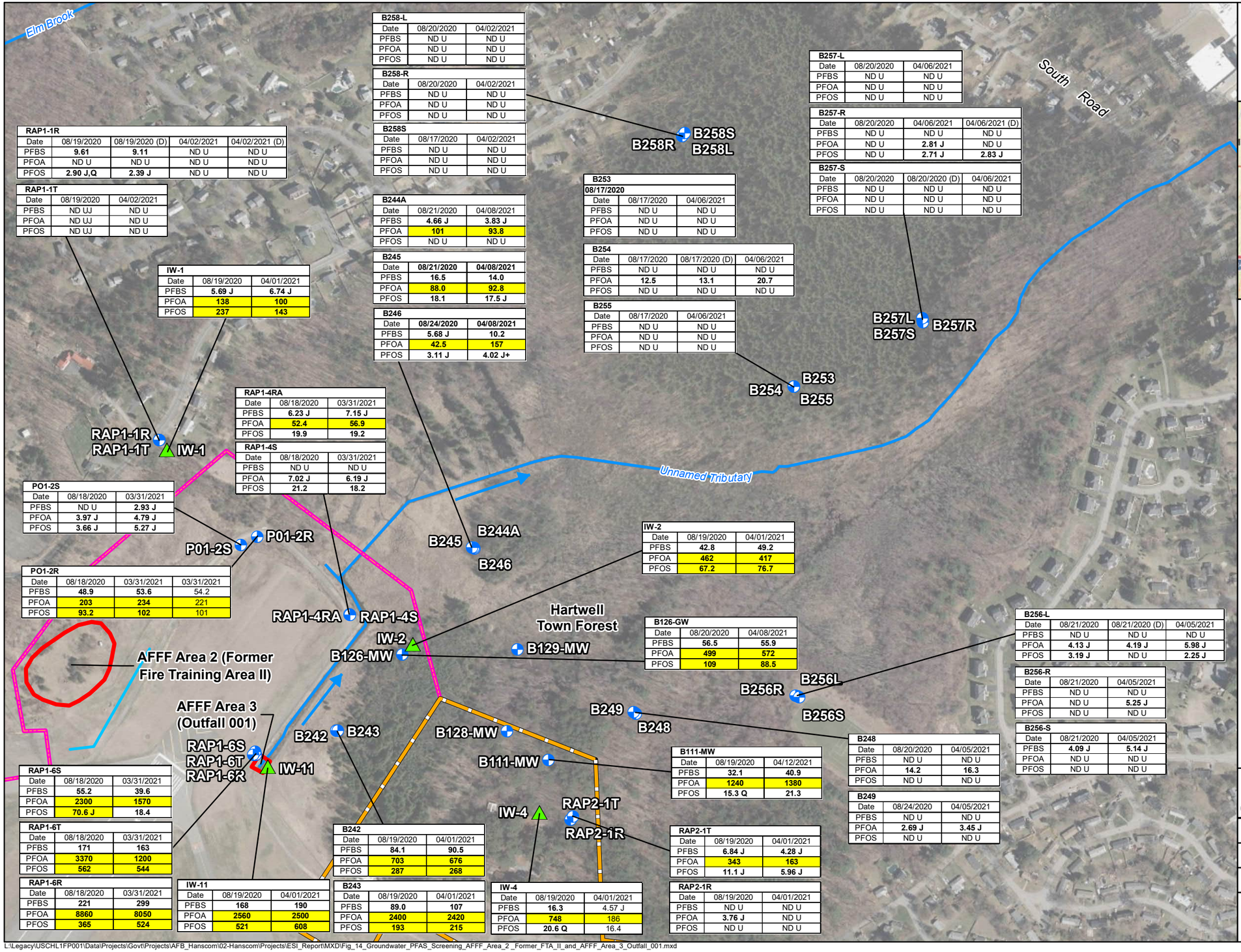


RAP1-1R

Date	08/19/2020	08/19/2020 (D)	04/02/2021	04/02/2021 (D)
PFBS	**9.61**	**9.11**	ND U	ND U
PFOA	ND U	ND U	ND U	ND U
PFOS	**2.90 J,Q**	**2.39 J**	ND U	ND U

RAP1-1T

Date	08/19/2020	04/02/2021
PFBS	ND UJ	ND U
PFOA	ND UJ	ND U
PFOS	ND UJ	ND U

IW-1

Date	08/19/2020	04/01/2021
PFBS	**5.69 J**	**6.74 J**
PFOA	**138**	**100**
PFOS	**237**	**143**

PO1-2S

Date	08/18/2020	03/31/2021
PFBS	ND U	**2.93 J**
PFOA	**3.97 J**	**4.79 J**
PFOS	**3.66 J**	**5.27 J**

PO1-2R

Date	08/18/2020	03/31/2021	03/31/2021
PFBS	**48.9**	**53.6**	54.2
PFOA	**203**	**234**	221
PFOS	**93.2**	**102**	101

RAP1-4RA

Date	08/18/2020	03/31/2021
PFBS	**6.23 J**	**7.15 J**
PFOA	**52.4**	**56.9**
PFOS	**19.9**	**19.2**

RAP1-4S

Date	08/18/2020	03/31/2021
PFBS	ND U	ND U
PFOA	**7.02 J**	**6.19 J**
PFOS	**21.2**	**18.2**

B258-L

Date	08/20/2020	04/02/2021
PFBS	ND U	ND U
PFOA	ND U	ND U
PFOS	ND U	ND U

B258-R

Date	08/20/2020	04/02/2021
PFBS	ND U	ND U
PFOA	ND U	ND U
PFOS	ND U	ND U

B258S

Date	08/17/2020	04/02/2021
PFBS	ND U	ND U
PFOA	ND U	ND U
PFOS	ND U	ND U

B244A

Date	08/21/2020	04/08/2021
PFBS	**4.66 J**	**3.83 J**
PFOA	**101**	**93.8**
PFOS	ND U	ND U

B245

Date	**08/21/2020**	**04/08/2021**
PFBS	**16.5**	**14.0**
PFOA	**88.0**	**92.8**
PFOS	**18.1**	**17.5 J**

B246

Date	**08/24/2020**	**04/08/2021**
PFBS	**5.68 J**	**10.2**
PFOA	**42.5**	**157**
PFOS	**3.11 J**	**4.02 J+**

B253
08/17/2020

Date	08/17/2020	04/06/2021
PFBS	ND U	ND U
PFOA	ND U	ND U
PFOS	ND U	ND U

B254

Date	08/17/2020	08/17/2020 (D)	04/06/2021
PFBS	ND U	ND U	ND U
PFOA	**12.5**	**13.1**	**20.7**
PFOS	ND U	ND U	ND U

B255

Date	08/17/2020	04/06/2021
PFBS	ND U	ND U
PFOA	ND U	ND U
PFOS	ND U	ND U

B257-L

Date	08/20/2020	04/06/2021
PFBS	ND U	ND U
PFOA	ND U	ND U
PFOS	ND U	ND U

B257-R

Date	08/20/2020	04/06/2021	04/06/2021 (D)
PFBS	ND U	ND U	ND U
PFOA	ND U	**2.81 J**	ND U
PFOS	ND U	**2.71 J**	**2.83 J**

B257-S

Date	08/20/2020	08/20/2020 (D)	04/06/2021
PFBS	ND U	ND U	ND U
PFOA	ND U	ND U	ND U
PFOS	ND U	ND U	ND U

IW-2

Date	08/19/2020	04/01/2021
PFBS	**42.8**	**49.2**
PFOA	**462**	**417**
PFOS	**67.2**	**76.7**

B126-GW

Date	08/20/2020	04/08/2021
PFBS	**56.5**	**55.9**
PFOA	**499**	**572**
PFOS	**109**	**88.5**

B256-L

Date	08/21/2020	08/21/2020 (D)	04/05/2021
PFBS	ND U	ND U	ND U
PFOA	**4.13 J**	**4.19 J**	**5.98 J**
PFOS	**3.19 J**	ND U	**2.25 J**

B256-R

Date	08/21/2020	04/05/2021
PFBS	ND U	ND U
PFOA	ND U	**5.25 J**
PFOS	ND U	ND U

B256-S

Date	08/21/2020	04/05/2021
PFBS	**4.09 J**	**5.14 J**
PFOA	ND U	ND U
PFOS	ND U	ND U

B248

Date	08/20/2020	04/05/2021
PFBS	ND U	ND U
PFOA	**14.2**	**16.3**
PFOS	ND U	ND U

B249

Date	08/24/2020	04/05/2021
PFBS	ND U	ND U
PFOA	**2.69 J**	**3.45 J**
PFOS	ND U	ND U

B111-MW

Date	08/19/2020	04/12/2021
PFBS	**32.1**	**40.9**
PFOA	**1240**	**1380**
PFOS	**15.3 Q**	**21.3**

RAP1-6S

Date	08/18/2020	03/31/2021
PFBS	**55.2**	**39.6**
PFOA	**2300**	**1570**
PFOS	**70.6 J**	**18.4**

RAP1-6T

Date	08/18/2020	03/31/2021
PFBS	**171**	**163**
PFOA	**3370**	**1200**
PFOS	**562**	**544**

RAP1-6R

Date	08/18/2020	03/31/2021
PFBS	**221**	**299**
PFOA	**8860**	**8050**
PFOS	**365**	**524**

IW-11

Date	08/19/2020	04/01/2021
PFBS	**168**	**190**
PFOA	**2560**	**2500**
PFOS	**521**	**608**

B242

Date	08/19/2020	04/01/2021
PFBS	**84.1**	**90.5**
PFOA	**703**	**676**
PFOS	**287**	**268**

B243

Date	08/19/2020	04/01/2021
PFBS	**89.0**	**107**
PFOA	**2400**	**2420**
PFOS	**193**	**215**

IW-4

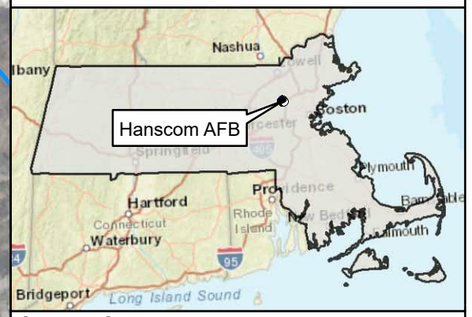
Date	08/19/2020	04/01/2021
PFBS	**16.3**	4.57 J
PFOA	**748**	186
PFOS	**20.6 Q**	16.4

RAP2-1T

Date	08/19/2020	04/01/2021
PFBS	**6.84 J**	**4.28 J**
PFOA	**343**	**163**
PFOS	**11.1 J**	**5.96 J**

RAP2-1R

Date	08/19/2020	04/01/2021
PFBS	ND U	ND U
PFOA	**3.76 J**	ND U
PFOS	ND U	ND U



Legend

- Exiting Interceptor Well
- Existing Monitoring Well
- AFFF Area
- Hanscom AFB Boundary
- Approximate Airfield Boundary
- Surface Water
- Groundwater Collection Trench
- Surface Water Flow
- OSD SL Exceeded

Notes

1. Office of the Secretary of Defense (OSD) Tap Water Screening Levels (SL) presented in OSD PFAS Memo, September 15, 2021.
2. All concentrations in nanograms per liter (ng/L).

PFAS Polyfluoroalkyl Substances
PFBS Perfluorobutanesulfonic Acid
PFOA Perfluorooctanoic Acid
PFOS Perfluorooctane Sulfonate
(D) Field Duplicate
J Estimated Concentration
J+ Estimated Concentration, Biased High
ND U No Detected, Below Detection Limit
Detected concentrations are bolded.

N

0 200 400 800 Feet

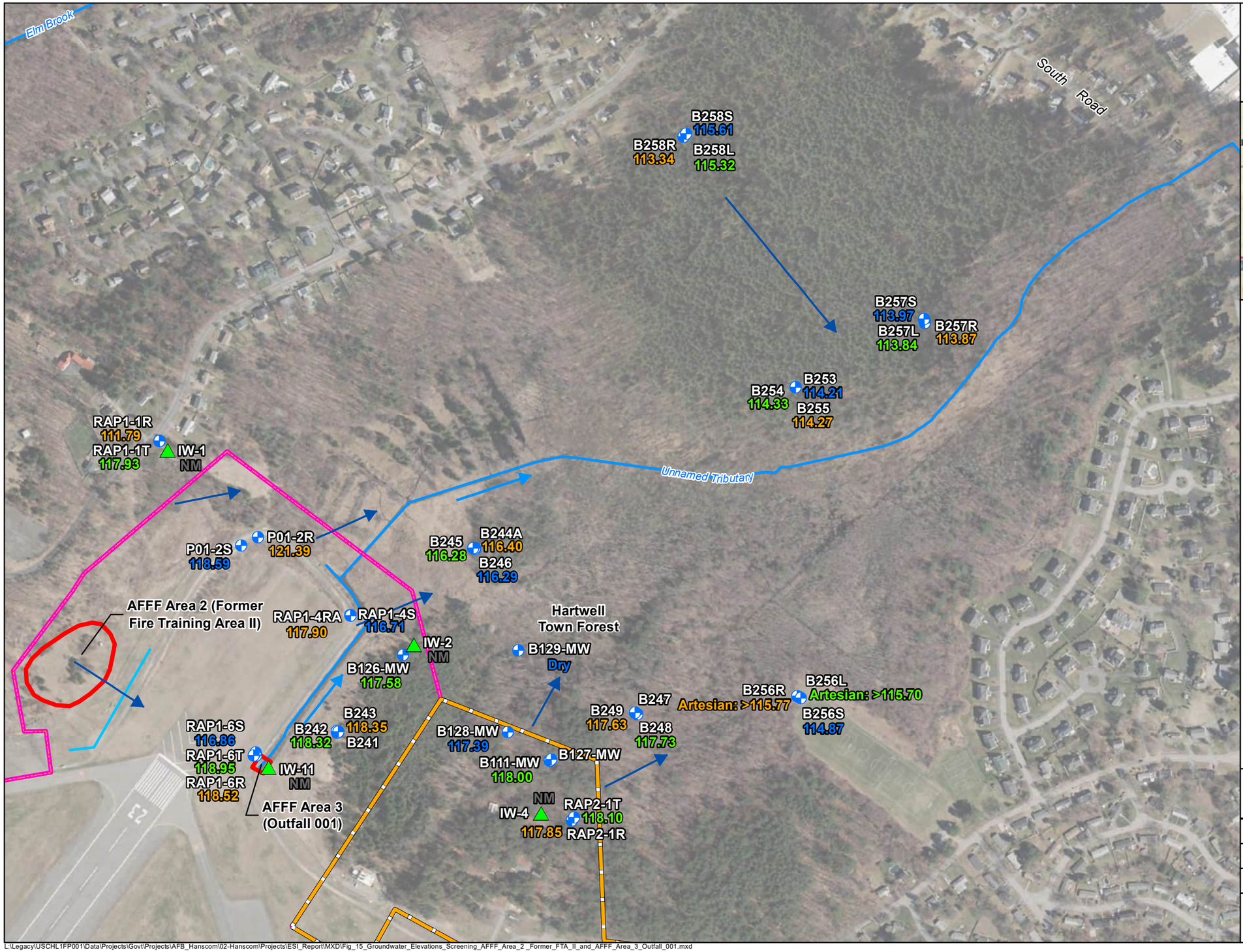
Figure 14
Groundwater PFAS Screening, AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)

Hanscom Air Force Base, Middlesex County, MA

GIS BY: JB	12/28/2021
CHK BY: BE	12/28/2021

Source
Imagery from MassGIS, 2019.

L:\Legacy\USCHL1FP001\Data\Projects\Govt\Projects\AFB_Hanscom\02-Hanscom\Projects\ESI_Report\MXD\Fig_14_Groundwater_PFAS_Screening_AFFF_Area_2 _Former_FTA_II_and_AFFF_Area_3_Outfall_001.mxd



Legend

- 113.87 Bedrock Aquifer Groundwater Elevation
- 115.32 Till Aquifer Groundwater Elevation
- 113.97 Shallow Aquifer Groundwater Elevation
- NM Not Measured
- Exiting Interceptor Well
- Existing Monitoring Well
- AFFF Area
- Hanscom AFB Boundary
- Approximate Airfield Boundary
- Surface Water
- Groundwater Collection Trench
- Surface Water Flow
- Shallow Groundwater Flow

Note
Groundwater elevations are in feet relative to the North American Vertical Datum of 1988.

N

0 200 400 800 Feet

Figure 15
Groundwater Elevations, AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)

Hanscom Air Force Base, Middlesex County, MA

GIS BY: JB	12/29/2021
CHK BY: BE	12/29/2021

Source
Imagery from MassGIS, 2019.

L:\Legacy\USCHL1FP001\Data\Projects\Govt\Projects\AFB_Hanscom\02-Hanscom\Projects\ESI_Report\MXD\Fig_15_Groundwater_Elevations_Screening_AFFF_Area_2_Former_FTA_II_and_AFFF_Area_3_Outfall_001.mxd

Notes
1. All Surface Water (SW) PFAS concentrations in nanograms per liter (ng/L).
2. All Sediment (SD) PFAS concentration in nanograms per gram (ng/g).

PFAS Polyfluoroalkyl Substances
PFBS Perfluorobutanesulfonic Acid
PFOA Perfluorooctanoic Acid
PFOS Perfluorooctane Sulfonate
J Estimated Concentration
ND U No Detected, Below Detection Limit
Detected concentrations are bolded.

South Road

A2A3-SWSD5

A2A3-SWSD5-SW	
Date	08/03/2021
PFBS	**4.51 J**
PFOA	**43.8 J**
PFOS	**10.5 J**

A2A3-SWSD5-SD	
Date	08/03/2021
PFBS	ND U
PFOA	**1.69 J**
PFOS	**3.83 J**

A2A3-SWSD3-SW	
Date	08/04/2021
PFBS	**7.62 J**
PFOA	**62.1 J**
PFOS	**17.4 J**

A2A3-SWSD3-SD	
Date	08/04/2021
PFBS	ND U
PFOA	**0.605**
PFOS	ND U

A2A3-SWSD2-SW	
Date	08/04/2021
PFBS	**7.19 J**
PFOA	**61.2 J**
PFOS	**16.6 J**

A2A3-SWSD2-SD	
Date	08/04/2021
PFBS	ND U
PFOA	**3.17**
PFOS	ND U

A2A3-SWSD1-SW	
Date	08/04/2021
PFBS	**5.84 J**
PFOA	**57.7 J**
PFOS	**16.6 J**

A2A3-SWSD1-SD	
Date	08/04/2021
PFBS	ND U
PFOA	ND U
PFOS	ND U

A2A3-SWSD1
A2A3-SWSD2
A2A3-SWSD3
A2A3-SWSD4
A2A3-SWSD5

Unnamed Tributary

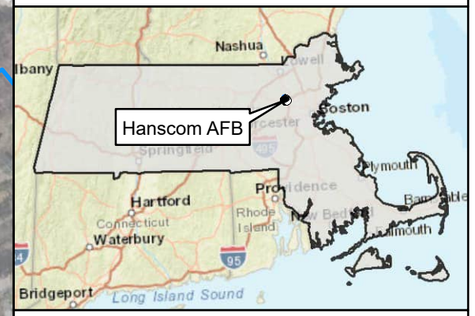
A2A3-SWSD4-SW	
Date	08/04/2021
PFBS	**6.68 J**
PFOA	**59.3 J**
PFOS	**14.5 J**

A2A3-SWSD4-SD	
Date	08/04/2021
PFBS	ND U
PFOA	**0.855**
PFOS	ND U

Hartwell Town Forest

AFFF Area 2 (Former Fire Training Area II)

AFFF Area 3 (Outfall 001)



Legend

- SIA Surface Water & Sediment Sample
- AFFF Area
- Hanscom AFB Boundary
- Approximate Airfield Boundary
- Surface Water
- Groundwater Collection Trench
- Surface Water Flow
- RSL Exceeded

N

0 200 400 800 Feet

Figure 16
Surface Water & Sediment Samples, AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)

Hanscom Air Force Base, Middlesex County, MA

GIS BY: JB	6/29/2022
CHK BY: BE	6/29/2022

Source
Imagery from MassGIS, 2019.

L:\Legacy\USCHL1FP001\Data\Projects\Govt\Projects\AFB_Hanscom\02-Hanscom\Projects\ESI_Report\MXD\Fig_16_Surface_Water_Sediment_Samples_AFFF_Area_2_Former_FTA_II_and_AFFF_Area_3_Outfall_001.mxd

Notes
1. Office of the Secretary of Defense (OSD) Tap Water Screening Levels (SL) presented in OSD PFAS Memo, September 15, 2021.
2. All concentrations in nanograms per liter (ng/L).

PFAS Polyfluoroalkyl Substances
PFBS Perfluorobutanesulfonic Acid
PFOA Perfluorooctanoic Acid
PFOS Perfluorooctane Sulfonate
(D) Field Duplicate
J Estimated Concentration
J+ Estimated Concentration, Biased High
ND U No Detected, Below Detection Limit
Detected concentrations are bolded.

CH-106			
Date	08/25/2020	04/09/2021	04/09/2021 (D)
PFBS	**3.92 J**	**4.83 J**	**3.90 J**
PFOA	**16.6**	**17.9**	**19.7**
PFOS	**143**	**122**	**135**

CH-107		
Date	08/25/2020	04/09/2021
PFBS	**144**	**848**
PFOA	**147**	**963**
PFOS	**3360**	**31300**

MW6-117U		
Date	08/25/2020	04/07/2021
PFBS	**3.59 J**	**3.17 J**
PFOA	**9.34**	ND U
PFOS	**62.4**	**7.62 J**

MW6-117T		
Date	08/25/2020	04/07/2021
PFBS	**20.4**	**17.9**
PFOA	**104**	**90.7**
PFOS	**251**	**222**

MW-10		
Date	08/26/2020	04/09/2021
PFBS	**76.4**	74.1
PFOA	**239**	35.5
PFOS	**1060**	30.6

MW-07		
Date	8/24/2020	04/07/2021
PFBS	**6.29 J**	**2.15 J**
PFOA	**36.3**	ND U
PFOS	ND U	ND U

A4-MW2S	
Date	08/12/2021
PFBS	ND U
PFOA	**9.81**
PFOS	**8.74 J**

A4-MW2T	
Date	08/11/2021
PFBS	ND U
PFOA	**4.31 J**
PFOS	**35.2 J**

A4-MW1S		
Date	08/12/2021	08/12/2021 (D)
PFBS	**4.84 J**	ND U
PFOA	**5.97 J**	**5.47 J**
PFOS	**109**	**121**

A4-MW1T	
Date	08/12/2021
PFBS	ND U
PFOA	ND U
PFOS	ND U

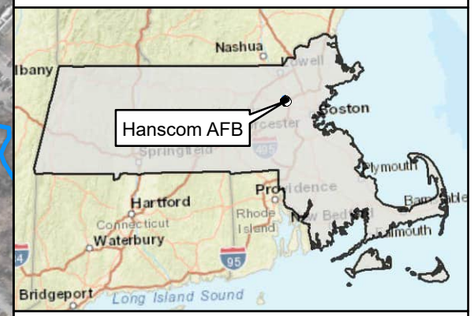
MW6-116T			
Date	08/25/2020	08/25/2020 (D)	04/07/2021
PFBS	**12.3**	**11.0**	**12.4**
PFOA	**36.4**	**33.4**	**33.0**
PFOS	**189**	**177**	**185**

MW6-116U		
Date	08/25/2020	04/07/2021
PFBS	ND U	ND U
PFOA	**7.98 J**	**7.08 J**
PFOS	**115**	**29.8**

HB-11		
Date	08/24/2020	04/07/2021
PFBS	**2.89 J**	**2.31 J**
PFOA	**15.4**	**8.66**
PFOS	**33.7**	**26.7**

MW13-3		
Date	08/24/2020	04/09/2021
PFBS	**276 J-**	**269**
PFOA	**332 J**	**1200**
PFOS	**1460**	**6860**

Shawsheen River
Kiln Brook
CH-106
CH-107
MW6-116T
MW6-116U
MW6-117U
MW6-117T
MW-07
HB-11
MW-10
A4-MW2S
A4-MW2T
A4-MW1S
A4-MW1T
MW13-3
Catch Basin
AFFF Area 4 (Motor Pool Release Area)
HAFB Motor Pool (Building 1642)
29



Legend

- Existing Monitoring Well
- SIA New Monitoring Well Location
- AFFF Area
- Hanscom AFB Boundary
- Approximate Airfield Boundary
- Surface Water
- Surface Water Flow
- Segment of Shawsheen River within an Underground Culvert
- Storm Sewer and Culvert Flow Directions
- OSD SL Exceeded

N

0 225 450 900 Feet

Figure 17
Groundwater PFAS Screening, AFFF Area 4 (Motor Pool Release Area)

Hanscom Air Force Base, Middlesex County, MA

GIS BY: JB	6/29/2022
CHK BY: BE	6/29/2022

Source
Imagery from MassGIS, 2019.

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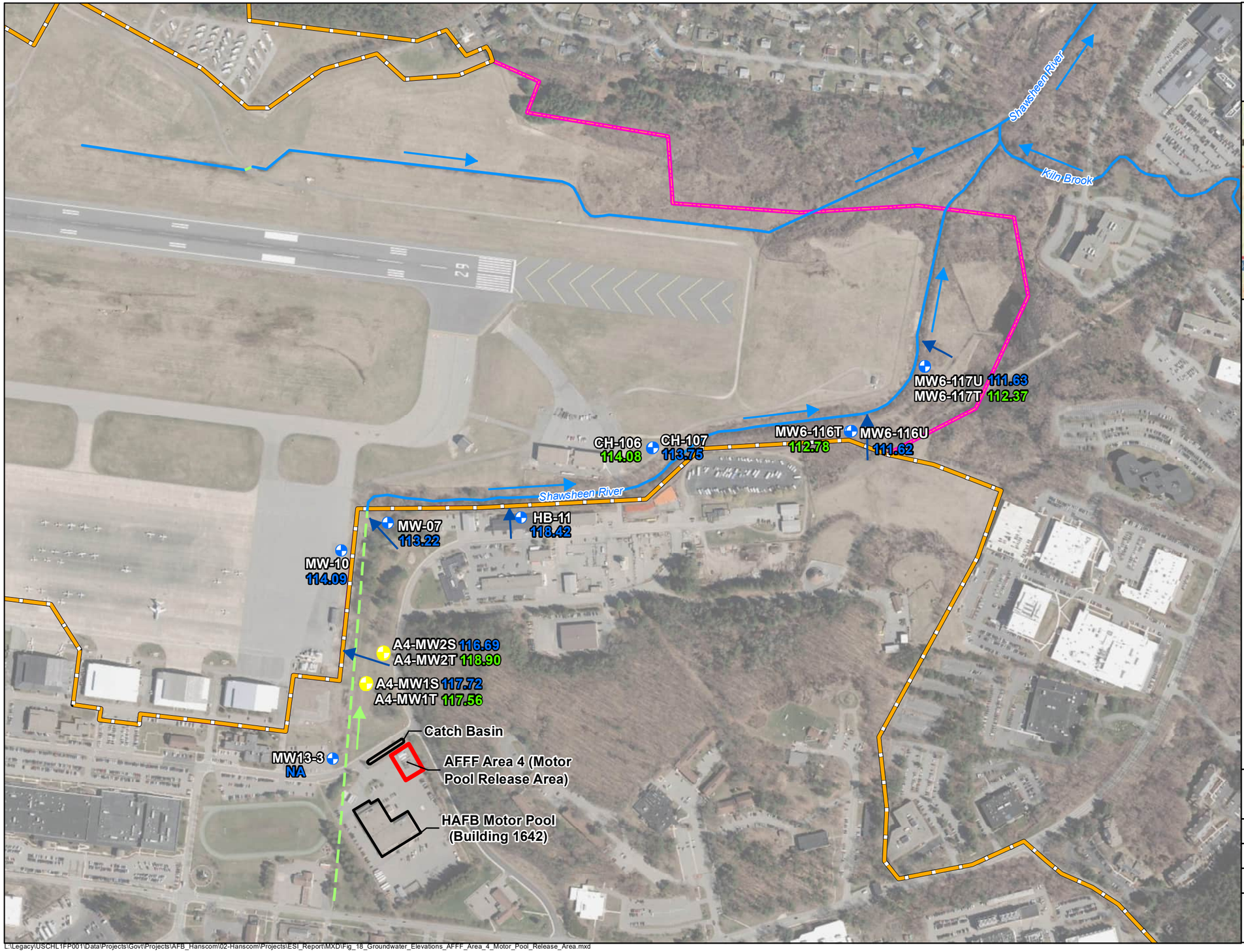

Legend

115.32 Till Aquifer Groundwater Elevation

113.97 Shallow Aquifer Groundwater Elevation

- Existing Monitoring Well
- SIA New Monitoring Well Location
- AFFF Area
- Hanscom AFB Boundary
- Approximate Airfield Boundary
- Surface Water
- Surface Water Flow
- Segment of Shawsheen River within an Underground Culvert
- Storm Sewer and Culvert Flow Directions
- Shallow Groundwater Flow

NA - Top of Casing Elevation Not Available.

Note
Groundwater elevations are in feet relative to the North American Vertical Datum of 1988.

N

0 225 450 900 Feet

Figure 18
Groundwater Elevations, AFFF Area 4 (Motor Pool Release Area)

Hanscom Air Force Base, Middlesex County, MA

GIS BY: JB	6/29/2022
CHK BY: BE	6/29/2022

Source
Imagery from MassGIS, 2019.

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Notes
1. All Surface Water (SW) PFAS concentrations in nanograms per liter (ng/L).
2. All Sediment (SD) PFAS concentration in nanograms per gram (ng/g).

PFAS Polyfluoroalkyl Substances
PFBS Perfluorobutanesulfonic Acid
PFOA Perfluorooctanoic Acid
PFOS Perfluorooctane Sulfonate
(D) Field Duplicate
J Estimated Concentration
ND U No Detected, Below Detection Limit
Detected concentrations are bolded.

A4-SWSD1-SW		
Date	08/03/2021	08/03/2021 (D)
PFBS	**5.98 J**	**5.12 J**
PFOA	**11.2 J**	**13.2 J**
PFOS	**62.8 J**	**75.3 J**

A4-SWSD1-SD		
Date	08/03/2021	08/03/2021 (D)
PFBS	ND U	ND U
PFOA	ND U	ND U
PFOS	**2.78**	**1.89**

A4-SWSD4-SW	
Date	08/02/2021
PFBS	**25.8 J**
PFOA	**33.1 J**
PFOS	**346 J**

A4-SWSD4-SD	
Date	08/02/2021
PFBS	ND U
PFOA	ND U
PFOS	**0.937 J**

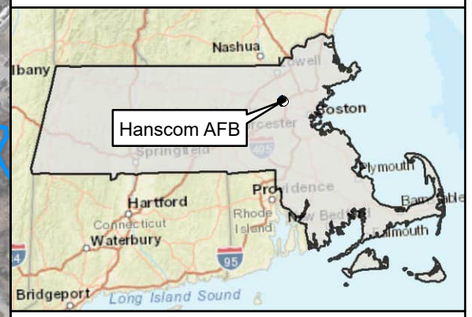
A4-SWSD3-SW	
Date	08/02/2021
PFBS	**10.8 J**
PFOA	**36.8 J**
PFOS	**348 J**

A4-SWSD3-SD	
Date	08/02/2021
PFBS	ND U
PFOA	ND U
PFOS	**1.53**

A4-SWSD2-SW		
Date	08/03/2021	08/03/2021 (D)
PFBS	**7.67 J**	**6.84 J**
PFOA	**27.2 J**	**25.3 J**
PFOS	**164 J**	**128 J**

A4-SWSD2-SD		
Date	08/03/2021	08/03/2021 (D)
PFBS	ND U	ND U
PFOA	ND U	ND U
PFOS	**2.11**	**5.59**

A4-SWSD1
A4-SWSD2
A4-SWSD3
A4-SWSD4
Shawsheen River
Kiln Brook
Catch Basin
AFFF Area 4 (Motor Pool Release Area)
HAFB Motor Pool (Building 1642)



Legend

- SIA Surface Water & Sediment Sample
- AFFF Area
- Hanscom AFB Boundary
- Approximate Airfield Boundary
- Surface Water
- Surface Water Flow
- Segment of Shawsheen River within an Underground Culvert
- Storm Sewer and Culvert Flow Directions
- RSL Exceeded

N

0 225 450 900 Feet

Figure 19
Surface Water & Sediment Samples, AFFF Area 4 (Motor Pool Release Area)

Hanscom Air Force Base, Middlesex County, MA

GIS BY: JB	6/29/2022
CHK BY: BE	6/29/2022

Source
Imagery from MassGIS, 2019.

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Tables

Table 1
Twenty-four Analyzed PFAS
Groundwater, Soil, Surface Water and Sediment

Analyte	Abbreviation
4:2 fluorotelomer sulfonate	4:2 FTS
6:2 fluorotelomer sulfonate	6:2 FTS
8:2 fluorotelomer sulfonate	8:2 FTS
perfluorooctane sulfonamide	FOSA
N-ethyl perfluorooctane- sulfonamidoacetic acid	NEtFOSAA
N-methyl perfluorooctanesulfonamidoacetic acid	NMeFOSAA
perfluorobutanoic acid	PFBA
perfluorobutanesulfonic acid	PFBS
perfluorodecanoic acid	PFDA
perfluorododecanoic acid	PFDoA
perfluorodecane sulfonic acid	PFDS
perfluoroheptanoic acid	PFHpA
perfluoroheptane sulfonic acid	PFHpS
perfluorohexanoic acid	PFHxA
perfluorohexanesulfonic acid	PFHxS
perfluorononanoic acid	PFNA
perfluorononane sulfonic acid	PFNS
perfluorooctanoic acid	PFOA
perfluorooctane sulfonate	PFOS
perfluoropentanoic acid	PFPeA
perfluoropentane sulfonic acid	PFPeS
perfluorotetradecanoic acid	PFTeDA
perfluorotridecanoic acid	PFTrDA
perfluoro-n-undecanoic acid	PFUnDA

Table 2
Monitoring Well Construction Summary
AFFF Area 1 (Taxiway Echo Release Area), AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001), and AFFF Area 4 (Motor Pool Release Area)
Hanscom AFB

Well	AFFF Area	Well Vintage	Aquifer Screened	Riser Material / Diameter (in)	Screen Slot Size (in)	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Screen Length (ft)	Surface Type	Coordinates (Easting)	Coordinates (Northing)	Elevation (TOC)
AFFF Area 1 (Taxiway Echo Release Area)												
A1-MW1T	1	New	Till	40PVC / 2	0.01	3.00	13.00	10.00	Flush	**708666.456**	**2997024.614**	**131.45**
A1-MW1R	1	New	Bedrock	40PVC / 2	0.01	20.00	30.00	10.00	Flush	**708669.122**	**2997029.577**	**131.49**
A1-MW2S	1	New	Shallow	40PVC / 2	0.01	3.00	13.00	10.00	Flush	**709198.111**	**2997500.464**	**123.36**
A1-MW2R	1	New	Bedrock	40PVC / 2	0.01	35.00	45.00	10.00	Flush	**709204.907**	**2997500.759**	**123.49**
A1-MW3S	1	New	Shallow	40PVC / 2	0.01	3.00	13.00	10.00	Flush	**709966.340**	**2997648.498**	**125.06**
A1-MW3R	1	New	Bedrock	40PVC / 2	0.01	30.00	40.00	10.00	Flush	**709959.106**	**2997649.120**	**125.34**
A1-MW4S	1	New	Shallow	40PVC / 2	0.01	3.00	13.00	10.00	Flush	**710451.476**	**2997933.783**	**123.20**
A1-MW4T	1	New	Till	40PVC / 2	0.01	15.00	25.00	10.00	Flush	**710450.154**	**2997928.251**	**123.24**
A1-MW4R	1	New	Bedrock	40PVC / 2	0.01	30.00	40.00	10.00	Flush	**710447.885**	**2997921.822**	**122.98**
A1-MW5S	1	New	Shallow	40PVC / 2	0.01	3.00	13.00	10.00	Flush	**711228.376**	**2997773.419**	**124.38**
A1-MW5T	1	New	Till	40PVC / 2	0.01	30.00	40.00	10.00	Flush	**711233.385**	**2997772.666**	**124.25**
A1-MW5R	1	New	Bedrock	40PVC / 2	0.01	50.00	60.00	10.00	Flush	**711237.751**	**2997771.717**	**124.48**
A1-MW6S	1	New	Shallow	40PVC / 2	0.01	3.00	13.00	10.00	Flush	**711747.891**	**2997719.129**	**123.98**
A1-MW6T	1	New	Till	40PVC / 2	0.01	25.00	35.00	10.00	Flush	**711753.836**	**2997719.028**	**124.07**
A1-MW6R	1	New	Bedrock	40PVC / 2	0.01	39.50	49.50	10.00	Flush	**711758.847**	**2997719.351**	**123.91**
AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)												
B111-MW	2 & 3	Existing	Till	40PVC / 2	0.01	57.00	67.00	10.00	Stickup	537393.000	659268.000	124.01
B126-MW	2 & 3	Existing	Till	40PVC / 2	0.01	51.70	61.70	10.00	Stickup	537848.000	658708.000	122.10
B128-MW	2 & 3	Existing	Shallow	Steel / 0.5	0.01	1.00	11.00	10.00	Stickup	537508.000	659076.000	119.81
B129-MW	2 & 3	Existing	Shallow	Steel / 0.5	0.01	1.00	11.00	10.00	Stickup	537901.000	659136.000	118.37
B242	2 & 3	Existing	Till	40PVC / 2	0.01	43.00	48.00	5.00	Stickup	537515.800	658419.900	124.54
B243	2 & 3	Existing	Bedrock	40PVC / 2	0.01	58.00	68.00	10.00	Stickup	537514.800	658425.800	124.76
B244A	2 & 3	Existing	Bedrock	40PVC / 2	0.01	41.00	61.00	20.00	Stickup	538239.700	658966.400	120.46
B245	2 & 3	Existing	Till	40PVC / 2	0.01	16.00	19.00	3.00	Stickup	538239.400	658973.200	120.30
B246	2 & 3	Existing	Shallow	40PVC / 2	0.01	+2.5	7.50	10.00	Stickup	538235.800	658975.400	120.78
B248	2 & 3	Existing	Till	40PVC / 2	0.01	57.00	62.00	5.00	Stickup	537604.000	659601.700	120.32
B249	2 & 3	Existing	Bedrock	40PVC / 2	0.01	92.50	97.50	5.00	Stickup	537609.900	659592.500	119.22
B253	2 & 3	Existing	Shallow	40PVC / 2	0.01	3.30	13.30	10.00	Stickup	537142.600	659630.900	121.78
B254	2 & 3	Existing	Till	40PVC / 2	0.01	61.80	66.80	5.00	Stickup	537142.600	659630.900	121.78
B255	2 & 3	Existing	Bedrock	40PVC / 2	0.01	97.00	102.00	5.00	Stickup	537142.600	659630.900	121.78
B256-S	2 & 3	Existing	Shallow	40PVC / 2	0.01	3.27	8.17	4.90	Flush	**716586.180**	**2998318.720**	**115.70**
B256-L	2 & 3	Existing	Lower/Till	40PVC / 2	0.01	21.11	25.86	4.75	Flush	**716578.650**	**2998322.230**	**115.70**
B256-R	2 & 3	Existing	Bedrock	40PVC / 2	0.01	35.34	45.15	9.81	Flush	**716571.250**	**2998325.930**	**115.77**
B257-S	2 & 3	Existing	Shallow	40PVC / 2	0.01	4.06	8.73	4.67	Stickup	**717085.133**	**2999852.086**	**120.85**
B257-L	2 & 3	Existing	Lower/Till	40PVC / 2	0.01	66.36	71.02	4.66	Stickup	**717086.143**	**2999843.905**	**121.67**
B257-R	2 & 3	Existing	Bedrock	40PVC / 2	0.01	84.27	94.08	9.81	Stickup	**717087.563**	**2999835.945**	**121.27**
B258-S	2 & 3	Existing	Shallow	40PVC / 2	0.01	4.03	8.98	4.95	Stickup	**716121.250**	**3000601.060**	**122.98**
B258-L	2 & 3	Existing	Lower/Till	40PVC / 2	0.01	37.43	42.38	4.95	Stickup	**716116.220**	**3000594.740**	**122.63**
B258-R	2 & 3	Existing	Bedrock	40PVC / 2	0.01	50.26	60.07	9.81	Stickup	**716111.300**	**3000588.930**	**122.64**
IW-1	2 & 3	Existing	NA	NA	NA	NA	NA	NA	Stickup	**714022.633**	**2999319.188**	**128.81**
IW-11	2 & 3	Existing	NA	NA	NA	NA	NA	NA	Stickup	**714431.050**	**2998036.690**	**125.00**
IW-2	2 & 3	Existing	NA	NA	NA	NA	NA	NA	Stickup	**715019.329**	**2998532.593**	**118.50**
IW-4	2 & 3	Existing	NA	NA	NA	NA	NA	NA	Stickup	**715533.258**	**2997852.039**	**203.12**
P01-2S	2 & 3	Existing	Shallow	40PVC / 2	0.01	2.30	17.30	15.00	Flush	538265.000	657993.000	123.45
P01-2R	2 & 3	Existing	Bedrock	40PVC / 2	0.01	30.00	70.00	40.00	Flush	538309.300	658084.500	125.40
RAP1-1T	2 & 3	Existing	Till	40PVC / 2	0.02	18.70	23.80	5.10	Stickup	538695.000	657692.000	132.97
RAP1-1R	2 & 3	Existing	Bedrock	40PVC / 2	0.02	32.90	53.10	20.20	Stickup	538697.000	657705.000	133.14
RAP1-4S	2 & 3	Existing	Shallow	40PVC / 2	0.02	0.00	14.70	14.70	Stickup	537991.000	658464.000	122.92
RAP1-4RA	2 & 3	Existing	Bedrock	40PVC / 2	0.01	46.00	56.00	10.00	Stickup	537994.000	658462.000	123.99
RAP1-6S	2 & 3	Existing	Shallow	40PVC / 2	0.02	0.00	14.50	14.50	Stickup	537430.600	658081.200	123.50
RAP1-6T	2 & 3	Existing	Till	40PVC / 2	0.02	29.60	44.70	15.10	Stickup	537417.700	658074.400	123.70
RAP1-6R	2 & 3	Existing	Bedrock	40PVC / 2	0.02	51.50	71.70	20.20	Stickup	537420.700	658082.900	123.40
RAP2-1T	2 & 3	Existing	Lower Till	40PVC / 2	0.02	58.30	79.00	20.70	Stickup	537155.000	659329.000	126.21
RAP2-1R	2 & 3	Existing	Bedrock	40PVC / 2	OPEN	106.00	122.50	16.50	Stickup	537155.000	659333.000	126.61

Table 2
Monitoring Well Construction Summary
AFFF Area 1 (Taxiway Echo Release Area), AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001), and
AFFF Area 4 (Motor Pool Release Area)
Hanscom AFB

Well	AFFF Area	Well Vintage	Aquifer Screened	Riser Material / Diameter (in)	Screen Slot Size (in)	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Screen Length (ft)	Surface Type	Coordinates (Easting)	Coordinates (Northing)	Elevation (TOC)
AFFF Area 4 (Motor Pool Release Area)												
A4-MW1S	4	New	Shallow	40PVC / 2	0.01	10.00	20.00	10.00	Flush	**716320.477**	**2994318.950**	**129.18**
A4-MW1T	4	New	Till	40PVC / 2	0.01	20.00	30.00	10.00	Flush	**716321.254**	**2994323.918**	**129.19**
A4-MW2S	4	New	Shallow	40PVC / 2	0.01	16.00	26.00	10.00	Flush	**716399.396**	**2994456.444**	**138.64**
A4-MW2T	4	New	Till	40PVC / 2	0.01	38.00	48.00	10.00	Flush	**716400.061**	**2994463.358**	**138.48**
CH-106	4	Existing	Till	40PVC / 2	0.01	24.46	30.24	5.78	Flush	534758.600	661456.100	**124.93**
CH-107	4	Existing	Shallow	40PVC / 2	0.01	7.73	17.83	10.10	Flush	534761.100	661460.200	**124.95**
HB-11	4	Existing	Shallow	40PVC / 2	0.01	7.73	15.73	8.00	Flush	534443.200	660860.100	**127.28**
MW-07	4	Existing	Shallow	40PVC / 2	0.01	5.00	25.00	20.00	Flush	534420.500	660253.600	129.20
MW-10	4	Existing	Shallow	40PVC / 2	0.01	5.00	20.00	15.00	Flush	534293.600	660042.600	124.98
MW13-3	4	Existing	Shallow	40PVC / 4	NA	6.00	16.00	10.00	Flush	533310.000	659867.000	125.30
MW6-116U	4	Existing	Shallow	40PVC / 2	0.01	5.00	15.00	10.00	Stickup	**718528.760**	**2995469.380**	125.30
MW6-116T	4	Existing	Till	40PVC / 2	0.01	25.00	35.00	10.00	Stickup	**718520.930**	**2995468.630**	125.65
MW6-117U	4	Existing	Shallow	40PVC / 2	0.01	5.00	15.00	10.00	Stickup	**718861.440**	**2995765.110**	125.62
MW6-117T	4	Existing	Till	40PVC / 2	0.01	39.00	49.00	10.00	Stickup	**718861.180**	**2995762.560**	125.49

Note: Northing and Easting are refferenced to the Massachsuetts State Plane Coordinate System.
Coordinates in Bold = NAD 1983, and coordinates in plain text = NAD 1927
Top of Casing (TOC) elevations are referenced to NAVD 88 (bold text) or NGVD 27 (plain text)

Table 3
PFAS in Groundwater Samples
AFFF Area 1 (Taxiway Echo Release Area)
Hanscom AFB

	Sample ID	A1-MW1R-GW-P1				A1-MW1T-GW-P1				A1-MW2R-GW-P1				A1-MW2S-GW-P1				A1-MW3R-GW-P1				A1-MW3S-GW-P1				A1-MW4R-GW-P1			
	Sample Date	08/12/2021				08/12/2021				08/12/2021				08/11/2021				08/11/2021				08/11/2021				08/10/2021			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																													
4:2 FTS	-	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	ND	4.42	8.82	U	ND	4.24	8.44	U
6:2 FTS	-	ND	4.20	8.40	U	ND	4.27	8.55	U	**22.2**	4.24	8.45		ND	4.35	8.72	U	**3.89**	4.35	8.69	J	ND	4.42	8.82	U	ND	4.24	8.44	U
8:2 FTS	-	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	ND	4.42	8.82	U	ND	4.24	8.44	U
FOSA	-	ND	4.20	8.40	UJ	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	ND	4.42	8.82	UJ	ND	4.24	8.44	U
NEtFOSAA	-	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	ND	4.42	8.82	UJ	ND	4.24	8.44	U
NMeFOSAA	-	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	ND	4.42	8.82	UJ	ND	4.24	8.44	U
PFBA	-	**6.65**	4.20	8.40	J	ND	4.27	8.55	U	**15.6**	4.24	8.45		ND	4.35	8.72	U	**9.53**	4.35	8.69		**15.3**	4.42	8.82		ND	4.24	8.44	U
PFBS	600	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	ND	4.42	8.82	U	ND	4.24	8.44	U
PFDA	-	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	ND	4.42	8.82	U	ND	4.24	8.44	U
PFDoA	-	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	ND	4.42	8.82	U	ND	4.24	8.44	U
PFDS	-	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	ND	4.42	8.82	U	ND	4.24	8.44	U
PFHpA	-	ND	4.20	8.40	U	**2.35**	4.27	8.55	J	**3.62**	4.24	8.45	J	ND	4.35	8.72	U	**2.38**	4.35	8.69	J	**5.57**	4.13	8.23	J	ND	4.13	8.29	UJ
PFHpS	-	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	ND	4.42	8.82	U	ND	4.24	8.44	U
PFHxA	-	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	**6.71**	4.42	8.82	J	ND	4.24	8.44	U
PFHxS	-	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	ND	4.42	8.82	U	ND	4.24	8.44	U
PFNA	-	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	ND	4.42	8.82	U	ND	4.24	8.44	U
PFNS	-	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	ND	4.42	8.82	U	ND	4.24	8.44	U
PFOA	40	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	**9.67**	4.42	8.82		ND	4.24	8.44	U
PFOS	40	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	ND	4.42	8.82	U	ND	4.24	8.44	U
PFPeA	-	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	**8.60**	4.42	8.82	J	ND	4.24	8.44	U
PFPeS	-	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	ND	4.42	8.82	U	ND	4.24	8.44	U
PFTeDA	-	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	ND	4.42	8.82	U	ND	4.24	8.44	U
PFTrDA	-	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	ND	4.42	8.82	U	ND	4.24	8.44	U
PFUnDA	-	ND	4.20	8.40	U	ND	4.27	8.55	U	ND	4.24	8.45	U	ND	4.35	8.72	U	ND	4.35	8.69	U	ND	4.42	8.82	U	ND	4.24	8.44	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

Table 3
PFAS in Groundwater Samples
AFFF Area 1 (Taxiway Echo Release Area)
Hanscom AFB

Sample ID		A1-MW4S-GW-P1				A1-MW4T-GW-P1				A1-MW5R-GW-P1				A1-MW5S-GW-P1				A1-MW5T-GW-P1				A1-MW6R-GW-P1				A1-MW6S-GW-P1			
Sample Date		08/10/2021				08/10/2021				08/11/2021				08/11/2021				08/11/2021				08/10/2021				08/10/2021			
Analyte	**OSD SL Tap Water (a)**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																													
4:2 FTS	-	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	ND	4.20	8.43	U	ND	4.24	8.45	U
6:2 FTS	-	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	**39.5**	4.20	8.43		ND	4.24	8.45	U
8:2 FTS	-	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	ND	4.20	8.43	U	ND	4.24	8.45	U
FOSA	-	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	ND	4.20	8.43	U	ND	4.24	8.45	U
NEtFOSAA	-	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	ND	4.20	8.43	U	ND	4.24	8.45	U
NMeFOSAA	-	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	ND	4.20	8.43	U	ND	4.24	8.45	U
PFBA	-	**9.55**	4.17	8.35		**5.17**	4.35	8.73	J	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	**8.02**	4.20	8.43	J	ND	4.24	8.45	U
PFBS	600	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	ND	4.20	8.43	U	ND	4.24	8.45	U
PFDA	-	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	ND	4.20	8.43	U	ND	4.24	8.45	U
PFDoA	-	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	ND	4.20	8.43	U	ND	4.24	8.45	U
PFDS	-	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	ND	4.20	8.43	U	ND	4.24	8.45	U
PFHpA	-	ND	4.24	8.45	UJ	ND	4.24	8.51	UJ	**2.82**	4.20	8.37	J	ND	4.20	8.43	UJ	ND	4.17	8.32	UJ	**2.89**	4.39	8.80	J	ND	4.27	8.56	UJ
PFHpS	-	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	ND	4.20	8.43	U	ND	4.24	8.45	U
PFHxA	-	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	**4.44**	4.20	8.43	J	ND	4.24	8.45	U
PFHxS	-	ND	4.17	8.35	U	ND	4.35	8.73	U	**3.43**	4.20	8.37	J	ND	4.39	8.80	U	**8.22**	4.27	8.56	J	**6.25**	4.20	8.43	J	ND	4.24	8.45	U
PFNA	-	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	ND	4.20	8.43	U	ND	4.24	8.45	U
PFNS	-	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	ND	4.20	8.43	U	ND	4.24	8.45	U
PFOA	40	ND	4.17	8.35	U	ND	4.35	8.73	U	**4.15**	4.20	8.37	J	ND	4.39	8.80	U	**8.02**	4.27	8.56	J	**8.75**	4.20	8.43		ND	4.24	8.45	U
PFOS	40	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	**6.16**	4.27	8.56	J	**4.23**	4.20	8.43	J	ND	4.24	8.45	U
PFPeA	-	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	**4.48**	4.20	8.43	J	ND	4.24	8.45	U
PFPeS	-	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	ND	4.20	8.43	U	ND	4.24	8.45	U
PFTeDA	-	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	ND	4.20	8.43	U	ND	4.24	8.45	U
PFTrDA	-	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	ND	4.20	8.43	U	ND	4.24	8.45	U
PFUnDA	-	ND	4.17	8.35	U	ND	4.35	8.73	U	ND	4.20	8.37	U	ND	4.39	8.80	U	ND	4.27	8.56	U	ND	4.20	8.43	U	ND	4.24	8.45	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

Table 3
PFAS in Groundwater Samples
AFFF Area 1 (Taxiway Echo Release Area)
Hanscom AFB

	Sample ID	A1-MW6T-GW-P1				A1-MW6T-GW-P1-DUP			
	Sample Date	08/10/2021				08/10/2021			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)									
4:2 FTS	-	ND	4.27	8.57	U	ND	4.17	8.32	U
6:2 FTS	-	ND	4.27	8.57	U	ND	4.17	8.32	U
8:2 FTS	-	ND	4.27	8.57	U	ND	4.17	8.32	U
FOSA	-	ND	4.27	8.57	U	ND	4.17	8.32	U
NEtFOSAA	-	ND	4.27	8.57	U	ND	4.17	8.32	U
NMeFOSAA	-	ND	4.27	8.57	U	ND	4.17	8.32	U
PFBA	-	ND	4.27	8.57	U	ND	4.17	8.32	U
PFBS	600	ND	4.27	8.57	U	ND	4.17	8.32	U
PFDA	-	ND	4.27	8.57	U	ND	4.17	8.32	U
PFDoA	-	ND	4.27	8.57	U	ND	4.17	8.32	U
PFDS	-	ND	4.27	8.57	U	ND	4.17	8.32	U
PFHpA	-	ND	4.27	8.57	UJ	ND	4.24	8.45	UJ
PFHpS	-	ND	4.27	8.57	U	ND	4.17	8.32	U
PFHxA	-	ND	4.27	8.57	U	ND	4.17	8.32	U
PFHxS	-	**5.96**	4.27	8.57	J	**5.96**	4.17	8.32	J
PFNA	-	ND	4.27	8.57	U	ND	4.17	8.32	U
PFNS	-	ND	4.27	8.57	U	ND	4.17	8.32	U
PFOA	40	**3.49**	4.27	8.57	J	**3.08**	4.17	8.32	J
PFOS	40	ND	4.27	8.57	U	ND	4.17	8.32	U
PFPeA	-	ND	4.27	8.57	U	ND	4.17	8.32	U
PFPeS	-	ND	4.27	8.57	U	ND	4.17	8.32	U
PFTeDA	-	ND	4.27	8.57	U	ND	4.17	8.32	U
PFTrDA	-	ND	4.27	8.57	U	ND	4.17	8.32	U
PFUnDA	-	ND	4.27	8.57	U	ND	4.17	8.32	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

References

a. Office of the Assistant Secretary of Defense (OSD) PFAS Memo dated September 15, 2021.

Massachusetts Groundwater Standard
310 CMR 40.0974(2), Table 1
PFAS: 20 ng/L
Where the PFAS concentration is derived as the sum of the concentrations of PFDA, PFHpA, PFHxS, PFNA, PFOA and PFOS

Interpreted Qualifiers

J = Estimated concentration
J- = Estimated concentration, biased low
J+ = Estimated concentration, biased high
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)
UJ = The analyte was not detected at a level greater than or equal to the adjusted DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.
UX/X = The presence or absence of the analyte cannot be substantiated. Acceptance or rejection of the data should be decided by the project team, but exclusion of the data is recommended.

Acronyms and Abbreviations

DUP	duplicate
GW	groundwater
HQ	hazard quotient
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
LOQ	limit of quantitation
QSM	Quality Systems Manual
Qual	interpreted qualifier
USEPA	United States Environmental Protection Agency
ng/l	nanograms per liter
-	Not applicable
ND	analyte not detected above the LOD

4:2 FTS	4:2 fluorotelomer sulfonate
6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
FOSA	perfluorooctane sulfonamide
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFDS	perfluorodecane sulfonic acid
PFHpA	perfluoroheptanoic acid
PFHpS	perfluoroheptane sulfonic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFNS	perfluorononane sulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PFPeA	perfluoropentanoic acid
PFPeS	perfluoropentane sulfonic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Table 4
Groundwater Elevation Summary
AFFF Area 1 (Taxiway Echo Release Area), AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001), and and AFFF Area 3 (Outfall 001), and AFFF Area 4 (Motor Pool Release Area)
Hanscom AFB

Well ID	AFFF Area	Aquifer Screened	Total Depth (ft bgs)	Top of Casing (ft NAVD 88)	August 9, 2021	
					Depth to Water (ft bgs)	Groundwater Elevation (ft NAVD 88)
AFFF Area 1 (Taxiway Echo Release Area)						
A1-MW1T	1	Till	13	131.45	2.53	128.92
A1-MW1R	1	Bedrock	30	131.49	2.85	128.64
A1-MW2S	1	Shallow	13	123.36	3.33	120.03
A1-MW2R	1	Bedrock	45	123.49	3.26	120.23
A1-MW3S	1	Shallow	13	125.06	4.36	120.70
A1-MW3R	1	Bedrock	40	125.34	4.13	121.21
A1-MW4S	1	Shallow	13	123.20	3.43	119.77
A1-MW4T	1	Till	25	123.24	3.21	120.03
A1-MW4R	1	Bedrock	40	122.98	2.76	120.22
A1-MW5S	1	Shallow	13	124.38	5.30	119.08
A1-MW5T	1	Till	40	124.25	1.64	122.61
A1-MW5R	1	Bedrock	60	124.48	1.47	123.01
A1-MW6S	1	Shallow	13	123.98	4.52	119.46
A1-MW6T	1	Till	35	124.07	2.91	121.16
A1-MW6R	1	Bedrock	50	123.91	2.68	121.23
AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)						
B111-MW	2 & 3	Till	67	123.12	5.12	118.00
B126-MW	2 & 3	Till	62	121.21	3.63	117.58
B128-MW	2 & 3	Shallow	11	118.92	1.53	117.39
B129-MW	2 & 3	Shallow	11	117.48	Dry	Dry
B242	2 & 3	Till	48	123.65	5.33	118.32
B243	2 & 3	Bedrock	68	123.87	5.52	118.35
B244A	2 & 3	Bedrock	61	119.57	3.17	116.40
B245	2 & 3	Till	19	119.41	3.13	116.28
B246	2 & 3	Shallow	10	119.89	3.60	116.29
B248	2 & 3	Till	62	119.43	1.70	117.73
B249	2 & 3	Bedrock	98	118.33	0.70	117.63
B253	2 & 3	Shallow	13	120.89	6.68	114.21
B254	2 & 3	Till	67	120.89	6.56	114.33
B255	2 & 3	Bedrock	> 100	120.89	6.62	114.27
B256-S	2 & 3	Shallow	8.2	115.70	0.83	114.87
B256-L	2 & 3	Lower/Till	25.9	115.70	0.00	Artesian: >115.70
B256-R	2 & 3	Bedrock	45.2	115.77	0.00	Artesian: >115.77
B257-S	2 & 3	Shallow	8.7	120.85	6.88	113.97
B257-L	2 & 3	Lower/Till	71	121.67	7.83	113.84
B257-R	2 & 3	Bedrock	94	121.27	7.40	113.87
B258-S	2 & 3	Shallow	9	122.98	7.37	115.61
B258-L	2 & 3	Lower/Till	42.4	122.63	7.31	115.32
B258-R	2 & 3	Bedrock	60	122.64	9.30	113.34
P01-2S	2 & 3	Shallow	17	122.56	3.97	118.59
P01-2R	2 & 3	Bedrock	70	124.51	3.12	121.39
RAP1-1T	2 & 3	Shallow	24	132.08	14.15	117.93
RAP1-1R	2 & 3	Lower Till	53	132.25	20.46	111.79
RAP1-4S	2 & 3	Shallow	15	122.03	5.32	116.71
RAP1-4RA	2 & 3	Bedrock	56	123.10	5.20	117.90
RAP1-6S	2 & 3	Shallow	14	*122.61*	5.75	*116.86*
RAP1-6T	2 & 3	Till	45	*122.81*	3.86	*118.95*
RAP1-6R	2 & 3	Bedrock	72	*122.51*	3.99	*118.52*
RAP2-1T	2 & 3	Lower Till	79	125.32	7.22	118.10
RAP2-1R	2 & 3	Bedrock	22	125.72	7.87	117.85

Table 4
Groundwater Elevation Summary
AFFF Area 1 (Taxiway Echo Release Area), AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001), and and AFFF Area 3 (Outfall 001), and AFFF Area 4 (Motor Pool Release Area)
Hanscom AFB

Well ID	AFFF Area	Aquifer Screened	Total Depth (ft bgs)	Top of Casing (ft NAVD 88)	August 9, 2021	
					Depth to Water (ft bgs)	Groundwater Elevation (ft NAVD 88)
AFFF Area 4 (Motor Pool Release Area)						
A4-MW1S	4	Shallow	20	129.18	11.46	117.72
A4-MW1T	4	Till	30	129.19	11.63	117.56
A4-MW2S	4	Shallow	26	138.64	21.95	116.69
A4-MW2T	4	Till	48	138.48	19.58	118.90
CH-106	4	Till	30	124.93	10.85	114.08
CH-107	4	Shallow	18	124.95	11.20	113.75
HB-11	4	Shallow	16	127.28	8.86	118.42
MW-07	4	Shallow	25	128.31	15.09	113.22
MW-10	4	Shallow	21	124.09	10.00	114.09
MW13-3	4	Shallow	16	NA	8.72	NA
MW6-116U	4	Shallow	15	124.41	12.79	111.62
MW6-116T	4	Till	49	124.76	11.98	112.78
MW6-117U	4	Shallow	15	124.73	13.10	111.63
MW6-117T	4	Till	40	124.60	12.23	112.37

Notes ft bgs = ft below ground surface
ft NAVD 88 = feet North American Vertical Datum of 1988
AFFF = Aqueous Fire Fighting Foam
NA = Not Available
Bold and Underline = Estimated TOC elevation

Table 5
PFAS in Shallow and Deep Soil Samples
AFFF Area 1 (Taxiway Echo Release Area) and AFFF Area 4 (Motor Pool Release Area)
Hanscom AFB

Sample ID		A1-MW1T-SB-INT1				A1-MW2S-SB-INT1				A1-MW2S-SB-INT2				A1-MW3S-SB-INT1				A1-MW4S-SB-INT1				A1-MW4S-SB-INT1-DUP				A1-MW5S-SB-INT1				A1-MW5S-SB-INT1-DUP			
Sample Interval (ft bgs)		0 - 2				0 - 2				2 - 3				0 - 2				0 - 2				0 - 2				0 - 2				0 - 2			
Sample Date		07/13/2021				07/13/2021				07/13/2021				07/13/2021				07/12/2021				07/12/2021				07/12/2021				07/12/2021			
Analyte	OSD SL Residential Soil HQ=0.1 (ng/g) [a]	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Soil, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/g)																																	
4:2 FTS	-	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
6:2 FTS	-	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
8:2 FTS	-	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
FOSA	-	ND	0.974	1.95	UJ	ND	0.957	1.91	U	ND	1.00	2.01	UJ	ND	0.958	1.92	UJ	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
NEtFOSAA	-	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
NMeFOSAA	-	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
PFBA	-	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
PFBS	1,900	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
PFDA	-	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
PFDoA	-	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
PFDS	-	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
PFHpA	-	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
PFHpS	-	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
PFHxA	-	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
PFHxS	-	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
PFNA	-	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
PFNS	-	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
PFOA	130	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
PFOS	130	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
PFPeA	-	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
PFPeS	-	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
PFTeDA	-	ND	0.974	1.95	UJ	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	UJ	ND	0.993	1.99	U	ND	0.997	1.99	UJ	ND	0.996	1.99	UJ	ND	0.988	1.98	U
PFTrDA	-	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U
PFUnDA	-	ND	0.974	1.95	U	ND	0.957	1.91	U	ND	1.00	2.01	U	ND	0.958	1.92	U	ND	0.993	1.99	U	ND	0.997	1.99	U	ND	0.996	1.99	U	ND	0.988	1.98	U

A1 - AFFF Area 1 (Former FTA II)

A4 - AFFF Area 4 (Motor Pool Release Area)

Table 5
PFAS in Shallow and Deep Soil Samples
AFFF Area 1 (Taxiway Echo Release Area) and AFFF Area 4 (Motor Pool Release Area)
Hanscom AFB

Sample ID		A1-MW5S-SB-INT2				A1-MW6S-SB-INT1				A1-MW6S-SB-INT2				A4-MW1S-SB-INT1				A4-MW1T-SB-INT2				A4-MW2S-SB-INT1				A4-MW2T-SB-INT2			
Sample Interval (ft bgs)		3 - 5				0 - 2				2 - 4				0 - 2				11 - 13				0 - 2				13 - 15			
Sample Date		07/12/2021				07/12/2021				07/12/2021				07/30/2021				07/30/2021				07/28/2021				07/29/2021			
Analyte	OSD SL Residential Soil HQ=0.1 (ng/g) [a]	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Soil, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/g)																													
4:2 FTS	-	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
6:2 FTS	-	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
8:2 FTS	-	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
FOSA	-	ND	0.968	1.94	UJ	ND	0.983	1.97	U	ND	0.978	1.96	UJ	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
NEtFOSAA	-	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
NMeFOSAA	-	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
PFBA	-	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
PFBS	1,900	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
PFDA	-	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
PFDoA	-	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
PFDS	-	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
PFHpA	-	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
PFHpS	-	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
PFHxA	-	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
PFHxS	-	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
PFNA	-	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
PFNS	-	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
PFOA	130	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
PFOS	130	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
PFPeA	-	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
PFPeS	-	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
PFTeDA	-	ND	0.968	1.94	UJ	ND	0.983	1.97	UJ	ND	0.978	1.96	UJ	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
PFTrDA	-	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ
PFUnDA	-	ND	0.968	1.94	U	ND	0.983	1.97	U	ND	0.978	1.96	U	ND	0.976	1.95	UJ	ND	0.971	1.94	UJ	ND	0.984	1.97	UJ	ND	0.973	1.95	UJ

A1 - AFFF Area 1 (Former FTA II)

A4 - AFFF Area 4 (Motor Pool Release Area)

References

a. OSD PFAS Memo dated September 15, 2021.

Interpreted Qualifiers

U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)

UJ = The analyte was not detected at a level greater than or equal to the adjusted DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

Acronyms and Abbreviations

DUP	duplicate
HQ	hazard quotient
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
LOQ	limit of quantitation
QSM	Quality Systems Manual
Qual	interpreted qualifier
RSL	Regional Screening Levels
SB	soil boring
USEPA	United States Environmental Protection Agency
ng/g	nanograms per gram
-	Not applicable
<	analyte not detected above the LOD
ft bgs	ft below ground surface

4:2 FTS	4:2 fluorotelomer sulfonate
6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
FOSA	perfluorooctane sulfonamide
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFDS	perfluorodecane sulfonic acid
PFHpA	perfluoroheptanoic acid
PFHpS	perfluoroheptane sulfonic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFNS	perfluorononane sulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PFPeA	perfluoropentanoic acid
PFPeS	perfluoropentane sulfonic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Table 6
pH and TOC in Shallow and Deep Soil Samples
AFFF Area 1 (Taxiway Echo Release Area) and AFFF Area 4 (Motor Pool Release Area)
Hanscom AFB

Sample ID	A1-MW1T-SB-INT1				A1-MW2S-SB-INT1				A1-MW2S-SB-INT2				A1-MW3S-SB-INT1				A1-MW4S-SB-INT1				A1-MW4S-SB-INT1-DUP				A1-MW5S-SB-INT1			
Sample Interval (ft bgs)	0 - 2				0 - 2				2 - 3				0 - 2				0 - 2				0 - 2				0 - 2			
Sample Date	07/13/2021				07/13/2021				07/13/2021				07/13/2021				07/12/2021				07/12/2021				07/12/2021			
Analyte	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**
pH	**5.91**	1.00	1.00		**5.85**	1.00	1.00		**5.83**	1.00	1.00		**6.26**	1.00	1.00		**6.36**	1.00	1.00		**6.46**	1.00	1.00		**4.32**	1.00	1.00	
Total Organic Carbon (mg/kg)	**6090**	150.00	200.0		**2540**	150.00	200.0		**807**	150.00	200.0		**13000**	150.00	200.0		**6710**	150.00	200.0		**7690**	150.00	200.0		**20600**	150.00	200.0	

Sample ID	A1-MW5S-SB-INT1-DUP				A1-MW5S-SB-INT2				A1-MW6S-SB-INT1				A1-MW6S-SB-INT2				A4-MW1S-SB-INT1				A4-MW1T-SB-INT2				A4-MW2S-SB-INT1			
Sample Interval (ft bgs)	0 - 2				3 - 5				0 - 2				2 - 4				0 - 2				11 - 13				0 - 2			
Sample Date	07/12/2021				07/12/2021				07/12/2021				07/12/2021				07/30/2021				07/30/2021				07/28/2021			
Analyte	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**
pH	**4.38**	1.00	1.00		**5.38**	1.00	1.00		**6.46**	1.00	1.00		**6.71**	1.00	1.00		**5.51**	1.00	1.00		**6.58**	1.00	1.00		**5.94**	1.00	1.00	
Total Organic Carbon (mg/kg)	**22500**	150.00	200.0		**764**	150.00	200.0		**3870**	150.00	200.0		**580**	150.00	200.0		**11000**	170.00	220.0		**120**	170.00	230.0		**3300**	160.00	210.0	

Sample ID	A4-MW2T-SB-INT2			
Sample Interval (ft bgs)	13 - 15			
Sample Date	07/29/2021			
Analyte	**Result**	**LOD**	**LOQ**	**Qual**
pH	**6.98**	1.00	1.00	
Total Organic Carbon (mg/kg)	**1900**	160.00	210.0	

Acronyms and Abbreviations

DUP	duplicate
LOD	limit of detection
LOQ	limit of quantitation
Qual	interpreted qualifier
mg/kg	milligram per kilogram
SB	soil boring
SD	sediment
ft bgs	ft below ground surface

Table 7
PFAS in Surface Water Samples
AFFF Area 1 (Taxiway Echo Release Area), AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001), and AFFF Area 4 (Motor Pool Release Area)
Hanscom AFB

	Sample ID	A1-SWSD1-SW				A1-SWSD2-SW				A1-SWSD3-SW				A2A3-SWSD1-SW				A2A3-SWSD2-SW				A2A3-SWSD3-SW				A2A3-SWSD4-SW			
	Sample Date	07/07/2021				08/02/2021				07/07/2021				08/04/2021				08/04/2021				08/04/2021				08/04/2021			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																													
4:2 FTS	-	ND	4.42	8.83	U	ND	3.97	7.95	UJ	ND	4.63	9.24	U	ND	4.55	9.07	UJ	ND	4.31	8.64	UJ	ND	4.39	8.74	UJ	ND	3.88	7.77	UJ
6:2 FTS	-	**263**	4.42	8.83		ND	3.97	7.95	UJ	**26.3**	4.63	9.24		ND	4.55	9.07	UJ	ND	4.31	8.64	UJ	ND	4.39	8.74	UJ	ND	3.88	7.77	UJ
8:2 FTS	-	**2.24**	4.42	8.83	J	ND	3.97	7.95	UJ	ND	4.63	9.24	U	ND	4.55	9.07	UJ	ND	4.31	8.64	UJ	ND	4.39	8.74	UJ	ND	3.88	7.77	UJ
FOSA	-	ND	4.42	8.83	U	ND	3.97	7.95	UJ	ND	4.63	9.24	U	ND	4.55	9.07	UJ	ND	4.31	8.64	UJ	ND	4.39	8.74	UJ	ND	3.88	7.77	UJ
NEtFOSAA	-	ND	4.42	8.83	U	ND	3.97	7.95	UJ	ND	4.63	9.24	U	ND	4.55	9.07	UJ	ND	4.31	8.64	UJ	ND	4.39	8.74	UJ	ND	3.88	7.77	UJ
NMeFOSAA	-	ND	4.42	8.83	U	ND	3.97	7.95	UJ	ND	4.63	9.24	U	ND	4.55	9.07	UJ	ND	4.31	8.64	UJ	ND	4.39	8.74	UJ	ND	3.88	7.77	UJ
PFBA	-	**11.8**	4.42	8.83		**3.20**	3.97	7.95	J	**3.82**	4.63	9.24	J+	**4.97**	4.55	9.07	J	**7.42**	4.31	8.64	J	**7.72**	4.39	8.74	J	**10.9**	3.88	7.77	J
PFBS	600	**5.80**	4.42	8.83	J	ND	3.97	7.95	UJ	ND	4.63	9.24	U	**5.84**	4.55	9.07	J	**7.19**	4.31	8.64	J	**7.62**	4.39	8.74	J	**6.68**	3.88	7.77	J
PFDA	-	ND	4.42	8.83	U	ND	3.97	7.95	UJ	ND	4.63	9.24	U	ND	4.55	9.07	UJ	ND	4.31	8.64	UJ	ND	4.39	8.74	UJ	ND	3.88	7.77	UJ
PFDoA	-	ND	4.42	8.83	U	ND	3.97	7.95	UJ	ND	4.63	9.24	U	ND	4.55	9.07	UJ	ND	4.31	8.64	UJ	ND	4.39	8.74	UJ	ND	3.88	7.77	UJ
PFDS	-	ND	4.42	8.83	U	ND	3.97	7.95	UJ	ND	4.63	9.24	U	ND	4.55	9.07	UJ	ND	4.31	8.64	UJ	ND	4.39	8.74	UJ	ND	3.88	7.77	UJ
PFHpA	-	**6.94**	4.42	8.83	J	ND	3.97	7.95	UJ	ND	4.63	9.24	U	**2.77**	4.55	9.07	J	**4.16**	**4.31**	8.64	J	**4.15**	**4.39**	8.74	J	**4.57**	3.88	7.77	J
PFHpS	-	**4.76**	4.42	8.83	J	ND	3.97	7.95	UJ	ND	4.63	9.24	U	ND	4.55	9.07	UJ	ND	4.31	8.64	UJ	ND	4.39	8.74	UJ	ND	3.88	7.77	UJ
PFHxA	-	**49.8**	4.42	8.83		**3.97**	3.97	7.95	J	**5.73**	4.63	9.24	J	**61.4**	4.55	9.07	J	**69.4**	4.31	8.64	J	**63.9**	4.39	8.74	J	**62.6**	3.88	7.77	J
PFHxS	-	**60.7**	4.42	8.83		**5.79**	3.97	7.95	J	**6.52**	4.63	9.24	J	**197**	4.55	9.07	J	**264**	4.31	8.64	J	**226**	4.39	8.74	J	**215**	3.88	7.77	J
PFNA	-	ND	4.42	8.83	U	ND	3.97	7.95	UJ	ND	4.63	9.24	U	ND	4.55	9.07	UJ	ND	4.31	8.64	UJ	ND	4.39	8.74	UJ	ND	3.88	7.77	UJ
PFNS	-	ND	4.42	8.83	U	ND	3.97	7.95	UJ	ND	4.63	9.24	U	ND	4.55	9.07	UJ	ND	4.31	8.64	UJ	ND	4.39	8.74	UJ	ND	3.88	7.77	UJ
PFOA	40	**8.17**	4.42	8.83	J	**4.49**	3.97	7.95	J	**5.98**	4.63	9.24	J	**57.7**	4.55	9.07	J	**61.2**	4.31	8.64	J	**62.1**	4.39	8.74	J	**59.3**	3.88	7.77	J
PFOS	40	**208**	4.42	8.83		**7.77**	3.97	7.95	J	**12.7**	4.63	9.24		**16.6**	4.55	9.07	J	**16.6**	4.31	8.64	J	**17.4**	4.39	8.74	J	**14.5**	3.88	7.77	J
PFPeA	-	**62.1**	4.42	8.83		**3.49**	3.97	7.95	J	**7.60**	4.63	9.24	J	**10.7**	4.55	9.07	J	**12.3**	4.31	8.64	J	**11.9**	4.39	8.74	J	**10.7**	3.88	7.77	J
PFPeS	-	**6.48**	4.42	8.83	J	ND	3.97	7.95	UJ	ND	4.63	9.24	U	**3.09**	4.55	9.07	J	**3.23**	4.31	8.64	J	**3.79**	4.39	8.74	J	ND	3.88	7.77	UJ
PFTeDA	-	ND	4.42	8.83	U	ND	3.97	7.95	UJ	ND	4.63	9.24	UJ	ND	4.55	9.07	UJ	ND	4.31	8.64	UJ	ND	4.39	8.74	UJ	ND	3.88	7.77	UJ
PFTrDA	-	ND	4.42	8.83	U	ND	3.97	7.95	UJ	ND	4.63	9.24	U	ND	4.55	9.07	UJ	ND	4.31	8.64	UJ	ND	4.39	8.74	UJ	ND	3.88	7.77	UJ
PFUnDA	-	ND	4.42	8.83	U	ND	3.97	7.95	UJ	ND	4.63	9.24	U	ND	4.55	9.07	UJ	ND	4.31	8.64	UJ	ND	4.39	8.74	UJ	ND	3.88	7.77	UJ

Grey Fill — Detected concentration exceeded OSD Tap Water SL

A1 - AFFF Area 1 (Former FTA II)

A2A3 - AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)

A4 - AFFF Area 4 (Motor Pool Release Area)

Table 7
PFAS in Surface Water Samples
AFFF Area 1 (Taxiway Echo Release Area), AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001), and AFFF Area 4 (Motor Pool Release Area)
Hanscom AFB

	Sample ID	A2A3-SWSD5-SW				A4-SWSD1-SW				A4-SWSD1-SW-DUP				A4-SWSD2-SW				A4-SWSD2-SW-DUP				A4-SWSD3-SW				A4-SWSD4-SW			
	Sample Date	08/03/2021				08/03/2021				08/03/2021				08/03/2021				08/03/2021				08/02/2021				08/02/2021			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																													
4:2 FTS	-	ND	4.27	8.58	UJ	ND	4.00	8.01	UJ	ND	4.27	8.57	UJ	ND	4.39	8.76	UJ	ND	4.39	8.77	UJ	ND	4.35	8.72	UJ	ND	4.13	8.29	UJ
6:2 FTS	-	ND	4.27	8.58	UJ	**3.04**	4.00	8.01	J	**4.87**	4.27	8.57	J	**82.2**	4.39	8.76	J	**80.5**	4.39	8.77	J	**100**	4.35	8.72	J	**83.4**	4.13	8.29	J
8:2 FTS	-	ND	4.27	8.58	UJ	ND	4.00	8.01	UJ	ND	4.27	8.57	UJ	**10.1**	4.39	8.76	J	**9.29**	4.39	8.77	J	**12.4**	4.35	8.72	J	**11.5**	4.13	8.29	J
FOSA	-	ND	4.27	8.58	UJ	ND	4.00	8.01	UJ	ND	4.27	8.57	UJ	ND	4.39	8.76	UJ	ND	4.39	8.77	UJ	ND	4.35	8.72	UJ	ND	4.13	8.29	UJ
NEtFOSAA	-	ND	4.27	8.58	UJ	ND	4.00	8.01	UJ	ND	4.27	8.57	UJ	ND	4.39	8.76	UJ	ND	4.39	8.77	UJ	ND	4.35	8.72	UJ	ND	4.13	8.29	UJ
NMeFOSAA	-	ND	4.27	8.58	UJ	ND	4.00	8.01	UJ	ND	4.27	8.57	UJ	ND	4.39	8.76	UJ	ND	4.39	8.77	UJ	ND	4.35	8.72	UJ	ND	4.13	8.29	UJ
PFBA	-	**17.0**	4.27	8.58	J	**5.12**	4.00	8.01	J	**6.19**	4.27	8.57	J	**9.63**	4.39	8.76	J	**9.78**	4.39	8.77	J	**11.7**	4.35	8.72	J	**13.5**	4.13	8.29	J
PFBS	600	**4.51**	4.27	8.58	J	**5.98**	4.00	8.01	J	**5.12**	4.27	8.57	J	**7.67**	4.39	8.76	J	**6.84**	4.39	8.77	J	**10.8**	4.35	8.72	J	**25.8**	4.13	8.29	J
PFDA	-	ND	4.27	8.58	UJ	ND	4.00	8.01	UJ	ND	4.27	8.57	UJ	ND	4.39	8.76	UJ	ND	4.39	8.77	UJ	ND	4.35	8.72	UJ	ND	4.13	8.29	UJ
PFDoA	-	ND	4.27	8.58	UJ	ND	4.00	8.01	UJ	ND	4.27	8.57	UJ	ND	4.39	8.76	UJ	ND	4.39	8.77	UJ	ND	4.35	8.72	UJ	ND	4.13	8.29	UJ
PFDS	-	ND	4.27	8.58	UJ	ND	4.00	8.01	UJ	ND	4.27	8.57	UJ	ND	4.39	8.76	UJ	ND	4.39	8.77	UJ	ND	4.35	8.72	UJ	ND	4.13	8.29	UJ
PFHpA	-	**3.24**	4.27	8.58	J	**5.82**	4.00	8.01	J	**4.77**	4.27	8.57	J	**13.3**	4.39	8.76	J	**12.9**	4.39	8.77	J	**15.9**	4.35	8.72	J	**17.7**	4.13	8.29	J
PFHpS	-	ND	4.27	8.58	UJ	ND	4.00	8.01	UJ	ND	4.27	8.57	UJ	**4.67**	4.39	8.76	J	**3.56**	4.39	8.77	J	**3.37**	4.35	8.72	J	**6.74**	4.13	8.29	J
PFHxA	-	**39.9**	4.27	8.58	J	**12.1**	4.00	8.01	J	**11.8**	4.27	8.57	J	**33.2**	4.39	8.76	J	**30.5**	4.39	8.77	J	**42.7**	4.35	8.72	J	**54.4**	4.13	8.29	J
PFHxS	-	**140**	4.27	8.58	J	**31.7**	4.00	8.01	J	**34.8**	4.27	8.57	J	**75.7**	4.39	8.76	J	**73.5**	4.39	8.77	J	**123**	4.35	8.72	J	**177**	4.13	8.29	J
PFNA	-	ND	4.27	8.58	UJ	ND	4.00	8.01	UJ	ND	4.27	8.57	UJ	**2.71**	4.39	8.76	J	**2.36**	4.39	8.77	J	**3.18**	4.35	8.72	J	**3.97**	4.13	8.29	J
PFNS	-	ND	4.27	8.58	UJ	ND	4.00	8.01	UJ	ND	4.27	8.57	UJ	ND	4.39	8.76	UJ	ND	4.39	8.77	UJ	ND	4.35	8.72	UJ	ND	4.13	8.29	UJ
PFOA	40	**43.8**	4.27	8.58	J	**11.2**	4.00	8.01	J	13.2	4.27	8.57	J	**27.2**	4.39	8.76	J	**25.3**	4.39	8.77	J	**36.8**	4.35	8.72	J	**33.1**	4.13	8.29	J
PFOS	40	**10.5**	4.27	8.58	J	**62.8**	4.00	8.01	J	**75.3**	4.27	8.57	J	**164**	4.39	8.76	J	**128**	4.39	8.77	J	**348**	4.35	8.72	J	**346**	4.13	8.29	J
PFPeA	-	**9.24**	4.27	8.58	J	**9.74**	4.00	8.01	J	**10.4**	4.27	8.57	J	**31.1**	4.39	8.76	J	**30.5**	4.39	8.77	J	**34.4**	4.35	8.72	J	**37.4**	4.13	8.29	J
PFPeS	-	ND	4.27	8.58	UJ	**2.81**	4.00	8.01	J	ND	4.27	8.57	UJ	**5.53**	4.39	8.76	J	**4.86**	4.39	8.77	J	**9.96**	4.35	8.72	J	**26.7**	4.13	8.29	J
PFTeDA	-	ND	4.27	8.58	UJ	ND	4.00	8.01	UJ	ND	4.27	8.57	UJ	ND	4.39	8.76	UJ	ND	4.39	8.77	UJ	ND	4.35	8.72	UJ	ND	4.13	8.29	UJ
PFTrDA	-	ND	4.27	8.58	UJ	ND	4.00	8.01	UJ	ND	4.27	8.57	UJ	ND	4.39	8.76	UJ	ND	4.39	8.77	UJ	ND	4.35	8.72	UJ	ND	4.13	8.29	UJ
PFUnDA	-	ND	4.27	8.58	UJ	ND	4.00	8.01	UJ	ND	4.27	8.57	UJ	ND	4.39	8.76	UJ	ND	4.39	8.77	UJ	ND	4.35	8.72	UJ	ND	4.13	8.29	UJ

Grey Fill — Detected concentration exceeded OSD Tap Water SL

References

a. Office of the Assistant Secretary of Defense (OSD) PFAS Memo dated September 15, 2021.

A1 - AFFF Area 1 (Former FTA II)
A2A3 - AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)
A4 - AFFF Area 4 (Motor Pool Release Area)

Interpreted Qualifiers

J = Estimated concentration
J+ = Estimated concentration, biased high
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)
UJ = The analyte was not detected at a level greater than or equal to the adjusted DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

Acronyms and Abbreviations

DUP	duplicate
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
LOQ	limit of quantitation
QSM	Quality Systems Manual
Qual	interpreted qualifier
SW	surface water
USEPA	United States Environmental Protection Agency
ng/l	nanograms per liter
ND	analyte not detected above the LOD

4:2 FTS	4:2 fluorotelomer sulfonate
6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
FOSA	perfluorooctane sulfonamide
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFDS	perfluorodecane sulfonic acid
PFHpA	perfluoroheptanoic acid
PFHpS	perfluoroheptane sulfonic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFNS	perfluorononane sulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PFPeA	perfluoropentanoic acid
PFPeS	perfluoropentane sulfonic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Table 8
PFAS in Sediment Samples
AFFF Area 1 (Taxiway Echo Release Area), AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001), and AFFF Area 4 (Motor Pool Release Area)
Hanscom AFB

	Sample ID	A1-SWSD1-SD				A1-SWSD2-SD				A1-SWSD3-SD				A2A3-SWSD1-SD				A2A3-SWSD2-SD				A2A3-SWSD3-SD				A2A3-SWSD4-SD			
	Sample Date	07/07/2021				08/02/2021				07/07/2021				08/04/2021				08/04/2021				08/04/2021				08/04/2021			
Analyte	OSD SL Residential Soil HQ=0.1 (ng/g) [a]	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Soil, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/g)																													
4:2 FTS	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	0.994	1.99	U	ND	0.998	2.00	U
6:2 FTS	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	0.994	1.99	U	ND	0.998	2.00	U
8:2 FTS	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	0.994	1.99	U	ND	0.998	2.00	U
FOSA	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	0.994	1.99	U	ND	0.998	2.00	U
NEtFOSAA	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	UJ	ND	0.994	1.99	U	ND	0.998	2.00	UJ
NMeFOSAA	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	UJ	ND	0.994	1.99	U	ND	0.998	2.00	UJ
PFBA	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	UJ	ND	1.00	2.00	U	ND	0.994	1.99	UJ	ND	0.998	2.00	UJ
PFBS	1,900	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	0.994	1.99	U	ND	0.998	2.00	U
PFDA	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	UJ	ND	0.994	1.99	U	ND	0.998	2.00	U
PFDoA	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	UJ	ND	0.994	1.99	U	ND	0.998	2.00	UJ
PFDS	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	0.994	1.99	U	ND	0.998	2.00	U
PFHpA	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	0.994	1.99	U	ND	0.998	2.00	U
PFHpS	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	0.994	1.99	U	ND	0.998	2.00	U
PFHxA	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	0.994	1.99	U	ND	0.998	2.00	U
PFHxS	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	**9.63**	1.00	2.00	J	ND	0.994	1.99	U	ND	0.998	2.00	U
PFNA	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	0.994	1.99	U	ND	0.998	2.00	U
PFNS	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	0.994	1.99	U	ND	0.998	2.00	U
PFOA	130	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	**3.17**	1.00	2.00		**0.605**	0.994	1.99	J	**0.855**	0.998	2.00	J
PFOS	130	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	0.994	1.99	U	ND	0.998	2.00	U
PFPeA	-	ND	1.00	2.00	U	**1.01**	0.979	1.96	J	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	0.994	1.99	U	ND	0.998	2.00	U
PFPeS	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	0.994	1.99	U	ND	0.998	2.00	U
PFTeDA	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	UJ	ND	0.994	1.99	U	ND	0.998	2.00	UJ
PFTrDA	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	UJ	ND	0.994	1.99	U	ND	0.998	2.00	UJ
PFUnDA	-	ND	1.00	2.00	U	ND	0.979	1.96	U	ND	1.00	2.00	U	ND	1.00	2.00	U	ND	1.00	2.00	UJ	ND	0.994	1.99	U	ND	0.998	2.00	U

A1 - AFFF Area 1 (Former FTA II)

A2A3 - AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)

A4 - AFFF Area 4 (Motor Pool Release Area)

Table 8
PFAS in Sediment Samples
AFFF Area 1 (Taxiway Echo Release Area), AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001), and AFFF Area 4 (Motor Pool Release Area)
Hanscom AFB

	Sample ID	A2A3-SWSD5-SD				A4-SWSD1-SD				A4-SWSD1-SD-DUP				A4-SWSD2-SD				A4-SWSD2-SD-DUP				A4-SWSD3-SD				A4-SWSD4-SD			
	Sample Date	08/03/2021				08/03/2021				08/03/2021				08/03/2021				08/03/2021				08/02/2021				08/02/2021			
Analyte	OSD SL Residential Soil HQ=0.1 (ng/g) [a]	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Soil, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/g)																													
4:2 FTS	-	ND	0.994	1.99	U	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
6:2 FTS	-	ND	0.994	1.99	U	**1.16**	0.996	1.99	J	**0.566**	0.978	1.96	J	**1.86**	0.994	1.99	J	**1.32**	0.994	1.99	J	**0.755**	0.985	1.97	J	ND	1.00	2.00	U
8:2 FTS	-	ND	0.994	1.99	U	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
FOSA	-	ND	0.994	1.99	UJ	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
NEtFOSAA	-	ND	0.994	1.99	UJ	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
NMeFOSAA	-	ND	0.994	1.99	UJ	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
PFBA	-	ND	0.994	1.99	UJ	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	UJ
PFBS	1,900	ND	0.994	1.99	U	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
PFDA	-	ND	0.994	1.99	U	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
PFDoA	-	ND	0.994	1.99	UJ	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
PFDS	-	ND	0.994	1.99	U	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
PFHpA	-	ND	0.994	1.99	U	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
PFHpS	-	ND	0.994	1.99	U	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
PFHxA	-	ND	0.994	1.99	U	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
PFHxS	-	ND	0.994	1.99	U	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
PFNA	-	ND	0.994	1.99	U	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
PFNS	-	ND	0.994	1.99	U	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
PFOA	130	**1.69**	0.994	1.99	J	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
PFOS	130	**3.83**	0.994	1.99	J	**2.78**	0.996	1.99		**1.89**	0.978	1.96	J	**2.11**	0.994	1.99		**5.59**	0.994	1.99		**1.53**	0.985	1.97	J	**0.937**	1.00	2.00	J
PFPeA	-	ND	0.994	1.99	U	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
PFPeS	-	ND	0.994	1.99	U	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
PFTeDA	-	ND	0.994	1.99	UJ	ND	0.996	1.99	U	ND	0.978	1.96	UJ	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
PFTrDA	-	ND	0.994	1.99	UJ	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U
PFUnDA	-	ND	0.994	1.99	UJ	ND	0.996	1.99	U	ND	0.978	1.96	U	ND	0.994	1.99	U	ND	0.994	1.99	U	ND	0.985	1.97	U	ND	1.00	2.00	U

A1 - AFFF Area 1 (Former FTA II)
A2A3 - AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)
A4 - AFFF Area 4 (Motor Pool Release Area)

References
a. OSD PFAS Memo dated September 15, 2021.

Interpreted Qualifiers
J = Estimated concentration
J- = Estimated concentration, biased low
J+ = Estimated concentration, biased high
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)
UJ = The analyte was not detected at a level greater than or equal to the adjusted DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.
UX/X = The presence or absence of the analyte cannot be substantiated. Acceptance or rejection of the data should be decided by the project team, but exclusion of the data is recommended.

Acronyms and Abbreviations

DUP	duplicate
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
LOQ	limit of quantitation
QSM	Quality Systems Manual
Qual	interpreted qualifier
SD	sediment
USEPA	United States Environmental Protection Agency
ng/g	nanograms per gram
-	Not applicable
ND	analyte not detected above the LOD

4:2 FTS	4:2 fluorotelomer sulfonate
6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
FOSA	perfluorooctane sulfonamide
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFDS	perfluorodecane sulfonic acid
PFHpA	perfluoroheptanoic acid
PFHpS	perfluoroheptane sulfonic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFNS	perfluorononane sulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PFPeA	perfluoropentanoic acid
PFPeS	perfluoropentane sulfonic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Table 9
pH and TOC in Sediment Samples
AFFF Area 1 (Taxiway Echo Release Area), AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001), and AFFF Area 4 (Motor Pool Release Area)
Hanscom AFB

Sample ID	A1-SWSD1-SD				A1-SWSD2-SD				A1-SWSD3-SD				A2A3-SWSD1-SD				A2A3-SWSD2-SD				A2A3-SWSD3-SD				A2A3-SWSD4-SD			
Sample Date	07/07/2021				08/02/2021				07/07/2021				08/04/2021				08/04/2021				08/04/2021				08/04/2021			
Analyte	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**
pH	**6.53**	1.00	1.00		**6.77**	1.00	1.00		**6.25**	1.00	1.00		**6.07**	1.00	1.00		**6.11**	1.00	1.00		**6.17**	1.00	1.00		**6.13**	1.00	1.00	
Total Organic Carbon (mg/kg)	**12800**	150.00	150.00		**10000**	230.00	310.0		**11800**	150.00	150.00		**21000**	190.00	260.0		**150000**	770.00	1000.0		**41000**	270.00	360.0		**95000**	790.00	1100.0	

Sample ID	A2A3-SWSD5-SD				A4-SWSD1-SD				A4-SWSD1-SD-DUP				A4-SWSD2-SD				A4-SWSD2-SD-DUP				A4-SWSD3-SD				A4-SWSD4-SD			
Sample Date	08/03/2021				08/03/2021				08/03/2021				08/03/2021				08/03/2021				08/02/2021				08/02/2021			
Analyte	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**
pH	**6.01**	1.00	1.00		**6.01**	1.00	1.00		**6.11**	1.00	1.00		**6.32**	1.00	1.00		**6.07**	1.00	1.00		**6.48**	1.00	1.00		**5.80**	1.00	1.00	
Total Organic Carbon (mg/kg)	**220000**	1200.0	1600.0		**4100**	190.00	260.0		**2100**	180.00	240.0		**7300**	210.00	280.0		**1400**	200.00	260.0		**1000**	170.00	230.0		**5200**	190.00	250.0	

Acronyms and Abbreviations

DUP	duplicate
LOD	limit of detection
LOQ	limit of quantitation
Qual	interpreted qualifier
mg/kg	milligram per kilogram
SB	soil boring
SD	sediment

Table 10
PFAS in Groundwater Samples
AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)
Hanscom AFB

	Sample ID	B111-MW-GW-P1				B126-GW-P1				B242-GW-P1				B243-GW-P1				B244A-GW-P1				B246-GW-P1				B249-GW-P1			
	Sample Date	08/19/2020				08/20/2020				08/19/2020				08/19/2020				08/21/2020				08/24/2020				08/24/2020			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																													
4:2 FTS	-	ND	4.27	8.54	U	ND	4.81	9.61	U	ND	4.59	9.20	U	ND	4.39	8.78	U	ND	4.27	8.51	U	ND	4.72	9.43	U	ND	4.50	9.03	U
6:2 FTS	-	ND	4.27	8.54	U	ND	4.81	9.61	U	ND	4.59	9.20	U	ND	4.39	8.78	U	ND	4.27	8.51	U	ND	4.72	9.43	U	ND	4.50	9.03	U
8:2 FTS	-	ND	4.27	8.54	U	ND	4.81	9.61	U	ND	4.59	9.20	U	ND	4.39	8.78	U	ND	4.27	8.51	U	ND	4.72	9.43	U	ND	4.50	9.03	U
FOSA	-	ND	4.27	8.54	U	ND	4.81	9.61	U	ND	4.59	9.20	U	ND	4.39	8.78	UJ	ND	4.27	8.51	UJ	ND	4.72	9.43	U	ND	4.50	9.03	U
NEtFOSAA	-	ND	4.27	8.54	U	ND	4.81	9.61	U	ND	4.59	9.20	U	ND	4.39	8.78	U	ND	4.27	8.51	U	ND	4.72	9.43	U	ND	4.50	9.03	U
NMeFOSAA	-	ND	4.27	8.54	U	ND	4.81	9.61	U	ND	4.59	9.20	U	ND	4.39	8.78	U	ND	4.27	8.51	U	ND	4.72	9.43	U	ND	4.50	9.03	U
PFBA	-	**15.9**	4.27	8.54		**31.7**	4.81	9.61		**55.8**	4.59	9.20		**66.3**	4.39	8.78		ND	4.27	8.51	U	**3.77**	4.72	9.43	J	ND	4.50	9.03	U
PFBS	600	**32.1**	4.27	8.54		**56.5**	4.81	9.61		**84.1**	4.59	9.20		**89.0**	4.39	8.78		**4.66**	4.27	8.51	J	**5.68**	4.72	9.43	J	ND	4.50	9.03	U
PFDA	-	ND	4.27	8.54	U	ND	4.81	9.61	U	ND	4.59	9.20	U	ND	4.39	8.78	U	ND	4.27	8.51	U	ND	4.72	9.43	U	ND	4.50	9.03	U
PFDoA	-	ND	4.27	8.54	U	ND	4.81	9.61	U	ND	4.59	9.20	U	ND	4.39	8.78	U	ND	4.27	8.51	U	ND	4.72	9.43	U	ND	4.50	9.03	U
PFDS	-	ND	4.27	8.54	U	ND	4.81	9.61	U	ND	4.59	9.20	U	ND	4.39	8.78	U	ND	4.27	8.51	U	ND	4.72	9.43	U	ND	4.50	9.03	U
PFHpA	-	**28.1**	4.27	8.54		**24.5**	4.81	9.61		**34.7**	4.59	9.20		**68.5**	4.39	8.78		ND	4.27	8.51	U	ND	4.72	9.43	U	ND	4.50	9.03	U
PFHpS	-	**2.22**	4.27	8.54	J	**8.17**	4.81	9.61	J	**16.4**	4.59	9.20		**12.6**	4.39	8.78		ND	4.27	8.51	U	ND	4.72	9.43	U	ND	4.50	9.03	U
PFHxA	-	**346**	4.27	8.54		**596**	4.81	9.61		**1000**	4.59	9.20		**1340**	4.39	8.78		**29.3**	4.27	8.51		**32.0**	4.72	9.43		ND	4.50	9.03	U
PFHxS	-	**1120**	4.27	8.54		**3070**	4.81	9.61		**3790**	4.59	9.20		**4060**	21.9	43.9		**92.9**	4.27	8.51		**202**	4.72	9.43		ND	4.50	9.03	U
PFNA	-	ND	4.27	8.54	U	ND	4.81	9.61	U	ND	4.59	9.20	U	**3.07**	4.39	8.78	J	ND	4.27	8.51	U	ND	4.72	9.43	U	ND	4.50	9.03	U
PFNS	-	ND	4.27	8.54	U	ND	4.81	9.61	U	ND	4.59	9.20	U	ND	4.39	8.78	U	ND	4.27	8.51	U	ND	4.72	9.43	U	ND	4.50	9.03	U
PFOA	40	**1240**	4.27	8.54		**499**	4.81	9.61		**703**	4.59	9.20		**2400**	4.39	8.78		**101**	4.27	8.51		**42.5**	4.72	9.43		**2.69**	4.50	9.03	J
PFOS	40	**15.3**	4.27	8.54	Q	**109**	4.81	9.61		**287**	4.59	9.20		**193**	4.39	8.78		**ND**	4.27	8.51	U	**3.11**	4.72	9.43	J	ND	4.50	9.03	U
PFPeA	-	**44.5**	4.27	8.54		**95.8**	4.81	9.61		**157**	4.59	9.20		**200**	4.39	8.78		**3.45**	4.27	8.51	J	**5.56**	4.72	9.43	J	ND	4.50	9.03	U
PFPeS	-	**28.8**	4.27	8.54		**50.7**	4.81	9.61		**65.2**	4.59	9.20		**79.5**	4.39	8.78		**3.41**	4.27	8.51	J	**4.71**	4.72	9.43	J	ND	4.50	9.03	U
PFTeDA	-	ND	4.27	8.54	U	ND	4.81	9.61	U	ND	4.59	9.20	U	ND	4.39	8.78	U	ND	4.27	8.51	U	ND	4.72	9.43	U	ND	4.50	9.03	U
PFTrDA	-	ND	4.27	8.54	U	ND	4.81	9.61	U	ND	4.59	9.20	U	ND	4.39	8.78	U	ND	4.27	8.51	U	ND	4.72	9.43	U	ND	4.50	9.03	U
PFUnDA	-	ND	4.27	8.54	U	ND	4.81	9.61	U	ND	4.59	9.20	U	ND	4.39	8.78	U	ND	4.27	8.51	U	ND	4.72	9.43	U	ND	4.50	9.03	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

Table 10
PFAS in Groundwater Samples
AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)
Hanscom AFB

	Sample ID	B245-GW-P1				B248-GW-P1				B253-GW-P1				B254-GW-P1				B254-GW-P1-DUP				B255-GW-P1				B256-L-GW-P1			
	Sample Date	08/21/2020				08/20/2020				08/17/2020				08/17/2020				08/17/2020				08/17/2020				08/21/2020			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																													
4:2 FTS	-	ND	4.46	8.96	U	ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	ND	4.59	9.18	U
6:2 FTS	-	ND	4.46	8.96	U	ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	ND	4.59	9.18	U
8:2 FTS	-	ND	4.46	8.96	U	ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	ND	4.59	9.18	U
FOSA	-	ND	4.46	8.96	UJ	ND	4.59	9.16	U	ND	4.59	9.21	UJ	ND	4.46	8.91	UJ	ND	4.81	9.60	UJ	ND	4.17	8.34	UJ	ND	4.59	9.18	UJ
NEtFOSAA	-	ND	4.46	8.96	U	ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	ND	4.59	9.18	U
NMeFOSAA	-	ND	4.46	8.96	U	ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	ND	4.59	9.18	U
PFBA	-	**10.3**	4.46	8.96		ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	ND	4.59	9.18	U
PFBS	600	**16.5**	4.46	8.96		ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	ND	4.59	9.18	U
PFDA	-	ND	4.46	8.96	U	ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	ND	4.59	9.18	U
PFDoA	-	ND	4.46	8.96	U	ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	ND	4.59	9.18	U
PFDS	-	ND	4.46	8.96	U	ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	ND	4.59	9.18	U
PFHpA	-	**5.77**	4.46	8.96	J	ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	ND	4.59	9.18	U
PFHpS	-	ND	4.46	8.96	U	ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	ND	4.59	9.18	U
PFHxA	-	**152**	4.46	8.96		**4.27**	4.59	9.16	J	ND	4.59	9.21	U	**3.67**	4.46	8.91	J	**3.85**	4.81	9.60	J	ND	4.17	8.34	U	ND	4.59	9.18	U
PFHxS	-	**970**	4.46	8.96		**11.7**	4.59	9.16		ND	4.59	9.21	U	**9.45**	4.46	8.91		**7.50**	4.81	9.60	J	ND	4.17	8.34	U	**3.94**	4.59	9.18	J
PFNA	-	ND	4.46	8.96	U	ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	ND	4.59	9.18	U
PFNS	-	ND	4.46	8.96	U	ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	ND	4.59	9.18	U
PFOA	40	**88.0**	4.46	8.96		**14.2**	4.59	9.16		ND	4.59	9.21	U	**12.5**	4.46	8.91		**13.1**	4.81	9.60		ND	4.17	8.34	U	**4.13**	4.59	9.18	J
PFOS	40	**18.1**	4.46	8.96		ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	**3.19**	4.59	9.18	J
PFPeA	-	**21.9**	4.46	8.96		ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	ND	4.59	9.18	U
PFPeS	-	**16.6**	4.46	8.96		ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	ND	4.59	9.18	U
PFTeDA	-	ND	4.46	8.96	U	ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	ND	4.59	9.18	U
PFTrDA	-	ND	4.46	8.96	U	ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	ND	4.59	9.18	U
PFUnDA	-	ND	4.46	8.96	U	ND	4.59	9.16	U	ND	4.59	9.21	U	ND	4.46	8.91	U	ND	4.81	9.60	U	ND	4.17	8.34	U	ND	4.59	9.18	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

Table 10
PFAS in Groundwater Samples
AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)
Hanscom AFB

	Sample ID	B256-L-GW-P1-DUP				B256-R-GW-P1				B256-S-GW-P1				B257-L-GW-P1				B257-R-GW-P1				B257-S-GW-P1				B257-S-GW-P1-DUP			
	Sample Date	08/21/2020				08/21/2020				08/21/2020				08/20/2020				08/20/2020				08/20/2020				08/20/2020			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																													
4:2 FTS	-	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
6:2 FTS	-	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
8:2 FTS	-	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
FOSA	-	ND	4.46	8.93	U	ND	4.59	9.17	UJ	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	UJ	ND	4.42	8.87	U	ND	4.72	9.42	U
NEtFOSAA	-	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
NMeFOSAA	-	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
PFBA	-	ND	4.46	8.93	U	ND	4.59	9.17	U	**3.35**	4.55	9.12	J	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
PFBS	600	ND	4.46	8.93	U	ND	4.59	9.17	U	**4.09**	4.55	9.12	J	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
PFDA	-	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
PFDoA	-	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
PFDS	-	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
PFHpA	-	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
PFHpS	-	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
PFHxA	-	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
PFHxS	-	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
PFNA	-	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
PFNS	-	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
PFOA	40	**4.19**	4.46	8.93	J	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
PFOS	40	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
PFPeA	-	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
PFPeS	-	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
PFTeDA	-	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
PFTrDA	-	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U
PFUnDA	-	ND	4.46	8.93	U	ND	4.59	9.17	U	ND	4.55	9.12	U	ND	4.59	9.20	U	ND	4.76	9.49	U	ND	4.42	8.87	U	ND	4.72	9.42	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

Table 10
PFAS in Groundwater Samples
AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)
Hanscom AFB

	Sample ID	B258-L-GW-P1				B258-R-GW-P1				B258S-GW-P1				IW-1-GW-P1				IW-2-GW-P1				IW-4-GW-P1				IW-11-GW-P1			
	Sample Date	08/20/2020				08/20/2020				08/17/2020				08/19/2020				08/19/2020				08/19/2020				08/19/2020			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																													
4:2 FTS	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	ND	4.31	8.61	U	ND	4.46	8.94	U	ND	4.67	9.34	U	ND	4.72	9.45	U
6:2 FTS	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	ND	4.31	8.61	U	ND	4.46	8.94	U	ND	4.67	9.34	U	ND	4.72	9.45	U
8:2 FTS	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	ND	4.31	8.61	U	ND	4.46	8.94	U	ND	4.67	9.34	U	ND	4.72	9.45	U
FOSA	-	ND	4.46	8.96	UJ	ND	4.31	8.60	UJ	ND	4.63	9.22	UJ	**9.39**	4.31	8.61	J	ND	4.46	8.94	UJ	ND	4.67	9.34	U	**7.22**	4.72	9.45	J
NEtFOSAA	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	UJ	ND	4.31	8.61	U	ND	4.46	8.94	U	ND	4.67	9.34	U	ND	4.72	9.45	U
NMeFOSAA	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	ND	4.31	8.61	U	ND	4.46	8.94	U	ND	4.67	9.34	U	ND	4.72	9.45	U
PFBA	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	**4.67**	4.31	8.61	J	**26.8**	4.46	8.94		**14.6**	4.67	9.34		**119**	4.72	9.45	
PFBS	600	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	**5.69**	4.31	8.61	J	**42.8**	4.46	8.94		**16.3**	4.67	9.34		**168**	4.72	9.45	
PFDA	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	**2.23**	4.31	8.61	J	ND	4.46	8.94	U	ND	4.67	9.34	U	ND	4.72	9.45	U
PFDoA	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	ND	4.31	8.61	U	ND	4.46	8.94	U	ND	4.67	9.34	U	ND	4.72	9.45	U
PFDS	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	ND	4.31	8.61	U	ND	4.46	8.94	U	ND	4.67	9.34	U	ND	4.72	9.45	U
PFHpA	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	**4.84**	4.31	8.61	J,Q	**20.7**	4.46	8.94		**21.4**	4.67	9.34		**87.6**	4.72	9.45	
PFHpS	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	**3.35**	4.31	8.61	J	**6.77**	4.46	8.94	J	**2.68**	4.67	9.34	J	**23.9**	4.72	9.45	
PFHxA	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	**46.9**	4.31	8.61		**512**	4.46	8.94		**286**	4.67	9.34		**2060**	4.72	9.45	
PFHxS	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	**294**	4.31	8.61		**2660**	4.46	8.94		**668**	4.67	9.34		**7460**	23.6	47.2	
PFNA	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	**3.04**	4.31	8.61	J	ND	4.46	8.94	U	ND	4.67	9.34	U	**4.35**	4.72	9.45	J
PFNS	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	ND	4.31	8.61	U	ND	4.46	8.94	U	ND	4.67	9.34	U	ND	4.72	9.45	U
PFOA	40	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	**138**	4.31	8.61		**462**	4.46	8.94		**748**	4.67	9.34		**2560**	4.72	9.45	
PFOS	40	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	**237**	4.31	8.61		**67.2**	4.46	8.94		**20.6**	4.67	9.34	Q	**521**	4.72	9.45	
PFPeA	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	**8.84**	4.31	8.61		**74.9**	4.46	8.94		**39.3**	4.67	9.34		**322**	4.72	9.45	
PFPeS	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	**3.39**	4.31	8.61	J	**41.2**	4.46	8.94		**16.9**	4.67	9.34		**136**	4.72	9.45	
PFTeDA	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	ND	4.31	8.61	U	ND	4.46	8.94	U	ND	4.67	9.34	U	ND	4.72	9.45	U
PFTrDA	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	ND	4.31	8.61	U	ND	4.46	8.94	U	ND	4.67	9.34	U	ND	4.72	9.45	U
PFUnDA	-	ND	4.46	8.96	U	ND	4.31	8.60	U	ND	4.63	9.22	U	ND	4.31	8.61	U	ND	4.46	8.94	U	ND	4.67	9.34	U	ND	4.72	9.45	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

Table 10
PFAS in Groundwater Samples
AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)
Hanscom AFB

	Sample ID	PO1-2R-GW-P1				PO1-2S-GW-P1				RAP1-1R-GW-P1				RAP1-1R-GW-P1-DUP				RAP1-1T-GW-P1				RAP1-4RA-GW-P1				RAP1-4S-GW-P1			
	Sample Date	08/18/2020				08/18/2020				08/19/2020				08/19/2020				08/19/2020				08/18/2020				08/18/2020			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																													
4:2 FTS	-	ND	4.59	9.18	U	ND	4.63	9.23	U	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	ND	4.35	8.67	U	ND	4.81	9.62	U
6:2 FTS	-	ND	4.59	9.18	U	ND	4.63	9.23	U	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	ND	4.35	8.67	U	ND	4.81	9.62	U
8:2 FTS	-	ND	4.59	9.18	U	ND	4.63	9.23	U	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	ND	4.35	8.67	U	ND	4.81	9.62	U
FOSA	-	ND	4.59	9.18	UJ	ND	4.63	9.23	UJ	ND	4.42	8.84	UJ	ND	4.46	8.94	UJ	ND	4.39	8.74	UJ	ND	4.35	8.67	UJ	ND	4.81	9.62	UJ
NEtFOSAA	-	ND	4.59	9.18	U	ND	4.63	9.23	U	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	ND	4.35	8.67	U	ND	4.81	9.62	U
NMeFOSAA	-	ND	4.59	9.18	U	ND	4.63	9.23	U	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	ND	4.35	8.67	U	ND	4.81	9.62	U
PFBA	-	**30.6**	4.59	9.18	J	**2.66**	4.63	9.23	J	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	**3.79**	4.35	8.67	J	**24.2**	4.81	9.62	
PFBS	600	**48.9**	4.59	9.18		ND	4.63	9.23	U	**9.61**	4.42	8.84		**9.11**	4.46	8.94		ND	4.39	8.74	UJ	**6.23**	4.35	8.67	J	ND	4.81	9.62	U
PFDA	-	ND	4.59	9.18	U	ND	4.63	9.23	U	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	ND	4.35	8.67	U	ND	4.81	9.62	U
PFDoA	-	ND	4.59	9.18	U	ND	4.63	9.23	U	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	ND	4.35	8.67	U	ND	4.81	9.62	U
PFDS	-	ND	4.59	9.18	U	ND	4.63	9.23	U	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	ND	4.35	8.67	U	ND	4.81	9.62	U
PFHpA	-	**18.6**	4.59	9.18		ND	4.63	9.23	U	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	**3.27**	4.35	8.67	J	ND	4.81	9.62	U
PFHpS	-	**6.84**	4.59	9.18	J	ND	4.63	9.23	U	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	ND	4.35	8.67	U	ND	4.81	9.62	U
PFHxA	-	**547**	4.59	9.18		ND	4.63	9.23	U	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	**49.5**	4.35	8.67		**5.66**	4.81	9.62	J
PFHxS	-	**3050**	4.59	9.18		**33.6**	4.63	9.23		**7.66**	4.42	8.84	J	**8.60**	4.46	8.94	J	**6.61**	4.39	8.74	J	**287**	4.35	8.67		**16.1**	4.81	9.62	
PFNA	-	ND	4.59	9.18	U	ND	4.63	9.23	U	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	ND	4.35	8.67	U	**2.54**	4.81	9.62	J
PFNS	-	ND	4.59	9.18	U	ND	4.63	9.23	U	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	ND	4.35	8.67	U	ND	4.81	9.62	U
PFOA	40	**203**	4.59	9.18		**3.97**	4.63	9.23	J	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	**52.4**	4.35	8.67		**7.02**	4.81	9.62	J
PFOS	40	**93.2**	4.59	9.18		**3.66**	4.63	9.23	J	**2.90**	4.42	8.84	J,Q	**2.39**	4.46	8.94	J	ND	4.39	8.74	UJ	**19.9**	4.35	8.67		**21.2**	4.81	9.62	
PFPeA	-	**85.1**	4.59	9.18		ND	4.63	9.23	U	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	**6.81**	4.35	8.67	J	**4.49**	4.81	9.62	J
PFPeS	-	**47.0**	4.59	9.18		ND	4.63	9.23	U	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	**5.66**	4.35	8.67	J	ND	4.81	9.62	U
PFTeDA	-	ND	4.59	9.18	U	ND	4.63	9.23	U	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	ND	4.35	8.67	U	ND	4.81	9.62	U
PFTrDA	-	ND	4.59	9.18	U	ND	4.63	9.23	U	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	ND	4.35	8.67	U	ND	4.81	9.62	U
PFUnDA	-	ND	4.59	9.18	U	ND	4.63	9.23	U	ND	4.42	8.84	U	ND	4.46	8.94	U	ND	4.39	8.74	UJ	ND	4.35	8.67	U	ND	4.81	9.62	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

Table 10
PFAS in Groundwater Samples
AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)
Hanscom AFB

	Sample ID	RAP1-6R-GW-P1				RAP1-6S-GW-P1				RAP1-6T-GW-P1				RAP2-1R-GW-P1				RAP2-1T-GW-P1			
	Sample Date	08/18/2020				08/18/2020				08/18/2020				08/19/2020				08/19/2020			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																					
4:2 FTS	-	ND	4.50	9.04	U	ND	4.63	9.26	U	ND	4.59	9.14	U	ND	4.46	8.93	U	ND	4.24	8.49	U
6:2 FTS	-	ND	4.50	9.04	U	ND	4.63	9.26	U	ND	4.59	9.14	U	ND	4.46	8.93	U	ND	4.24	8.49	U
8:2 FTS	-	ND	4.50	9.04	U	ND	4.63	9.26	U	ND	4.59	9.14	U	ND	4.46	8.93	U	ND	4.24	8.49	U
FOSA	-	ND	4.50	9.04	U	ND	4.63	9.26	UJ	ND	4.59	9.14	UJ	ND	4.46	8.93	U	ND	4.24	8.49	U
NEtFOSAA	-	ND	4.50	9.04	U	ND	4.63	9.26	U	ND	4.59	9.14	U	ND	4.46	8.93	U	ND	4.24	8.49	U
NMeFOSAA	-	ND	4.50	9.04	U	ND	4.63	9.26	U	ND	4.59	9.14	U	ND	4.46	8.93	U	ND	4.24	8.49	U
PFBA	-	**206**	4.50	9.04		**51.7**	4.63	9.26		**130**	4.59	9.14		ND	4.46	8.93	U	**6.34**	4.24	8.49	J
PFBS	600	**221**	4.50	9.04		**55.2**	4.63	9.26		**171**	4.59	9.14		ND	4.46	8.93	U	**6.84**	4.24	8.49	J
PFDA	-	ND	4.50	9.04	U	ND	4.63	9.26	U	ND	4.59	9.14	U	ND	4.46	8.93	U	ND	4.24	8.49	U
PFDoA	-	ND	4.50	9.04	U	ND	4.63	9.26	U	ND	**4.59**	9.14	U	ND	4.46	8.93	U	ND	4.24	8.49	U
PFDS	-	ND	4.50	9.04	U	ND	4.63	9.26	U	ND	4.59	9.14	U	ND	4.46	8.93	U	ND	4.24	8.49	U
PFHpA	-	**287**	4.50	9.04		**65.8**	4.63	9.26		**107**	4.59	9.14		ND	4.46	8.93	U	**8.37**	4.24	8.49	J
PFHpS	-	**31.8**	4.50	9.04		**9.35**	4.63	9.26		**24.1**	4.59	9.14		ND	4.46	8.93	U	ND	4.24	8.49	U
PFHxA	-	**4370**	22.5	45.2		**1160**	4.63	9.26		**2380**	4.59	9.14		ND	4.46	8.93	U	**129**	4.24	8.49	
PFHxS	-	**9290**	22.5	45.2		**3400**	4.63	9.26		**8000**	22.9	45.7		ND	4.46	8.93	U	**275**	4.24	8.49	
PFNA	-	**5.33**	4.50	9.04	J	**2.59**	4.63	9.26	J	**4.27**	4.59	9.14	J	ND	4.46	8.93	U	ND	4.24	8.49	U
PFNS	-	ND	4.50	9.04	U	ND	4.63	9.26	U	ND	4.59	9.14	U	ND	4.46	8.93	U	ND	4.24	8.49	U
PFOA	40	**8860**	22.5	45.2		**2300**	4.63	9.26		**3370**	4.59	9.14		**3.76**	4.46	8.93	J	**343**	4.24	8.49	
PFOS	40	**365**	4.50	9.04		**70.6**	4.63	9.26	J	**562**	4.59	9.14		ND	4.46	8.93	U	**11.1**	4.24	8.49	J
PFPeA	-	**653**	4.50	9.04		**165**	4.63	9.26		**384**	4.59	9.14		ND	4.46	8.93	U	**18.9**	4.24	8.49	
PFPeS	-	**204**	4.50	9.04		**53.8**	4.63	9.26		**147**	4.59	9.14		ND	4.46	8.93	U	**5.79**	4.24	8.49	J
PFTeDA	-	ND	4.50	9.04	U	ND	4.63	9.26	U	ND	4.59	9.14	U	ND	4.46	8.93	U	ND	4.24	8.49	U
PFTrDA	-	ND	4.50	9.04	U	ND	4.63	9.26	U	ND	4.59	9.14	U	ND	4.46	8.93	U	ND	4.24	8.49	U
PFUnDA	-	ND	4.50	9.04	U	ND	4.63	9.26	U	ND	4.59	9.14	U	ND	4.46	8.93	U	ND	4.24	8.49	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

Table 10
PFAS in Groundwater Samples
AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)
Hanscom AFB

	Sample ID	B111-MW-GW-P2				B126-MW-GW-P2				B242-GW-P2				B243-GW-P2				B244A-GW-P2				B245-GW-P2				B246-GW-P2			
	Sample Date	04/12/2021				04/08/2021				04/01/2021				04/01/2021				04/08/2021				04/08/2021				04/08/2021			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																													
4:2 FTS	-	ND	4.17	8.37	U	ND	4.39	8.74	U	ND	4.10	8.19	U	ND	4.27	8.57	U	ND	4.17	8.35	U	ND	4.24	8.49	U	ND	4.17	8.30	U
6:2 FTS	-	ND	4.17	8.37	U	ND	4.39	8.74	U	ND	4.10	8.19	U	ND	4.27	8.57	U	ND	4.17	8.35	U	ND	4.24	8.49	U	ND	4.17	8.30	U
8:2 FTS	-	ND	4.17	8.37	U	ND	4.39	8.74	U	ND	4.10	8.19	U	ND	4.27	8.57	U	ND	4.17	8.35	U	ND	4.24	8.49	U	ND	4.17	8.30	U
FOSA	-	ND	4.17	8.37	U	ND	4.39	8.74	U	ND	4.10	8.19	UJ	ND	4.27	8.57	UJ	ND	4.17	8.35	U	ND	4.24	8.49	U	ND	4.17	8.30	U
NEtFOSAA	-	ND	4.17	8.37	U	ND	4.39	8.74	U	ND	4.10	8.19	U	ND	4.27	8.57	U	ND	4.17	8.35	U	ND	4.24	8.49	U	ND	4.17	8.30	U
NMeFOSAA	-	ND	4.17	8.37	U	ND	4.39	8.74	U	ND	4.10	8.19	U	ND	4.27	8.57	U	ND	4.17	8.35	U	ND	4.24	8.49	U	ND	4.17	8.30	U
PFBA	-	**20.7**	4.17	8.37		**34.3**	4.39	8.74		**61.5**	4.10	8.19		**77.2**	4.27	8.57		ND	4.17	8.35	U	**7.89**	4.24	8.49	J	**14.6**	4.17	8.30	
PFBS	600	**40.9**	4.17	8.37		**55.9**	4.39	8.74		**90.5**	4.10	8.19		**107**	4.27	8.57		**3.83**	4.17	8.35	J	**14.0**	4.24	8.49		**10.2**	4.17	8.30	
PFDA	-	ND	4.17	8.37	U	ND	4.39	8.74	U	ND	4.10	8.19	U	ND	4.27	8.57	U	ND	4.17	8.35	U	ND	4.24	8.49	U	ND	4.17	8.30	U
PFDoA	-	ND	4.17	8.37	U	ND	4.39	8.74	U	ND	4.10	8.19	U	ND	4.27	8.57	U	ND	4.17	8.35	U	ND	4.24	8.49	U	ND	4.17	8.30	U
PFDS	-	ND	4.17	8.37	U	ND	4.39	8.74	U	ND	4.10	8.19	U	ND	4.27	8.57	U	ND	4.17	8.35	U	ND	4.24	8.49	U	ND	4.17	8.30	U
PFHpA	-	**31.7**	4.17	8.37		**27.3**	4.39	8.74		**36.0**	4.10	8.19		**83.1**	4.27	8.57		ND	4.17	8.35	U	**6.06**	4.24	8.49	J	**6.33**	4.17	8.30	J
PFHpS	-	ND	4.17	8.37	U	**8.30**	4.39	8.74	J	**13.4**	4.10	8.19		**16.6**	4.27	8.57		ND	4.17	8.35	U	ND	4.24	8.49	U	ND	4.17	8.30	U
PFHxA	-	**477**	4.17	8.37		**677**	4.39	8.74		**925**	4.10	8.19		**1420**	4.27	8.57		**21.6**	4.17	8.35		**137**	4.24	8.49		**98.9**	4.17	8.30	
PFHxS	-	**1500**	4.17	8.37		**3140**	4.39	8.74		**3760**	4.10	8.19		**4220**	4.27	8.57		**63.1**	4.17	8.35		**892**	4.24	8.49		**236**	4.17	8.30	
PFNA	-	ND	4.17	8.37	U	ND	4.39	8.74	U	ND	4.10	8.19	U	ND	4.27	8.57	U	ND	4.17	8.35	U	ND	4.24	8.49	U	ND	4.17	8.30	U
PFNS	-	ND	4.17	8.37	U	ND	4.39	8.74	U	ND	4.10	8.19	U	ND	4.27	8.57	U	ND	4.17	8.35	U	ND	4.24	8.49	U	ND	4.17	8.30	U
PFOA	40	**1380**	4.17	8.37		**572**	4.39	8.74		**676**	4.10	8.19		**2420**	4.27	8.57		**93.8**	4.17	8.35		**92.8**	4.24	8.49		**157**	4.17	8.30	
PFOS	40	**21.3**	4.17	8.37		**88.5**	4.39	8.74		**268**	4.10	8.19		**215**	4.27	8.57		ND	4.17	8.35	U	**17.5**	4.24	8.49	J	**4.02**	4.17	8.30	J+
PFPeA	-	**59.7**	4.17	8.37		**96.8**	4.39	8.74		**153**	4.10	8.19		**205**	4.27	8.57		**3.16**	4.17	8.35	J	**18.2**	4.24	8.49		**18.3**	4.17	8.30	
PFPeS	-	**36.1**	4.17	8.37		**47.1**	4.39	8.74		**68.8**	4.10	8.19		**90.0**	4.27	8.57		**2.29**	4.17	8.35	J	**15.1**	4.24	8.49		**7.42**	4.17	8.30	J
PFTeDA	-	ND	4.17	8.37	U	ND	4.39	8.74	U	ND	4.10	8.19	U	ND	4.27	8.57	U	ND	4.17	8.35	U	ND	4.24	8.49	U	ND	4.17	8.30	U
PFTrDA	-	ND	4.17	8.37	U	ND	4.39	8.74	U	ND	4.10	8.19	U	ND	4.27	8.57	U	ND	4.17	8.35	U	ND	4.24	8.49	U	ND	4.17	8.30	U
PFUnDA	-	ND	4.17	8.37	U	ND	4.39	8.74	U	ND	4.10	8.19	U	ND	4.27	8.57	U	ND	4.17	8.35	U	ND	4.24	8.49	U	ND	4.17	8.30	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

Table 10
PFAS in Groundwater Samples
AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)
Hanscom AFB

	Sample ID	B248-GW-P2				B249-GW-P2				B253-GW-P2				B254-GW-P2				B255-GW-P2				B256-L-GW-P2				B256-R-GW-P2			
	Sample Date	04/05/2021				04/05/2021				04/06/2021				04/06/2021				04/06/2021				04/05/2021				04/05/2021			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																													
4:2 FTS	-	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	ND	4.27	8.53	U	ND	4.39	8.78	U
6:2 FTS	-	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	ND	4.27	8.53	U	ND	4.39	8.78	U
8:2 FTS	-	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	ND	4.27	8.53	U	ND	4.39	8.78	U
FOSA	-	ND	4.31	8.60	UJ	ND	4.20	8.41	UJ	ND	4.39	8.77	UJ	ND	4.35	8.70	UJ	ND	4.35	8.68	UJ	ND	4.35	8.73	UJ	ND	4.31	8.63	UJ
NEtFOSAA	-	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	ND	4.27	8.53	U	ND	4.39	8.78	U
NMeFOSAA	-	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	ND	4.27	8.53	U	ND	4.39	8.78	U
PFBA	-	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	**3.31**	4.27	8.53	J	**2.95**	4.39	8.78	J
PFBS	600	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	ND	4.27	8.53	U	ND	4.39	8.78	U
PFDA	-	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	ND	4.27	8.53	U	ND	4.39	8.78	U
PFDoA	-	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	ND	4.27	8.53	U	ND	4.39	8.78	U
PFDS	-	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	ND	4.27	8.53	U	ND	4.39	8.78	U
PFHpA	-	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	ND	4.27	8.53	U	ND	4.39	8.78	U
PFHpS	-	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	ND	4.27	8.53	U	ND	4.39	8.78	U
PFHxA	-	**3.76**	4.31	8.64	J	ND	4.46	8.96	U	ND	4.42	8.81	U	**4.49**	4.35	8.70	J	ND	4.46	8.95	U	**2.20**	4.27	8.53	J	ND	4.39	8.78	U
PFHxS	-	**10.8**	4.31	8.64		ND	4.46	8.96	U	ND	4.42	8.81	U	**10.6**	4.35	8.70		ND	4.46	8.95	U	**4.55**	4.27	8.53	J	**3.88**	4.39	8.78	J
PFNA	-	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	ND	4.27	8.53	U	ND	4.39	8.78	U
PFNS	-	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	ND	4.27	8.53	U	ND	4.39	8.78	U
PFOA	40	**16.3**	4.31	8.64		**3.45**	4.46	8.96	J	ND	4.42	8.81	U	**20.7**	4.35	8.70		ND	4.46	8.95	U	**5.98**	4.27	8.53	J	**5.25**	4.39	8.78	J
PFOS	40	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	**2.25**	4.27	8.53	J	ND	4.39	8.78	U
PFPeA	-	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	**3.31**	4.27	8.53	J	**2.45**	4.39	8.78	J
PFPeS	-	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	ND	4.27	8.53	U	ND	4.39	8.78	U
PFTeDA	-	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	ND	4.27	8.53	U	ND	4.39	8.78	U
PFTrDA	-	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	ND	4.27	8.53	U	ND	4.39	8.78	U
PFUnDA	-	ND	4.31	8.64	U	ND	4.46	8.96	U	ND	4.42	8.81	U	ND	4.35	8.70	U	ND	4.46	8.95	U	ND	4.27	8.53	U	ND	4.39	8.78	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

Table 10
PFAS in Groundwater Samples
AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)
Hanscom AFB

	Sample ID	B256-S-GW-P2				B257-L-GW-P2				B257-R-GW-P2				B257-R-GW-P2-DUP				B257-S-GW-P2				B258-L-GW-P2				B258-R-GW-P2			
	Sample Date	04/05/2021				04/06/2021				04/06/2021				04/06/2021				04/06/2021				04/02/2021				04/02/2021			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																													
4:2 FTS	-	ND	4.35	8.73	U	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
6:2 FTS	-	ND	4.35	8.73	U	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
8:2 FTS	-	ND	4.35	8.73	U	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
FOSA	-	ND	4.35	8.69	UJ	ND	4.39	8.77	UJ	ND	4.35	8.69	UJ	ND	4.20	8.40	UJ	ND	4.46	8.96	UJ	ND	4.39	8.76	U	ND	4.42	8.85	U
NEtFOSAA	-	ND	4.35	8.73	U	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
NMeFOSAA	-	ND	4.35	8.73	U	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
PFBA	-	**5.69**	4.35	8.73	J	ND	4.39	8.77	U	**4.67**	4.35	8.73	J	**5.56**	4.27	8.57	J	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
PFBS	600	**5.14**	4.35	8.73	J	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
PFDA	-	ND	4.35	8.73	U	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
PFDoA	-	ND	4.35	8.73	U	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
PFDS	-	ND	4.35	8.73	U	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
PFHpA	-	ND	4.35	8.73	U	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
PFHpS	-	ND	4.35	8.73	U	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
PFHxA	-	ND	4.35	8.73	U	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
PFHxS	-	ND	4.35	8.73	U	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
PFNA	-	ND	4.35	8.73	U	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
PFNS	-	ND	4.35	8.73	U	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
PFOA	40	ND	4.35	8.73	U	ND	4.39	8.77	U	**2.81**	4.35	8.73	J	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
PFOS	40	ND	4.35	8.73	U	ND	4.39	8.77	U	**2.71**	4.35	8.73	J	**2.83**	4.27	8.57	J	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
PFPeA	-	ND	4.35	8.73	U	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
PFPeS	-	ND	4.35	8.73	U	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
PFTeDA	-	ND	4.35	8.73	U	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
PFTrDA	-	ND	4.35	8.73	U	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U
PFUnDA	-	ND	4.35	8.73	U	ND	4.39	8.77	U	ND	4.35	8.73	U	ND	4.27	8.57	U	ND	4.46	8.96	U	ND	4.39	8.76	U	ND	4.42	8.85	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

Table 10
PFAS in Groundwater Samples
AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)
Hanscom AFB

	Sample ID	B258-S-GW-P2				IW-1-GW-P2				IW-2-GW-P2				IW-4-GW-P2				IW-11-GW-P2				P01-2R-GW-P2				P01-2R-GW-P2-DUP			
	Sample Date	04/02/2021				04/01/2021				04/01/2021				04/01/2021				04/01/2021				03/31/2021				03/31/2021			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																													
4:2 FTS	-	ND	4.27	8.58	U	ND	4.27	8.51	U	ND	4.17	8.36	U	ND	4.42	8.84	U	ND	4.27	8.57	U	ND	4.13	8.29	U	ND	4.20	8.42	U
6:2 FTS	-	ND	4.27	8.58	U	ND	4.27	8.51	U	ND	4.17	8.36	U	ND	4.42	8.84	U	ND	4.27	8.57	U	ND	4.13	8.29	U	ND	4.20	8.42	U
8:2 FTS	-	ND	4.27	8.58	U	ND	4.27	8.51	U	ND	4.17	8.36	U	ND	4.42	8.84	U	ND	4.27	8.57	U	ND	4.13	8.29	U	ND	4.20	8.42	U
FOSA	-	ND	4.27	8.58	UJ	ND	4.27	8.51	UJ	ND	4.17	8.36	UJ	ND	4.42	8.84	U	**2.75**	4.27	8.57	J	ND	4.13	8.29	U	ND	4.20	8.42	UJ
NEtFOSAA	-	ND	4.27	8.58	U	ND	4.27	8.51	U	ND	4.17	8.36	U	ND	4.42	8.84	U	ND	4.27	8.57	U	ND	4.13	8.29	U	ND	4.20	8.42	U
NMeFOSAA	-	ND	4.27	8.58	U	ND	4.27	8.51	U	ND	4.17	8.36	U	ND	4.42	8.84	U	ND	4.27	8.57	U	ND	4.13	8.29	U	ND	4.20	8.42	U
PFBA	-	ND	4.27	8.58	U	**5.98**	4.27	8.51	J	**30.0**	4.17	8.36		**4.92**	4.42	8.84	J	**126**	4.27	8.57		-	-	-	R	**19.7**	4.20	8.42	J
PFBS	600	ND	4.27	8.58	U	**6.74**	4.27	8.51	J	**49.2**	4.17	8.36		**4.57**	4.42	8.84	J	**190**	4.27	8.57		**53.6**	4.13	8.29		**54.2**	4.20	8.42	
PFDA	-	ND	4.27	8.58	U	ND	4.27	8.51	U	ND	4.17	8.36	U	ND	4.42	8.84	U	ND	4.27	8.57	U	ND	4.13	8.29	U	ND	4.20	8.42	U
PFDoA	-	ND	4.27	8.58	U	ND	4.27	8.51	U	ND	4.17	8.36	U	ND	4.42	8.84	U	ND	4.27	8.57	U	ND	4.13	8.29	U	ND	4.20	8.42	U
PFDS	-	ND	4.27	8.58	U	ND	4.27	8.51	**U**	ND	4.17	8.36	U	ND	4.42	8.84	U	ND	4.27	8.57	U	ND	4.13	8.29	U	ND	4.20	8.42	U
PFHpA	-	ND	4.27	8.58	U	**4.21**	4.27	8.51	J	**21.2**	4.17	8.36		**5.23**	4.42	8.84	J	**95.2**	4.27	8.57		**19.3**	4.13	8.29		**18.7**	4.20	8.42	
PFHpS	-	ND	4.27	8.58	U	**2.91**	4.27	8.51	J	**6.69**	4.17	8.36	J	ND	4.42	8.84	U	**25.7**	4.27	8.57		**6.10**	4.13	8.29	J	**6.51**	4.20	8.42	J
PFHxA	-	ND	4.27	8.58	U	**56.3**	4.27	8.51		**475**	4.17	8.36		**60.9**	4.42	8.84		**1910**	4.27	8.57		**567**	4.13	8.29		**546**	4.20	8.42	
PFHxS	-	ND	4.27	8.58	U	**304**	4.27	8.51		**2550**	4.17	8.36		**187**	4.42	8.84		**7710**	21.4	42.8		**2710**	4.13	8.29		**2850**	4.20	8.42	
PFNA	-	ND	4.27	8.58	U	ND	4.27	8.51	U	ND	4.17	8.36	U	ND	4.42	8.84	U	**3.82**	4.27	8.57	J	ND	4.13	8.29	U	ND	4.20	8.42	U
PFNS	-	ND	4.27	8.58	U	ND	4.27	8.51	U	ND	4.17	8.36	U	ND	4.42	8.84	U	ND	4.27	8.57	U	ND	4.13	8.29	U	ND	4.20	8.42	U
PFOA	40	ND	4.27	8.58	U	**100**	4.27	8.51		**417**	4.17	8.36		**186**	4.42	8.84		**2500**	4.27	8.57		**234**	4.13	8.29		**221**	4.20	8.42	
PFOS	40	ND	4.27	8.58	U	**143**	4.27	8.51		**76.7**	4.17	8.36		**16.4**	4.42	8.84		**608**	4.27	8.57		**102**	4.13	8.29		**101**	4.20	8.42	
PFPeA	-	ND	4.27	8.58	U	**9.91**	4.27	8.51		**72.9**	4.17	8.36		**9.60**	4.42	8.84		**327**	4.27	8.57		**95.0**	4.13	8.29	J	**86.4**	4.20	8.42	J
PFPeS	-	ND	4.27	8.58	U	**3.02**	4.27	8.51	J	**39.7**	4.17	8.36		**2.50**	4.42	8.84	J	**140**	4.27	8.57		**52.4**	4.13	8.29		**49.7**	4.20	8.42	
PFTeDA	-	ND	4.27	8.58	U	ND	4.27	8.51	U	ND	4.17	8.36	U	ND	4.42	8.84	U	ND	4.27	8.57	U	ND	4.13	8.29	U	ND	4.20	8.42	U
PFTrDA	-	ND	4.27	8.58	U	ND	4.27	8.51	U	ND	4.17	8.36	U	ND	4.42	8.84	U	ND	4.27	8.57	U	ND	4.13	8.29	U	ND	4.20	8.42	U
PFUnDA	-	ND	4.27	8.58	U	ND	4.27	8.51	U	ND	4.17	8.36	U	ND	4.42	8.84	U	ND	4.27	8.57	U	ND	4.13	8.29	U	ND	4.20	8.42	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

Table 10
PFAS in Groundwater Samples
AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)
Hanscom AFB

	Sample ID	P01-2S-GW-P2				RAP1-1R-GW-P2				RAP1-1R-GW-P2-DUP				RAP1-1T-GW-P2				RAP1-4RA-GW-P2				RAP1-4S-GW-P2				RAP1-6R-GW-P2			
	Sample Date	03/31/2021				04/02/2021				04/02/2021				04/02/2021				03/31/2021				03/31/2021				03/31/2021			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																													
4:2 FTS	-	ND	4.17	8.33	U	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	ND	4.10	8.17	U	ND	4.24	8.50	U	ND	4.35	8.70	U
6:2 FTS	-	ND	4.17	8.33	U	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	ND	4.10	8.17	U	ND	4.24	8.50	U	ND	4.35	8.70	U
8:2 FTS	-	ND	4.17	8.33	U	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	ND	4.10	8.17	U	ND	4.24	8.50	U	ND	4.35	8.70	U
FOSA	-	ND	4.17	8.33	UJ	ND	4.24	8.51	UJ	ND	4.17	8.36	UJ	ND	4.20	8.42	UJ	ND	4.10	8.17	UJ	ND	4.24	8.50	U	ND	4.35	8.70	UJ
NEtFOSAA	-	ND	4.17	8.33	U	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	ND	4.10	8.17	U	ND	4.24	8.50	U	ND	4.35	8.70	U
NMeFOSAA	-	ND	4.17	8.33	U	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	ND	4.10	8.17	U	ND	4.24	8.50	U	ND	4.35	8.70	U
PFBA	-	ND	4.17	8.33	U	**2.19**	4.24	8.51	J	**2.51**	4.17	8.36	J	ND	4.20	8.42	U	**3.90**	4.10	8.17	J	**6.32**	4.24	8.50	J	**229**	4.35	8.70	
PFBS	600	**2.93**	4.17	8.33	J	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	**7.15**	4.10	8.17	J	ND	4.24	8.50	U	**299**	4.35	8.70	
PFDA	-	ND	4.17	8.33	U	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	ND	4.10	8.17	U	ND	4.24	8.50	U	ND	4.35	8.70	U
PFDoA	-	ND	4.17	8.33	U	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	ND	4.10	8.17	U	ND	4.24	8.50	U	ND	4.35	8.70	U
PFDS	-	ND	4.17	8.33	U	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	ND	4.10	8.17	U	ND	4.24	8.50	U	ND	4.35	8.70	U
PFHpA	-	ND	4.17	8.33	U	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	**3.24**	4.10	8.17	J	ND	4.24	8.50	U	**301**	4.35	8.70	
PFHpS	-	ND	4.17	8.33	U	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	ND	4.10	8.17	U	ND	4.24	8.50	U	**37.9**	4.35	8.70	
PFHxA	-	ND	4.17	8.33	U	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	**46.4**	4.10	8.17		**3.24**	4.24	8.50	J	**4300**	4.35	8.70	
PFHxS	-	**120**	4.17	8.33		**7.39**	4.24	8.51	J	**8.65**	4.17	8.36		**7.15**	4.20	8.42	J	**294**	4.10	8.17		**18.1**	4.24	8.50		**10700**	21.7	43.5	
PFNA	-	ND	4.17	8.33	U	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	ND	4.10	8.17	U	ND	4.24	8.50	U	**7.07**	4.35	8.70	J
PFNS	-	ND	4.17	8.33	U	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	ND	4.10	8.17	U	ND	4.24	8.50	U	ND	4.35	8.70	U
PFOA	40	**4.79**	4.17	8.33	J	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	**56.9**	4.10	8.17		**6.19**	4.24	8.50	J	**8050**	21.7	43.5	
PFOS	40	**5.27**	4.17	8.33	J	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	**19.2**	4.10	8.17		**18.2**	4.24	8.50		**524**	4.35	8.70	
PFPeA	-	ND	4.17	8.33	U	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	**9.00**	4.10	8.17		ND	4.24	8.50	U	**649**	4.35	8.70	
PFPeS	-	ND	4.17	8.33	U	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	**4.82**	4.10	8.17	J	ND	4.24	8.50	U	**248**	4.35	8.70	
PFTeDA	-	ND	4.17	8.33	U	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	ND	4.10	8.17	U	ND	4.24	8.50	U	ND	4.35	8.70	U
PFTrDA	-	ND	4.17	8.33	U	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	ND	4.10	8.17	U	ND	4.24	8.50	U	ND	4.35	8.70	U
PFUnDA	-	ND	4.17	8.33	U	ND	4.24	8.51	U	ND	4.17	8.36	U	ND	4.20	8.42	U	ND	4.10	8.17	U	ND	4.24	8.50	U	ND	4.35	8.70	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

Table 10
PFAS in Groundwater Samples
AFFF Area 2 (Former FTA II) and AFFF Area 3 (Outfall 001)
Hanscom AFB

	Sample ID	RAP1-6S-GW-P2				RAP1-6T-GW-P2				RAP2-1R-GW-P2				RAP2-1T-GW-P2			
	Sample Date	03/31/2021				03/31/2021				04/01/2021				04/01/2021			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																	
4:2 FTS	-	ND	4.35	8.70	U	ND	4.27	8.53	U	ND	4.17	8.34	U	ND	4.17	8.32	U
6:2 FTS	-	ND	4.35	8.70	U	ND	4.27	8.53	U	ND	4.17	8.34	U	ND	4.17	8.32	U
8:2 FTS	-	ND	4.35	8.70	U	ND	4.27	8.53	U	ND	4.17	8.34	U	ND	4.17	8.32	U
FOSA	-	ND	4.35	8.70	UJ	ND	4.27	8.53	UJ	ND	4.17	8.34	U	ND	4.17	8.32	UJ
NEtFOSAA	-	ND	4.35	8.70	U	ND	4.27	8.53	U	ND	4.17	8.34	U	ND	4.17	8.32	U
NMeFOSAA	-	ND	4.35	8.70	U	ND	4.27	8.53	U	ND	4.17	8.34	U	ND	4.17	8.32	U
PFBA	-	**29.7**	4.35	8.70		**110**	4.27	8.53		ND	4.17	8.34	U	**3.53**	4.17	8.32	J
PFBS	600	**39.6**	4.35	8.70		**163**	4.27	8.53		ND	4.17	8.34	U	**4.28**	4.17	8.32	J
PFDA	-	ND	4.35	8.70	U	ND	4.27	8.53	U	ND	4.17	8.34	U	ND	4.17	8.32	U
PFDoA	-	ND	4.35	8.70	U	ND	4.27	8.53	U	ND	4.17	8.34	U	ND	4.17	8.32	U
PFDS	-	ND	4.35	8.70	U	ND	4.27	8.53	U	ND	4.17	8.34	U	ND	4.17	8.32	U
PFHpA	-	**38.2**	4.35	8.70		**59.6**	4.27	8.53		ND	4.17	8.34	U	**5.11**	4.17	8.32	J
PFHpS	-	**4.76**	4.35	8.70	J	**21.8**	4.27	8.53		ND	4.17	8.34	U	ND	4.17	8.32	U
PFHxA	-	**590**	4.35	8.70		**1580**	4.27	8.53		ND	4.17	8.34	U	**60.8**	4.17	8.32	
PFHxS	-	**1880**	4.35	8.70		**5690**	21.4	42.6		ND	4.17	8.34	U	**124**	4.17	8.32	
PFNA	-	ND	4.35	8.70	U	**2.87**	4.27	8.53	J	ND	4.17	8.34	U	ND	4.17	8.32	U
PFNS	-	ND	4.35	8.70	U	ND	4.27	8.53	U	ND	4.17	8.34	U	ND	4.17	8.32	U
PFOA	40	**1570**	4.35	8.70		**1200**	4.27	8.53		ND	4.17	8.34	U	**163**	4.17	8.32	
PFOS	40	**18.4**	4.35	8.70		**544**	4.27	8.53		ND	4.17	8.34	U	**5.96**	4.17	8.32	J
PFPeA	-	**76.9**	4.35	8.70		**271**	4.27	8.53		ND	4.17	8.34	U	**8.74**	4.17	8.32	
PFPeS	-	**32.8**	4.35	8.70		**108**	4.27	8.53		ND	4.17	8.34	U	**2.73**	4.17	8.32	J
PFTeDA	-	ND	4.35	8.70	U	ND	4.27	8.53	U	ND	4.17	8.34	U	ND	4.17	8.32	U
PFTrDA	-	ND	4.35	8.70	U	ND	4.27	8.53	U	ND	4.17	8.34	U	ND	4.17	8.32	U
PFUnDA	-	ND	4.35	8.70	U	ND	4.27	8.53	U	ND	4.17	8.34	U	ND	4.17	8.32	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

References

a. Office of the Assistant Secretary of Defense (OSD) PFAS Memo dated September 15, 2021.

Massachusettes Groundwater Standard
310 CMR 40.0974(2), Table 1
PFAS: 20 ng/L
Where the PFAS concentration is derived as the sum of the concentrations of PFDA, PFHpA, PFHxS, PFNA, PFOA and PFOS

Interpreted Qualifiers

J = Estimated concentration
J- = Estimated concentration, biased low
J+ = Estimated concentration, biased high
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)
UJ = The analyte was not detected at a level greater than or equal to the adjusted DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.
UX/X = The presence or absence of the analyte cannot be substantiated. Acceptance or rejection of the data should be decided by the project team, but exclusion of the data is recommended.

Acronyms and Abbreviations

DUP	duplicate
GW	groundwater
HQ	hazard quotient
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
LOQ	limit of quantitation
QSM	Quality Systems Manual
Qual	interpreted qualifier
USEPA	United States Environmental Protection Agency
ng/l	nanograms per liter
-	Not applicable
ND	analyte not detected above the LOD
R	Result Rejected.

4:2 FTS	4:2 fluorotelomer sulfonate
6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
FOSA	perfluorooctane sulfonamide
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFDS	perfluorodecane sulfonic acid
PFHpA	perfluoroheptanoic acid
PFHpS	perfluoroheptane sulfonic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFNS	perfluorononane sulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PFPeA	perfluoropentanoic acid
PFPeS	perfluoropentane sulfonic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Table 11
PFAS in Groundwater Samples
AFFF Area 4 (Motor Pool Release Area)
Hanscom AFB

Sample ID		CH-106-GW-P1				CH-107-GW-P1				HB-11-GW-P1				MW6-116T-GW-P1				MW6-116T-GW-P1-DUP				MW6-116U-GW-P1				MW6-117T-GW-P1			
Sample Date		08/25/2020				08/25/2020				08/24/2020				08/25/2020				08/25/2020				08/25/2020				08/25/2020			
Analyte	**OSD SL Tap Water (a)**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**	**Result**	**LOD**	**LOQ**	**Qual**
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																													
4:2 FTS	-	ND	4.50	8.98	U	ND	4.39	8.74	U	ND	4.72	9.40	U	ND	4.42	8.85	U	ND	4.55	9.09	U	ND	4.67	9.30	U	ND	4.50	8.99	U
6:2 FTS	-	**4.50**	4.50	8.98	J	**111**	4.39	8.74		ND	4.72	9.40	U	**8.47**	4.42	8.85	J	**8.22**	4.55	9.09	J	ND	4.67	9.30	U	**95.9**	4.50	8.99	
8:2 FTS	-	ND	4.50	8.98	U	ND	4.39	8.74	U	ND	4.72	9.40	U	ND	4.42	8.85	U	ND	4.55	9.09	U	ND	4.67	9.30	U	**3.06**	4.50	8.99	J
FOSA	-	**4.79**	4.50	8.98	J	ND	4.39	8.74	U	ND	4.72	9.40	U	ND	4.42	8.85	U	ND	4.55	9.09	U	ND	4.67	9.30	U	ND	4.50	8.99	U
NEtFOSAA	-	ND	4.50	8.98	U	ND	4.39	8.74	U	ND	4.72	9.40	U	ND	4.42	8.85	U	ND	4.55	9.09	U	ND	4.67	9.30	U	ND	4.50	8.99	U
NMeFOSAA	-	ND	4.50	8.98	U	ND	4.39	8.74	U	ND	4.72	9.40	U	ND	4.42	8.85	U	ND	4.55	9.09	U	ND	4.67	9.30	U	ND	4.50	8.99	U
PFBA	-	**17.7**	4.50	8.98		**49.5**	4.39	8.74		**8.80**	4.72	9.40	J	**21.9**	4.42	8.85		**21.9**	4.55	9.09		**14.2**	4.67	9.30		**63.9**	4.50	8.99	
PFBS	600	**3.92**	4.50	8.98	J	**144**	4.39	8.74		**2.89**	4.72	9.40	J	**12.3**	4.42	8.85		**11.0**	4.55	9.09		ND	4.67	9.30	U	**20.4**	4.50	8.99	
PFDA	-	ND	4.50	8.98	U	ND	4.39	8.74	U	ND	4.72	9.40	U	ND	4.42	8.85	U	ND	4.55	9.09	U	ND	4.67	9.30	U	ND	4.50	8.99	U
PFDoA	-	ND	4.50	8.98	U	ND	4.39	8.74	U	ND	4.72	9.40	U	ND	4.42	8.85	U	ND	4.55	9.09	U	ND	4.67	9.30	U	ND	4.50	8.99	U
PFDS	-	ND	4.50	8.98	U	ND	4.39	8.74	U	ND	4.72	9.40	U	ND	4.42	8.85	U	ND	4.55	9.09	U	ND	4.67	9.30	U	ND	4.50	8.99	U
PFHpA	-	**11.3**	4.50	8.98	J	**53.4**	4.39	8.74		**8.00**	4.72	9.40	J	**28.1**	4.42	8.85		**26.4**	4.55	9.09		**2.89**	4.67	9.30	J	**96.0**	4.50	8.99	
PFHpS	-	**2.62**	4.50	8.98	J	**97.6**	4.39	8.74		ND	4.72	9.40	U	**3.26**	4.42	8.85	J	**3.26**	4.55	9.09	J	ND	4.67	9.30	U	**7.06**	4.50	8.99	J
PFHxA	-	**21.6**	4.50	8.98		**283**	4.39	8.74		**19.5**	4.72	9.40		**48.2**	4.42	8.85		**45.5**	4.55	9.09		**7.39**	4.67	9.30	J	**162**	4.50	8.99	
PFHxS	-	**82.3**	4.50	8.98		**1680**	4.39	8.74		**28.3**	4.72	9.40		**122**	4.42	8.85		**108**	4.55	9.09		**48.3**	4.67	9.30		**212**	4.50	8.99	
PFNA	-	**7.58**	4.50	8.98	J	**7.85**	4.39	8.74	J	ND	4.72	9.40	U	**8.48**	4.42	8.85	J	**7.97**	4.55	9.09	J	ND	4.67	9.30	U	**12.8**	4.50	8.99	
PFNS	-	ND	4.50	8.98	U	ND	4.39	8.74	U	ND	4.72	9.40	U	ND	4.42	8.85	U	ND	4.55	9.09	U	ND	4.67	9.30	U	ND	4.50	8.99	U
PFOA	40	**16.6**	4.50	8.98		**147**	4.39	8.74		**15.4**	4.72	9.40		**36.4**	4.42	8.85		**33.4**	4.55	9.09		**7.98**	4.67	9.30	J	**104**	4.50	8.99	
PFOS	40	**143**	4.50	8.98		**3360**	4.39	8.74		**33.7**	4.72	9.40		**189**	4.42	8.85		**177**	4.55	9.09		**115**	4.67	9.30		**251**	4.50	8.99	
PFPeA	-	**18.8**	4.50	8.98		**108**	4.39	8.74		**19.9**	4.72	9.40		**47.2**	4.42	8.85		**48.5**	4.55	9.09		**5.01**	4.67	9.30	J	**221**	4.50	8.99	
PFPeS	-	**2.69**	4.50	8.98	J	**213**	4.39	8.74		**2.81**	4.72	9.40	J	**10.9**	4.42	8.85		**10.5**	4.55	9.09		ND	4.67	9.30	U	**25.7**	4.50	8.99	
PFTeDA	-	ND	4.50	8.98	U	ND	4.39	8.74	U	ND	4.72	9.40	U	ND	4.42	8.85	U	ND	4.55	9.09	U	ND	4.67	9.30	U	ND	4.50	8.99	U
PFTrDA	-	ND	4.50	8.98	U	ND	4.39	8.74	U	ND	4.72	9.40	U	ND	4.42	8.85	U	ND	4.55	9.09	U	ND	4.67	9.30	U	ND	4.50	8.99	U
PFUnDA	-	ND	4.50	8.98	U	ND	4.39	8.74	U	ND	4.72	9.40	U	ND	4.42	8.85	U	ND	4.55	9.09	U	ND	4.67	9.30	U	ND	4.50	8.99	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

Table 11
PFAS in Groundwater Samples
AFFF Area 4 (Motor Pool Release Area)
Hanscom AFB

	Sample ID	MW6-117U-GW-P1				MW-07-GW-P1				MW-10-GW-P1				MW13-3-GW-P1			
	Sample Date	08/25/2020				08/24/2020				08/26/2020				08/24/2020			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																	
4:2 FTS	-	ND	4.50	9.03	U	ND	4.67	9.33	U	ND	4.67	9.34	U	ND	4.67	9.35	U
6:2 FTS	-	ND	4.50	9.03	U	ND	4.67	9.33	U	**581**	4.67	9.34		**314**	4.67	9.35	J
8:2 FTS	-	ND	4.50	9.03	U	ND	4.67	9.33	U	**4.28**	4.67	9.34	J	**34.8**	4.67	9.35	J
FOSA	-	ND	4.50	9.03	U	ND	4.67	9.33	U	ND	4.67	9.34	U	ND	4.67	9.35	U
NEtFOSAA	-	ND	4.50	9.03	U	ND	4.67	9.33	U	ND	4.67	9.34	U	ND	4.67	9.35	U
NMeFOSAA	-	ND	4.50	9.03	U	ND	4.67	9.33	U	ND	4.67	9.34	U	ND	4.67	9.35	U
PFBA	-	**7.36**	4.50	9.03	J	**11.6**	4.67	9.33		**263**	4.67	9.34		**146**	4.67	9.35	
PFBS	600	**3.59**	4.50	9.03	J	**6.29**	4.67	9.33	J	**76.4**	4.67	9.34		**276**	4.67	9.35	J-
PFDA	-	ND	4.50	9.03	U	ND	4.67	9.33	U	ND	4.67	9.34	U	ND	4.67	9.35	U
PFDoA	-	ND	4.50	9.03	U	ND	4.67	9.33	U	ND	4.67	9.34	U	ND	4.67	9.35	U
PFDS	-	ND	4.50	9.03	U	ND	4.67	9.33	U	ND	4.67	9.34	U	ND	4.67	9.35	U
PFHpA	-	**4.07**	4.50	9.03	J	**21.1**	4.67	9.33		**279**	4.67	9.34		**155**	4.67	9.35	J
PFHpS	-	ND	4.50	9.03	U	ND	4.67	9.33	U	**22.6**	4.67	9.34		**52.6**	4.67	9.35	J
PFHxA	-	**8.18**	4.50	9.03	J	**22.8**	4.67	9.33		**1270**	4.67	9.34		**628**	4.67	9.35	
PFHxS	-	**29.7**	4.50	9.03		**165**	4.67	9.33		**1920**	4.67	9.34		**1570**	4.67	9.35	
PFNA	-	**2.57**	4.50	9.03	J	ND	4.67	9.33	U	**64.4**	4.67	9.34		**4.91**	4.67	9.35	J
PFNS	-	ND	4.50	9.03	U	ND	4.67	9.33	U	ND	4.67	9.34	U	ND	4.67	9.35	U
PFOA	40	**9.34**	4.50	9.03		**36.3**	4.67	9.33		**239**	4.67	9.34		**332**	4.67	9.35	J
PFOS	40	**62.4**	4.50	9.03		ND	4.67	9.33	U	**1060**	4.67	9.34		**1460**	4.67	9.35	
PFPeA	-	**7.13**	4.50	9.03	J	**25.1**	4.67	9.33		**1680**	4.67	9.34		**444**	4.67	9.35	
PFPeS	-	**2.69**	4.50	9.03	J	**6.40**	4.67	9.33	J	**90.3**	4.67	9.34		**253**	4.67	9.35	J
PFTeDA	-	ND	4.50	9.03	U	ND	4.67	9.33	U	ND	4.67	9.34	U	ND	4.67	9.35	U
PFTrDA	-	ND	4.50	9.03	U	ND	4.67	9.33	U	ND	4.67	9.34	U	ND	4.67	9.35	U
PFUnDA	-	ND	4.50	9.03	U	ND	4.67	9.33	U	ND	4.67	9.34	U	ND	4.67	9.35	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

Table 11
PFAS in Groundwater Samples
AFFF Area 4 (Motor Pool Release Area)
Hanscom AFB

	Sample ID	CH-106-GW-P2				CH-106-GW-P2-DUP				CH-107-GW-P2				HB-11-GW-P2				MW6-116T-GW-P2				MW6-116U-GW-P2				MW6-117T-GW-P2			
	Sample Date	04/09/2021				04/09/2021				04/09/2021				04/07/2021				04/07/2021				04/07/2021				04/07/2021			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																													
4:2 FTS	-	ND	4.17	8.32	U	ND	3.97	7.96	U	ND	4.20	8.42	U	ND	4.27	8.56	U	ND	4.24	8.47	U	ND	4.42	8.86	U	ND	4.42	8.82	U
6:2 FTS	-	ND	4.17	8.32	U	ND	3.97	7.96	U	**546**	4.20	8.42		ND	4.27	8.56	U	**11.3**	4.24	8.47		ND	4.42	8.86	U	**70.3**	4.42	8.82	
8:2 FTS	-	ND	4.17	8.32	U	ND	3.97	7.96	U	**25.3**	4.20	8.42		ND	4.27	8.56	U	ND	4.24	8.47	U	ND	4.42	8.86	U	ND	4.42	8.82	U
FOSA	-	**3.63**	4.17	8.32	J	**5.28**	3.97	7.96	J	ND	4.20	8.42	UJ	ND	4.27	8.56	UJ	ND	4.24	8.47	U	ND	4.42	8.86	U	ND	4.42	8.82	UJ
NEtFOSAA	-	ND	4.17	8.32	U	ND	3.97	7.96	U	ND	4.20	8.42	UJ	ND	4.27	8.56	U	ND	4.24	8.47	U	ND	4.42	8.86	U	ND	4.42	8.82	U
NMeFOSAA	-	ND	4.17	8.32	U	ND	3.97	7.96	U	ND	4.20	8.42	U	ND	4.27	8.56	U	ND	4.24	8.47	U	ND	4.42	8.86	U	ND	4.42	8.82	U
PFBA	-	**12.8**	4.17	8.32		**13.1**	3.97	7.96		**183**	4.20	8.42		**43.6**	4.27	8.56		**19.6**	4.24	8.47		**10.4**	4.42	8.86		**58.4**	4.42	8.82	
PFBS	600	**4.83**	4.17	8.32	J	**3.90**	3.97	7.96	J	**848**	4.20	8.42		**2.31**	4.27	8.56	J	**12.4**	4.24	8.47		ND	4.42	8.86	U	**17.9**	4.42	8.82	
PFDA	-	ND	4.17	8.32	U	ND	3.97	7.96	U	ND	4.20	8.42	U	ND	4.27	8.56	U	ND	4.24	8.47	U	ND	4.42	8.86	U	ND	4.42	8.82	U
PFDoA	-	ND	4.17	8.32	U	ND	3.97	7.96	U	ND	4.20	8.42	U	ND	4.27	8.56	U	ND	4.24	8.47	U	ND	4.42	8.86	U	ND	4.42	8.82	U
PFDS	-	ND	4.17	8.32	U	ND	3.97	7.96	U	ND	4.20	8.42	U	ND	4.27	8.56	U	ND	4.24	8.47	U	ND	4.42	8.86	U	ND	4.42	8.82	U
PFHpA	-	**10.4**	4.17	8.32		**11.4**	3.97	7.96		**484**	4.20	8.42		**37.8**	4.27	8.56		**26.4**	4.24	8.47		**2.85**	4.42	8.86	J	**100**	4.42	8.82	
PFHpS	-	ND	4.17	8.32	U	ND	3.97	7.96	U	**452**	84.0	168		ND	4.27	8.56	U	**3.04**	4.24	8.47	J	ND	4.42	8.86	U	**4.66**	4.42	8.82	J
PFHxA	-	**16.0**	4.17	8.32		**16.8**	3.97	7.96		**2240**	4.20	8.42		**128**	4.27	8.56		**44.7**	4.24	8.47		**5.33**	4.42	8.86	J	**156**	4.42	8.82	
PFHxS	-	**76.5**	4.17	8.32		**83.8**	3.97	7.96		**24700**	84.0	168		**23.2**	4.27	8.56		**93.5**	4.24	8.47		**41.9**	4.42	8.86		**185**	4.42	8.82	
PFNA	-	**7.53**	4.17	8.32	J	**7.70**	3.97	7.96	J	**195**	4.20	8.42		ND	4.27	8.56	U	**6.98**	4.24	8.47	J	ND	4.42	8.86	U	**11.7**	4.42	8.82	
PFNS	-	ND	4.17	8.32	U	ND	3.97	7.96	U	ND	4.20	8.42	U	ND	4.27	8.56	U	ND	4.24	8.47	U	ND	4.42	8.86	U	ND	4.42	8.82	U
PFOA	40	**17.9**	4.17	8.32		**19.7**	3.97	7.96		**963**	4.20	8.42		**8.66**	4.27	8.56		**33.0**	4.24	8.47		**7.08**	4.42	8.86	J	**90.7**	4.42	8.82	
PFOS	40	**122**	4.17	8.32		**135**	3.97	7.96		**31300**	84.0	168		**26.7**	4.27	8.56		**185**	4.24	8.47		**29.8**	4.42	8.86		**222**	4.42	8.82	
PFPeA	-	**16.3**	4.17	8.32		**16.2**	3.97	7.96		**813**	4.20	8.42		**201**	4.27	8.56		**45.0**	4.24	8.47		**2.78**	4.42	8.86	J	**198**	4.42	8.82	
PFPeS	-	**2.79**	4.17	8.32	J	**2.58**	3.97	7.96	J	**1550**	4.20	8.42		**3.27**	4.27	8.56	J	**11.4**	4.24	8.47		ND	4.42	8.86	U	**25.4**	4.42	8.82	
PFTeDA	-	ND	4.17	8.32	U	ND	3.97	7.96	U	ND	4.20	8.42	UJ	ND	4.27	8.56	U	ND	4.24	8.47	U	ND	4.42	8.86	U	ND	4.42	8.82	U
PFTrDA	-	ND	4.17	8.32	U	ND	3.97	7.96	U	ND	4.20	8.42	U	ND	4.27	8.56	U	ND	4.24	8.47	U	ND	4.42	8.86	U	ND	4.42	8.82	U
PFUnDA	-	ND	4.17	8.32	U	ND	3.97	7.96	U	ND	4.20	8.42	U	ND	4.27	8.56	U	ND	4.24	8.47	U	ND	4.42	8.86	U	ND	4.42	8.82	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

Table 11
PFAS in Groundwater Samples
AFFF Area 4 (Motor Pool Release Area)
Hanscom AFB

	Sample ID	MW6-117U-GW-P2				MW-07-GW-P2				MW-10-GW-P2				MW13-3-GW-P2			
	Sample Date	04/07/2021				04/07/2021				04/09/2021				04/09/2021			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																	
4:2 FTS	-	ND	4.35	8.68	U	ND	4.20	8.39	U	ND	4.20	8.37	U	ND	4.27	8.54	U
6:2 FTS	-	ND	4.35	8.68	U	ND	4.20	8.39	U	ND	4.20	8.37	U	**1130**	4.27	8.54	
8:2 FTS	-	ND	4.35	8.68	U	ND	4.20	8.39	U	ND	4.20	8.37	U	**99.0**	4.27	8.54	
FOSA	-	ND	4.35	8.68	UJ	ND	4.20	8.39	UJ	ND	4.20	8.37	UJ	ND	4.27	8.54	UJ
NEtFOSAA	-	ND	4.35	8.68	U	ND	4.20	8.39	U	ND	4.20	8.37	U	ND	4.27	8.54	U
NMeFOSAA	-	ND	4.35	8.68	U	ND	4.20	8.39	U	ND	4.20	8.37	U	ND	4.27	8.54	U
PFBA	-	**2.20**	4.35	8.68	J	ND	4.20	8.39	U	**51.8**	4.20	8.37		**194**	4.27	8.54	
PFBS	600	**3.17**	4.35	8.68	J	**2.15**	4.20	8.39	J	**74.1**	4.20	8.37		**269**	4.27	8.54	
PFDA	-	ND	4.35	8.68	U	ND	4.20	8.39	U	ND	4.20	8.37	U	ND	4.27	8.54	U
PFDoA	-	ND	4.35	8.68	U	ND	4.20	8.39	U	ND	4.20	8.37	U	ND	4.27	8.54	U
PFDS	-	ND	4.35	8.68	U	ND	4.20	8.39	U	ND	4.20	8.37	U	ND	4.27	8.54	U
PFHpA	-	ND	4.35	8.68	U	ND	4.20	8.39	U	**32.8**	4.20	8.37		**263**	4.27	8.54	
PFHpS	-	ND	4.35	8.68	U	ND	4.20	8.39	U	ND	4.20	8.37	U	**174**	4.27	8.54	
PFHxA	-	**3.21**	4.35	8.68	J	ND	4.20	8.39	U	**127**	4.20	8.37		**998**	4.27	8.54	
PFHxS	-	**24.1**	4.35	8.68		**27.7**	4.20	8.39		**222**	4.20	8.37		**2910**	4.27	8.54	
PFNA	-	ND	4.35	8.68	U	ND	4.20	8.39	U	**3.30**	4.20	8.37	J	**7.69**	4.27	8.54	J
PFNS	-	ND	4.35	8.68	U	ND	4.20	8.39	U	ND	4.20	8.37	U	ND	4.27	8.54	U
PFOA	40	ND	4.35	8.68	U	ND	4.20	8.39	U	**35.5**	4.20	8.37		**1200**	4.27	8.54	
PFOS	40	**7.62**	4.35	8.68	J	ND	4.20	8.39	U	**30.6**	4.20	8.37		**6860**	21.4	42.7	
PFPeA	-	**2.95**	4.35	8.68	J	ND	4.20	8.39	U	**94.4**	4.20	8.37		**750**	4.27	8.54	
PFPeS	-	**3.49**	4.35	8.68	J	ND	4.20	8.39	U	**29.9**	4.20	8.37		**341**	4.27	8.54	
PFTeDA	-	ND	4.35	8.68	U	ND	4.20	8.39	U	ND	4.20	8.37	U	ND	4.27	8.54	U
PFTrDA	-	ND	4.35	8.68	U	ND	4.20	8.39	U	ND	4.20	8.37	U	ND	4.27	8.54	U
PFUnDA	-	ND	4.35	8.68	U	ND	4.20	8.39	U	ND	4.20	8.37	U	ND	4.27	8.54	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

Table 11
PFAS in Groundwater Samples
AFFF Area 4 (Motor Pool Release Area)
Hanscom AFB

	Sample ID	A4-MW1S-GW-P1				A4-MW1S-GW-P1-DUP				A4-MW1T-GW-P1				A4-MW2S-GW-P1				A4-MW2T-GW-P1			
	Sample Date	08/12/2021				08/12/2021				08/12/2021				08/12/2021				08/11/2021			
Analyte	OSD SL Tap Water (a)	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/l)																					
4:2 FTS	-	ND	4.39	8.77	U	ND	4.46	8.96	U	ND	4.42	8.82	U	ND	4.39	8.80	U	ND	4.39	8.78	U
6:2 FTS	-	ND	4.39	8.77	U	ND	4.46	8.96	U	ND	4.42	8.82	U	ND	4.39	8.80	U	ND	4.39	8.78	U
8:2 FTS	-	ND	4.39	8.77	U	ND	4.46	8.96	U	ND	4.42	8.82	U	ND	4.39	8.80	U	ND	4.39	8.78	U
FOSA	-	ND	4.39	8.77	U	ND	4.46	8.96	UJ	ND	4.42	8.82	U	ND	4.39	8.80	U	ND	4.39	8.78	U
NEtFOSAA	-	ND	4.39	8.77	U	ND	4.46	8.96	U	ND	4.42	8.82	U	ND	4.39	8.80	U	ND	4.39	8.78	U
NMeFOSAA	-	ND	4.39	8.77	U	ND	4.46	8.96	U	ND	4.42	8.82	U	ND	4.39	8.80	U	ND	4.39	8.78	U
PFBA	-	**6.94**	4.39	8.77	J	**7.16**	4.46	8.96	J	ND	4.42	8.82	U	**63.7**	4.39	8.80		**8.36**	4.39	8.78	J
PFBS	600	**4.84**	4.39	8.77	J	ND	4.46	8.96	U	ND	4.42	8.82	U	ND	4.39	8.80	U	ND	4.39	8.78	U
PFDA	-	ND	4.39	8.77	U	ND	4.46	8.96	U	ND	4.42	8.82	U	ND	4.39	8.80	U	ND	4.39	8.78	U
PFDoA	-	ND	4.39	8.77	U	ND	4.46	8.96	U	ND	4.42	8.82	U	ND	4.39	8.80	U	ND	4.39	8.78	U
PFDS	-	ND	4.39	8.77	U	ND	4.46	8.96	U	ND	4.42	8.82	U	ND	4.39	8.80	U	ND	4.39	8.78	U
PFHpA	-	**6.30**	4.39	8.77	J	**5.74**	4.46	8.96	J	**3.85**	4.42	8.82	J	**8.03**	4.39	8.80	J	**4.07**	4.39	8.78	J
PFHpS	-	ND	4.39	8.77	U	ND	4.46	8.96	U	ND	4.42	8.82	U	ND	4.39	8.80	U	ND	4.39	8.78	U
PFHxA	-	**7.56**	4.39	8.77	J	**7.25**	4.46	8.96	J	**2.57**	4.42	8.82	J	**10.8**	4.39	8.80	J	ND	4.39	8.78	U
PFHxS	-	**63.7**	4.39	8.77		**59.7**	4.46	8.96		**12.3**	4.42	8.82		**33.9**	4.39	8.80		**24.9**	4.39	8.78	
PFNA	-	ND	4.39	8.77	U	ND	4.46	8.96	U	ND	4.42	8.82	U	ND	4.39	8.80	U	ND	4.39	8.78	U
PFNS	-	ND	4.39	8.77	U	ND	4.46	8.96	U	ND	4.42	8.82	U	ND	4.39	8.80	U	ND	4.39	8.78	U
PFOA	40	**5.97**	4.39	8.77	J	**5.47**	4.46	8.96	J	ND	4.42	8.82	U	**9.81**	4.39	8.80		**4.31**	4.39	8.78	J
PFOS	40	**109**	4.39	8.77		**121**	4.46	8.96		ND	4.42	8.82	U	**8.74**	4.39	8.80	J	**35.2**	4.39	8.78	J
PFPeA	-	**9.22**	4.39	8.77		**10.3**	4.46	8.96		**5.14**	4.42	8.82	J	**9.11**	4.39	8.80		**5.36**	4.39	8.78	J
PFPeS	-	**3.10**	4.39	8.77	J	ND	4.46	8.96	U	ND	4.42	8.82	U	ND	4.39	8.80	U	ND	4.39	8.78	U
PFTeDA	-	ND	4.39	8.77	U	ND	4.46	8.96	U	ND	4.42	8.82	U	ND	4.39	8.80	U	ND	4.39	8.78	U
PFTrDA	-	ND	4.39	8.77	U	ND	4.46	8.96	U	ND	4.42	8.82	U	ND	4.39	8.80	U	ND	4.39	8.78	U
PFUnDA	-	ND	4.39	8.77	U	ND	4.46	8.96	U	ND	4.42	8.82	U	ND	4.39	8.80	U	ND	4.39	8.78	U

Grey Fill — Detected concentration exceeded OSD Tap Water SL

References

a. Office of the Assistant Secretary of Defense (OSD) PFAS Memo dated September 15, 2021.

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

J+ = Estimated concentration, biased high

U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)

UJ = The analyte was not detected at a level greater than or equal to the adjusted DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

UX/X = The presence or absence of the analyte cannot be substantiated. Acceptance or rejection of the data should be decided by the project team, but exclusion of the data is recommended.

Massachusetts Groundwater Standard
310 CMR 40.0974(2), Table 1
PFAS: 20 ng/L
Where the PFAS concentration is derived as the sum of the concentrations of PFDA, PFHpA, PFHxS, PFNA, PFOA and PFOS

Acronyms and Abbreviations

DUP	duplicate
GW	groundwater
HQ	hazard quotient
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
LOQ	limit of quantitation
QSM	Quality Systems Manual
Qual	interpreted qualifier
USEPA	United States Environmental Protection Agency
ng/l	nanograms per liter
-	Not applicable
ND	analyte not detected above the LOD

4:2 FTS	4:2 fluorotelomer sulfonate
6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
FOSA	perfluorooctane sulfonamide
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFDS	perfluorodecane sulfonic acid
PFHpA	perfluoroheptanoic acid
PFHpS	perfluoroheptane sulfonic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFNS	perfluorononane sulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PFPeA	perfluoropentanoic acid
PFPeS	perfluoropentane sulfonic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid